

### 3.3.2 Number of Research Papers per Teachers in the Journals during the Academic Year 2016 - 2017

<b>Title of Paper</b>	<b>Name of the Author/s</b>	<b>Department of the Teacher</b>	<b>Name of Journal</b>	<b>ISSN Number</b>
Think Home: A Smart Home as Digital Ecosystem In Circuits and Systems	Dr.M. Venkatesan	CSE	SCIENTIFIC Research Publishing Inc.	2153-1293
Efficient Trajectory Error Detection: Router Group Monitoring With Adaptive Interface Selection Strategy	Dr.M. Venkatesan	CSE	Journal of Computer Science Engineering and Software Testing	2581-6969
ERAM2 - Energy Based Resource Allocation With Minimum Reckon and Maximum Reckon	Dr.M. Venkatesan	CSE	Journal of Advances in Chemistry	2321 - 807X
Router Group Selection Using Bat Algorithm With Bayesian Filter (Babf): An Efficient Trajectory Error Detection	Dr.M. Venkatesan	CSE	Asian Journal of Research in Social Sciences and Humanities	2249-7315
Conceptual Model for Smart Cities For Irrigation and Highway Lamps Using IOT	Dr.M. Venkatesan	CSE	International Journal of Interactive Multimedia and Artificial Intelligence	1989-1660
Reducing Rejected Workflows Using WSHF Algorithm In Cloud	Dr.B.Kalaavathi	CSE	Asian Journal of Research in Social Sciences and Humanities	2249-7315
Multimodal Medical Image Fusion in Non-Subsampled Contourlet Transform Domain	Dr.B.Kalaavathi	CSE	Circuits and Systems	2153-1293 2153-1285
Multilayer Intensive Resource Allocation In Cloud Using Leftist Heaps With VM Migration	Dr.B.Kalaavathi	CSE	International Journal of Printing, Packaging & Allied Sciences	2320-4387
Agerl Based Enhanced Map Reduce Technique In Cloud Scheduling	Dr.B.Kalaavathi	CSE	SSRG International Journal of Computer Science and Engineering	2348-8387

Effective Multicast Broadcast Services In Mobile WiMax Using Location Based Load Management Technique	Dr.B.Kalaavathi	CSE	South Asian Journal of Engineering and Technology	2454-9614
A Schema for Evaluating Service Provider Level Trust	Dr.B.Kalaavathi	CSE	Asian Journal of Research in Social Sciences and Humanities	2249-7315
Enhancing User Trust Using Access Pattern Based User Trust Computation and Cloud Trial Strategies	Dr.B.Kalaavathi	CSE	International Journal of Printing, Packaging & Allied Sciences	2320-4387
Data Mining Models to Improve Clinical Decisions	Dr.B.Kalaavathi	CSE	Asian Journal of Research in Social Sciences and Humanities	2249-7315
Enhanced Scheduling Approach Using Heuristics Flow Equilibrium Based Load Balancing Algorithm In Cloud	Dr.B.Kalaavathi	CSE	International Journal of Control Theory and Applications	0974-5572
Attack Resistant Analysis Using Secure Singular Value Decomposition and Markov Random Field Based on Rotation Scaling Transformation Invariant Image Watermarking for deo Frames	Dr.B.Kalaavathi	CSE	Asian Journal of Information Technology	3182-3195
Lung Tumour Detection and Classification In Computed Tomography Images Using Multi Kernel SVM Classifier	Dr.B.Kalaavathi	CSE	International Journal of Printing, Packing & Allied Sciences	2320-4387
Efficient Query Handling on Bigdata By Using Fastraq	Dr.B.Kalaavathi	CSE	International Journal of Future Innovative Science and Engineering Research	2454- 1966
An Efficient Path Completion Technique Based on Auxiliary Pages for Web Usage Mining	Dr.B.Kalaavathi	CSE	Asian Journal of Research in Social Sciences and Humanities	2249-7315

Segmentation of Handwritten Tamil Character From Palm Script Using Histogram Approach	Dr. M. Vimaladevi	CSE	International Journal of Informative & Futuristic Research	2347-1697
Trust Based Energy Efficient Routing for Wireless Sensor Networks	Dr. M. Vimaladevi	CSE	Imperial Journal of Interdisciplinary Research	2454-1362
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A High Step-Up Hybrid DC-DC Converter With Reduced Voltage Stress For Renewable Energy Applications	Dr.R Jeyabharath	EEE	World Applied Sciences Journal	1818-4952
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# Think Home: A Smart Home as Digital Ecosystem

Vijender Kumar Solanki<sup>1</sup>, Venkatesan Muthusamy<sup>2</sup>, Somesh Katiyar<sup>3</sup>

<sup>1</sup>Anna University, Chennai, India

<sup>2</sup>KSRIET, Nammakal, India

<sup>3</sup>Chandigarh Group of College, Punjab, India

Email: [spesinfo@yahoo.com](mailto:spesinfo@yahoo.com)

Received 28 March 2016; accepted 20 April 2016; published 28 June 2016

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## Abstract

This work brings all new and advanced technology which is proposed for refinement and improvement in the existing electrification system at domestic as well as commercial levels including hotels, commercial complexes, apartments, rented floors and rooms. This advanced module will not only convey means of luxury but will also accomplish real-time energy monitoring and cost estimation. This developed module will rule out entire re-wiring and will be fruitful at places where installation of a new meter was a problem. The new system after installation will offer means of comfort to the consumer, elderly as well as handicapped and disabled people in operating electric load with ease and comfort. Apart from this, it would also benefit the apartment/hotel owner's and business personnel who have rented their property or portion of property and face problems in calculating energy bill.

## Keywords

Internet of Things, Home Automation, Power & Cost Estimation, Smart City, Energy Consumption Calculator

## 1. Introduction

As entering into the era of modernization and automation, there is an all around development and technological growth in the electrical and electronics sector. Modern electrical appliances, fittings are becoming more luxurious and simple to operate, like operating through Android or (Personal Computer) P.C. We thereby felt the requirement that needs to be brought up by slightly modifying the existing technology. Adopting this new technology would possess the benefits to not only operate the appliances with Android, P.C. or autonomously but

How to cite this paper: Solanki, V.K., Muthusamy, V. and Katiyar, S. (2016) Think Home: A Smart Home as Digital Ecosystem. *Circuits and Systems*, 7, 1976-1991. <http://dx.doi.org/10.4236/cs.2016.78172>

PRINCIPAL,  
K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALYANAGAR,  
TIRUCHENGODE - 631  
NAMAKKAL Dt, TAMIL NADU



## Efficient Trajectory Error Detection: Router Group Monitoring with Adaptive Interface Selection Strategy

M. Sakthivel<sup>1</sup>, M. Venkatesan<sup>2</sup>

<sup>1</sup>Department of CSE, Sengunthar Engineering College, India

<sup>2</sup>Department of CSE, K.S.R Institute for Engineering and Technology, India

E-mail: manicshakthi@gmail.com

### Abstract

*In networking setting police investigation packet forwarding errors is very important to operational networks. Many completely different traffic mechanical phenomenon watching techniques like mechanical phenomenon Sampling, PSAMP, and fatih are often used for traffic mechanical phenomenon error detection. However, direct application of those algorithms can incur the overhead at the same time watching all network interfaces during a network for the packets of interest. In this paper, we have a tendency to propose a completely unique technique known as adaptative router cluster observance with irregular router interface choice strategy to boost the potency of mechanical phenomenon error detection by solely observance the exiting interfaces of routers. Router cluster interface choice strategy to be applied to pick exiting interfaces among elect router teams. Our projected Router interface choice formula and router cluster observance, that monitors totally different set of packets throughout different observance amount. Our proposed design will monitor during each traffic (Period by period) to cover all the traffic. In order to reduce the monitoring overhead, exiting interfaces of traffic trajectory routers are to be monitored. In real time, the proper FEC scheme to be implemented to provide the best performance to the application. We evaluate the performance of parity-based FEC schemes using an analytical loss model. Finally, we show that the router group monitoring technique can significantly enhance the efficiency of trajectory error detection based on Trajectory Sampling or Fatih.*

**Keywords:** Traffic trajectory error, monitoring, sampling, detection, router group



2016-10



## ERAM2 - ENERGY BASED RESOURCE ALLOCATION WITH MINIMUM RECKON AND MAXIMUM RECKON

A.M.SenthilKumar<sup>1</sup>, Dr. M.Venkatesan<sup>2</sup>, Dr. A.RajivKannan<sup>3</sup>

<sup>1</sup>Research Scholar, <sup>2,3</sup>Professor  
senthilam1185@gmail.com

<sup>1</sup>Dept. of CSE, Tejaa Shakthi Inst. of Tech. for Women, Coimbatore, Tamil Nadu, India

<sup>2</sup>KSR Institute for Engg. and Tech, Tiruchengode, Tamil Nadu, India

<sup>3</sup>Dept. of CSE, KSR College of Engineering, Tiruchengode, Tamil Nadu, India

### ABSTRACT

The emerging field of cloud computing has flexibility and dominant computational architecture that offers ubiquitous services to users. It is different from traditional architecture because it accommodates resources in a unified way. Due to rapid growth in demands for providing the resources and computation in cloud environments, Resource allocation is considered as primary issues in performance, efficiency, and cost. For the provisioning of resource, Virtual Machine (VMs) is employed to reduce the response time and executing the tasks according to the available resources. The users utilize the VMs based on the characteristics of the tasks for effective usage of resources. This helps in load balancing and avoids VMs being in an idle state. Several resource allocation techniques are proposed to maximize the utility of physical resource and minimize the consuming cost of Virtual Machines (VMs). This paper proposes an Energy-Based Resource Allocation with Minimum Reckon and Maximum Reckon (ERAM2); which achieves an efficient scheduling by matching the user tasks on Resource parameters like Accessibility, Availability, Cost, Reliability, Reputation, Response time, Scalability and Throughput in the terms of Maximum Reckon and Minimum Reckon. This paper proposes an Ant Colony - Maximum Reckon and Minimum Reckon (AC-MRMR) method to consolidate all the available resource based on the pheromone value; the score is calculated for each pheromone value. When the score value exceeds Threshold limit  $\lambda$  then task migration process is carried out for optimized resource allocation of tasks.

**Keywords:** Cloud Computing, Virtual Machine, Resource Allocation, Minimum Reckon and Maximum Reckon, Ant Colony - Maximum Reckon and Minimum Reckon (AC-MRMR), Task Migration.

### 1. INTRODUCTION

In this emerging field, cloud computing [1] plays an important role by deploying several services in a disturbed system and these are accessed through networks. Cloud refers to collections of servers and devices in the networks. In cloud computing, the users are allowed to attain resources to achieve a powerful standard of networks by emerging QoS [1] and custom-need that are reliable for the end users. The resource allocation is based on the Service Level Agreement (SLA), established via service providers and customers [2]. "Resource allocation is used to allocate resources on the cloud based on user demand in an efficient and economic way. This is a way of scheduling the available resources and tasks to the required end users" [3]. Cloud has various resources and requires multiple policies for managing efficiently. Some of the factors that are affecting the resource management are performance, efficient allocation, and cost. In cloud computing, resource management is assigned with fluctuating tasks which pretense a major challenge in a maximum allocation of available resources [4].

The policies in the cloud computing for resource management are different from policies followed in traditional resource allocation systems. The general policies that are considered in a cloud environment are Admission control, Resource allocation, Resources parameter, Tasks Balancing, and Energy management. In a cloud, the architecture is framed for resource allocation [5] and to deal with the problems for efficient provisioning of VMs. In that architecture, the resource management satisfies three constraints such as CPU, Network I/O and RAM. The research focuses on CPU and RAM memory; meanwhile, a system allocates the jobs to the matched VMs. The proposed methodology does not overcome the scheduling issues faced in the cloud computing.

To overcome the scheduling issues new scheduling methodology is proposed, named as Haizea [6] that performs the scheduling policies like best effort reservation, immediate reservation and advanced reservation on Open Nebula. Major issue found in cloud computing is resource allocations by establishing Service Level Agreement with the end user. For provisioning of resource allocation the end user establish the contract with SLA [7]. The performance metrics termed in SLA is Latency in services, Consistency, Throughput, Security, Accessibility, Availability, Cost, Reliability, Reputation, Response time and Scalability.

The existing scheduling methodology does not utilize the Resources parameters for maximizing the resources for end users. The proposed ERAM2 framework uses resource parameters like Accessibility, Availability, Cost, Reliability, Reputation, Response time, Scalability and Throughput. The resources are allocated based on the User parameter list. At first, the user loads are scheduled by resource weight and resource capacity, this is done using First to Suit Scheduling (FSS) algorithm. FSS algorithm allocates the cloudlets by selecting the VMs based on requirements that are closest to the requested amount of resource requirements. Finally, it sorts the VMs so that the cloudlets are scheduled, this results in least usage of VMs. This algorithm sorts the items so that the user loads are scheduled based on first and best VM in the list at each iteration. FSS fails during idleness of VMs after completion of cloudlets and arrival of dynamic cloudlets. To overcome this dynamic situation, resource consolidation is done using Ant Colony - Maximum Reckon and Minimum



# Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 7, No. 1, January 2017, pp. 796-812.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2017.00023.5

Category: Science and Technology

Asian Journal  
of Research in  
Social Sciences  
and  
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## Router Group selection using BAT Algorithm with Bayesian Filter (BABF): An Efficient Trajectory Error Detection

M. Sakthivel\*; **Dr. M. Venkatesan\*\***

\*Department of CSE,  
Sengunthar Engineering College,  
India.

\*\*Department of CSE,  
K.S.R Institute for Engineering and Technology,  
India.

### Abstract

The most common factors of traffic trajectory monitoring in operational networks are Error prediction, computational time and communication overhead. These factors are most applicable to the Wide Area Network (WAN) such as MANETs (Mobile Ad-hoc Networks) including 3G, 4G and 5G networks. This larger network size affects the traffic trajectory monitoring factors, i.e., Larger the network size, Error prediction; computational time and communication overhead will be lesser. BAT Algorithm is a new meta-heuristic Swarm Intelligence based optimization algorithm, which has been developed rapidly and has been applied in different optimization issues in recent years. In this paper, heuristic BAT algorithm is deployed with Bayesian filter (BABF) based on Naïve Bayes Algorithm. To prove that our proposal is a promising approximation method, router group selection is applied with techniques such as Trajectory Sampling, PSAMP, and Fatih for the performance analysis and results are obtained. The proposed methodology is compared with the default Heuristic Router Group Selection Algorithm to analyze the efficiency of the new approach. The analysis is implemented in the working platform of MATLAB.

### 1. Introduction

Routing optimization issues on networks encompass finding paths between nodes of the networks in associate efficient manner. These issues and their solutions have evidenced to be essential ingredients

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PRINCIPAL,  
K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE -637 215,  
NAMAKKAL Dt, TAMIL NADU.

# Conceptual Model for Smart Cities: Irrigation and Highway Lamps using IoT

Vijender Kumar Solanki, M.Venkatesan, Somesh Katiyar

Research Scholar, Anna University, Chennai, India

**Abstract**—Keeping in mind the need to preserve energy as well as utilize the available at its best the need was felt to develop a module that would be able to sort out the problem where resources such as water and electricity were wasted, in urban as well as rural area. Resource (electricity) was wasted as beside the point operation of Highway & High Mast Lamp; while wastage of water followed by improper trends and methodologies imparted for watering of city park, road side plantation and highway plantation. Thus as per Energy survey statistics of a City (Lucknow, India) it was found that major portion of resources (water and electricity) were being wasted due to negligent activities of officials who were in charge of resource management. So to facilitate energy saving trends and to completely modernize it to autonomous system, module below is proposed which incorporates modern technological peripheral and has its base ingrained in IoT (Internet of Things) which when put into consideration would result in large scale resource and energy saving. This developed module incorporates the peripherals such as Arduino, Texas Instruments ultra low power kits etc. in accordance with software technology including Lab View which help to monitor as well as control the various operation from the base station, located far away from the site. Lab View Interface interacts with all the module located at various city parks, subways and highway lighting modules. Later below in several section a detailed pattern and application frame has been put up.

**Keywords** — Smart City, Arduino, Lab-View, Automatic Irrigation System, (Highway lamp/ High Mast Lighting) Operation and Control.

## I. INTRODUCTION

As per the growing rate of population with spontaneous consumption of resources, creates in the need for the managing the available resources at its best. So a need was felt to manage the outflow of the two major resources i.e. water and electricity and to formulate out, that's how it can be protected from getting wasted and could be utilized at its best. [1]

As during the survey study, it was found that (Lucknow, in India) the practices were manual and a major portion of resources was wasted due to slothful and unconcerned behavior leading to plant death and unwanted operation of the lights.

So using modern technology, and statistical, survey based study it was found that that major portion of the resources (water and Electricity) could be managed out and preserved by managing their controlled flow in an allocated area/city/state/territory with channelized Irrigation system and employing modern means for control of Highway lamps and High Mast Lighting. [2,3]

- Primarily, this module would be capable to help, rule out the problem faced with irrigation process, which was carried out manually, and improper trends were practiced which were either

resulting in resource (water) wastage or when not followed properly resulting in plant dying out indirectly unfavorable habitat.

- Secondarily the module helps in controlling the Lamps of Various Highways based on collection of data from weather forecast report (such as visibility, mist, fog etc.) and toll plaza as per the traffic density so that accordingly the lights/lamp/ high mast lamp could be operated.

## II. TECHNOLOGY ADOPTED

The developed module, thus incorporates the solution for both of the issues:

I.) Advanced Irrigation System for Parks and Road Side Plantation: It includes grouping together of various peripherals together using IoT which help in:

- Data accusation (such as: Status of fountain Running/Idle position; Water Level in the Tank; Soil Moisture Content: rated b/w 0 to 100) [4,5,6]
- Remote Operation Enables to control the various operations such as Operation of Lights, Operation of Fountain Pump, Operation of Sprinklers of City Parks and Road Side Plantation.

II.) Advanced Highway and High Mast Lighting System: Provides automatic control of the lights of the Highway and High Mast Light based on the:

- Weather Forecast (Visibility, Fog etc.): As it was found that during bad weather less visibility, fog affected condition it is necessary to operate all the lights at its full.
- Traffic Density: Data from the Toll Plaza has to be collected so accordingly the operation of Lamps if necessary could be operated in the available modes. (Alternate Mode, Full Mode operations)

## III. PROBLEM FORMULATION

The module at base station includes the Lab-View platform installed PC enabling:

- Highway lamps to be controlled as per the requirement through remote access [7]
- Irrigation related functioning such as: Water Level in Tank, Operation of Sprinkler, and Operation of Fountain Lights can be achieved [8].

In the schematic figure below Fig.1 represents the base station in continuous communication link with the discrete module i.e. Highway /High Mast Lamp and Irrigation module with on sites comm. through 30 ft Rx Tx Weatherproof Communication Link Network (SPN2dp8 for 5Km radii Communication range with 0 obst.)

At center lies the base station where Lab view platform based Host PC is installed while on to left half depicts the Highway and high mast Lighting control module where Arduino set's connected to



## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 7, No. 3, March 2017, pp. 397-405.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER:10.5958/2249-7315.2017.00178.2..

Category: Science and Technology

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of Research in  
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# Reducing Rejected Workflows using WSHF Algorithm in Cloud

S. Selvi\*, Dr. B. Kalaavathi\*\*

\*Assistant Professor,

Angel College of Engineering and Technology,

Tirupur, India.

selvi.me08@gmail.com

\*\*Professor,

K.S.R. Institute for Engineering and Technology,

Tiruchengode, India.

kalabhuvanesh@yahoo.co.in

## Abstract

Workflow ensembles of interdependent tasks for a larger scale application have to be managed efficiently to get accurate results within a stipulated time and it is a challenging task. In this paper, we address a problem of efficient scheduling of workflow ensembles within the budget and deadline constraints and also the workflow ensembles that deviates the budget and deadline constraints. We consider the benefits of both the resource providers and the users in our paper. We simulate our work and analyze the performance of our paper using cloudsim. The incoming tasks with respect to any criteria are admitted based on the admission and feedback procedure. The proposed work also concentrates on the workflows that is of beyond the budget and deadline The tasks that are within the budget and deadline criteria are handled directly and admitted by the queue, whereas the tasks that isof beyond the budget and deadline are readmitted by Workflow Shuffling and Hole Filling Algorithm (WSHFA). The algorithm achieves the minimization of rejected tasks by recycling it, thereby reducing the idleness of resources and maximizing the resource utilization in cloud.

**Keywords:** Rejected Workflows, Hole Filling, Ensembles, Tardy jobs, Rejected Queue.

# Multimodal Medical Image Fusion in Non-Subsampled Contourlet Transform Domain

Periyavattam Shanmugam Gomathi<sup>1</sup>, Bhuvanesh Kalavathi<sup>2</sup>\*

<sup>1</sup>Department of Electronics and Communication Engineering, V.S.B. Engineering College, Affiliated to Anna University, Karur, India

<sup>2</sup>Department of Computer Science and Engineering, K.S.R. Institute for Engineering and Technology, Affiliated to Anna University, Tiruchengode, India

Email: psgomathi05@gmail.com

Received 24 March 2016; accepted 20 April 2016; published 15 June 2016

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## Abstract

Multimodal medical image fusion is a powerful tool for diagnosing diseases in medical field. The main objective is to capture the relevant information from input images into a single output image, which plays an important role in clinical applications. In this paper, an image fusion technique for the fusion of multimodal medical images is proposed based on Non-Subsampled Contourlet Transform. The proposed technique uses the Non-Subsampled Contourlet Transform (NSCT) to decompose the images into lowpass and highpass subbands. The lowpass and highpass subbands are fused by using mean based and variance based fusion rules. The reconstructed image is obtained by taking Inverse Non-Subsampled Contourlet Transform (INSCT) on fused subbands. The experimental results on six pairs of medical images are compared in terms of entropy, mean, standard deviation,  $Q^{AB/F}$  as performance parameters. It reveals that the proposed image fusion technique outperforms the existing image fusion techniques in terms of quantitative and qualitative outcomes of the images. The percentage improvement in entropy is 0% - 40%, mean is 3% - 42%, standard deviation is 1% - 42%,  $Q^{AB/F}$  is 0.4% - 48% in proposed method comparing to conventional methods for six pairs of medical images.

## Keywords

Image Fusion, Non-Subsampled Contourlet Transform (NSCT), Medical Imaging, Fusion Rules

How to cite this paper: Shanmugam, G.P. and Bhuvanesh, K. (2016) Multimodal Medical Image Fusion in Non-Subsampled Contourlet Transform Domain. *Circuits and Systems*, 7, 1598-1610. <http://dx.doi.org/10.4236/cs.2016.78139>

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M. S. P. KAVINAGAR,  
TIRUCHENGODE,  
NAMAKKAL DISTRICT, TAMIL NADU.



# Multilayer Intensive Resource Allocation in Cloud Using Leftist Heaps with VM Migration

S. Selvi and **Dr.B. Kalaavathi**

**Abstract**— Now-a-days the compute intensive applications like Nano-science, bioscience, and molecular research are stepping into various research experiments. This compute intensive application requires the large number of resources and data for research. Involving in optimal resource allocation process of job scheduling is the toughest task in cloud. Predicting the future needs of VMs could be considered as one of the remedies in resource allocation in a dynamic scheduling and it is one of the hot issues researched currently. Our paper performs the allocation of resources for the incoming jobs by constructing the leftist heap tree. This tree organizes the jobs by analyzing its characteristics and resource requirements. This achieves an optimal way to allocate CPU supporting SaaS providers and maximizes the turn over of IaaS providers. We do focus on the effective way of using Virtual Machines (VM) for job executions in the field of nano science and molecular research activities. Virtual Machines are configured and structured using leftist heap dynamically whenever there is migration from a hotspot server to a cold spot server. This improves the resource utilization rate, reduces the VM migrations, the request completion time and the number of waiting tasks in the queue. Also, we calculate the trust model based on the historical information. Calculation of trust value could be achieved by analyzing the VM load and load of the resource in the leftist heap. Finally we conducted experiments in a virtual cloud environment and graph analysis proves our work is far better compared to the existing techniques.

**Keywords**— Leftist Heap, Virtual Machines, Resource Allocation.

## I. INTRODUCTION

Compute Intensive applications demand the various resources like meteorological data, bioscience information, and scientific data for solving the computational issues in the field of nanotechnology. Recently 4000 users at 200 universities making their research in the field of molecular bioscience, ocean science, earth science, mathematics, neuroscience, design and manufacturing, and other disciplines. They require the optimal resources from the internet world like cloud computing, green computing for enhancing the research study in future, in which the Cloud Computing is an upcoming era in the internet world. Cloud comprises of interconnection of virtual computers and provides services to the users through software, hardware and firmware. Resources are provided to the users as metered services either as a hourly, monthly or yearly basis etc. Virtualization plays a key role in cloud which makes the users feel that the resources are being served only for them. In order to maintain the transparency from the users, resource management should be optimized dynamically and thereby improving the resource utilization, reducing the response time and upgrading the QOS of the users.

S. Selvi, M.E., (Ph.D), Assistant Professor, CSE, Angel College of Engineering and Technology, Tirupur. E-mail: selvime08@gmail.com  
 Dr.B. Kalaavathi, M.E., Ph.D., Professor, CSE, K.S.R. Institute for Engineering and Technology, Tiruchengode. E-mail: kalabhuvanesh@yahoo.co.in

ISSN 2320-4387 | © EDITOR IJPAS

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# Agerl Based Enhanced Map Reduce Technique in Cloud Scheduling

S.Selvi<sup>#1</sup>, Dr.B.Kalavathi<sup>#2</sup>

<sup>#1</sup> Assitant Professor/CSE, Angel College of Engineering and Technology, (Affiliated to Anna University), Tirupur, Tamil Nadu, India

<sup>#2</sup> Professor/CSE, K.S.R. Institute for Engineering and Technology, (Affiliated to Anna University), Tiruchengode, Tamil Nadu, India

**ABSTRACT** - Today's real time big data applications mostly rely on map-reduce (M-R) framework of Hadoop File System (HDFS). Hadoop makes the complexity of such applications in a simpler manner. This paper works on two goals: maximizing resource utilization and reducing the overall job completion time. Based on the goals proposed, we have developed Agent Centric Enhanced Reinforcement Learning Algorithm (AGERL). The algorithm concentrates in four dimensions: variable partitioning of tasks, calculation of progress ratio of processing tasks including delays, XMPP based multi attribute query posting and Hopkins statistics assessment based dynamic cluster restructuring. An Enhanced Reinforcement Learning Process with the above features is employed to achieve the proposed goal. Finally performance gain is theoretically proved.

**Keywords:** map reduce, Hopkins, multi attribute query, reinforcement learning

## 1. INTRODUCTION:

The Map Reduce implementation in a Hadoop framework is an upcoming platform to handle larger applications involving parallel data processing. Research and scientific calculations for a single task can be carried out with substantial parallelism techniques. Improving job completion time and efficient utilization of resources are the main considerations in this framework. This can be achieved when allocation of map and reduce slots are scheduled optimally. The scheduling adopts two types of reinforcement methodologies, one is a discrete process and the other is a continuous process. A continuous reinforcement with a dynamic

restructuring mechanism is applied in our work to reschedule the map & reduce tasks whenever there is a necessity occurs.

Identifying and improving the straggler tasks in a heterogeneous cluster[13] is one of the milestones in the process of optimization of scheduling. Our paper enhances the characteristics of RL process. The RL algorithm is composed of the following components: Agent, Environment, State Space and Reward. The characteristics of agent are improved in the existing MRRL scheduler [12] and it performs the following:

- Variable partitioning of the incoming tasks
- Computing Progress ratio of the tasks in execution
- XMPP based multi attribute query model
- Cluster restructuring based on Hopkins statistical calculation

The agent plays an important role in the identification of straggler tasks and who invokes the multi attribute query based technique to retrieve the requirement of resources needed to convert the straggler tasks into faster tasks.

The environment is the configuration settings of cloud based device. The state representation is the classification of straggler tasks and quicker tasks. The nodes also classified into slow nodes or non scalable nodes and faster nodes or scalable nodes. An objective of RL algorithm is taking actions based on the computation value of reward function. It is positive(>0) and negative(<0) rewards. If the straggler task is able to be executed in the scalable node, then it is a positive reward else it is a negative reward. The scalable nodes can possess more number of stagglar tasks with positive reward and non scalable node possess more number of straggler tasks with negative reward.

## Effective Multicast Broadcast Services in Mobile WiMAX Using Location Based Load Management Technique

R.CHITHRA  
Department of IT,  
K.S.Rangasamy College of  
Technology, Tamilnadu,  
chithra@ksrct.ac.in

B. KALAAVATHI  
Dept, CSE  
KSR Institute of Engineering and  
Technology

K.S.ARUNA SHIVANI  
Department of IT,  
K.S.Rangasamy College of  
Technology, Tamilnadu,  
[arunasadhasshivam@gmail.com](mailto:arunasadhasshivam@gmail.com)

### ABSTRACT

Worldwide Interoperability for Microwave Access (WiMAX) is a broadband technology which can effectively transmit a data across a group of users using multicast and broadcast service. MBS zone which is a group of base stations that are broadcasting the same multicast packets which defines Multicast and Broadcast services. Handover is a process of transferring an ongoing call or data session from one channel connected to the core network to another channel. The handover causes authentication, delay, packet loss, jitter that mainly affects the communication. Handover in WiMAX across the MBS zone is a critical issue. The handover in multicast/broadcast service session involves delays due to the link-level messages that are exchanged during the handover and due to the multicast/broadcast service signaling messages. The former delay occurs whenever an MS with an ongoing multicast/broadcast service session switches to a new BS, irrespective of its multicast/broadcast service zone or location-management areas. However, the latter delay only occurs when an MS moves from one multicast/broadcast service zone to another. First, multicast/broadcast service handovers can therefore be classified into intra-multicast/broadcast service-zone handovers and inter-multicast/broadcast service zone. To reduce the

computational complexity, a practical algorithm called a zone planning-based solution was developed to minimize the total energy consumption. It may not lead to the maximum network lifetime.

### INTRODUCTION

World Wide Interoperability for Microwave Access (WiMAX) is a wireless communication standard designed to provide 30 to 40 mega-bit second per rates. It offers features of high bandwidth, extended coverage area and low cost [3]. WiMAX mainly focused on two areas such as location management and handover management. Mobile WiMAX provides a synthesis of mobile and fixed broadband access environment during a supple of network architecture and it has been unmitigated to include MBS architecture and its component protocols [3]. WiMAX is a broadband technology which can effectively transmit data across a group of users using a multicast broadcast service that is termed as MBS. MBS is introduced for the real time services such as news, live sports etc., Mobile WiMAX has two types of handover they are hard handover, soft handover, Macro Diversity Handover (MDHO) and Fast Base

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## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 6, No. 11, November 2016, pp. 179-188.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER:10.5958/2249-7315.2016.01184.9

Category: Science and Technology

Asian Journal  
of Research in  
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# A Schema for Evaluating Service Provider Level Trust

Prabu Ragavendiran S D\*; Kalaavathi B\*\*

\*Associate Professor,

Department of CSE,

Erode Builder Educational Trust's Group of Institutions,

Kangayam, Tamilnadu, India.

\*\*Professor and Head,

Department of CSE,

KSR Institute for Engineering and Technology,

Tiruchengode, Tamilnadu, India.

## Abstract

In this rising cloud computing generation, safety and privateness performs the most important limitation in cloud trust. Users require a relaxed, riskless and dependable Cloud Service Provider (CSP) from the cloud marketplace to hold their data in secure. Building a Trust Management System (TMS) between the cloud user and cloud service provider presents the approach for making a choice on trustworthy cloud providers in terms of different domains making use of Consensus assessment Initiative Questionnaire CSA, celebrity CAIQ (Consensus comparison Initiative Questionnaire) as one of the vital sources of trust expertise. Established on the solutions from the actual dataset, a believe rating might be assigned to the character service provider so that it can be used by the consumer to easily determine the quality cloud provider among the many. Outcome may just furnish the measure of trustworthiness of the provider for a secured cloud environment.

**Keywords:** Cloud computing, Cloud trust, Cloud Service Provider, Trust management system, CAIQ, Trustworthiness.

## 1. Introduction

Cloud computing is a prominent paradigm of computing service delivery. Any potential user of cloud services will ask about the trust level of the cloud service. In the context of cloud computing the attributes of a cloud service or a service provider are considered as the means for considering

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# Enhancing User Trust Using Access Pattern based User Trust Computation and Cloud Trial Strategies

S.D. Prabu Ragavendiran and **Dr.B. Kalaavathi**

*Abstract— Cloud computing is the interesting recent research area because of its exclusive features like least capital expense, flexible maintenance, instant scalability, rapid deployment and less maintenance cost. Even still there are issues to be ratified in the security because of the lack of trust, an important factor to ensure the same. This paper present a framework for the refinement of users to decide their trust level based on the trust policies. After establishing an initial trust on a cloud service, a cloud service provider needs to verify and re-evaluate that trust. The users are categorized based on their positive and negative behaviors. The users are evaluated with the updated trust value and clustered into several access patterns based on the user trust value which in turn reflects number of violated policies and number of received warnings. This trust evaluation helps the provider to track whether user is trustful to permit him or not to permit him on which the provider may assign the privileges to the user clusters. The introduction of cloud environment to the new users by means of cloud trial make them as experienced users, before moving for the actual cloud usage which is evident to increase the user trust.*

*Keywords— Cloud Computing, User Trust Evaluation, Clustering, Access Patterns, Cloud Trial.*

## I. INTRODUCTION


Cloud computing is the delivery of computing as a service to the user. Here the common resources, platform and software are provisioned to the registered cloud users as a utility over a inter network. It offers the service based on pay per usage concept.

Trust is the most sizably voluminous obstruction for the development of cloud computing. Ergo it's paramount to concentrate on the issue of confide in cloud computing. The user deportment here is referred as the failed operation which has contravened certain security policy. It is hard to say what trust exactly is because it is a multi-dimensional, multi-disciplinary and many sided.

Trust plays a strong role in binding a relationship between entities and still under study for a long time, by societal researchers. At present, trust is broadly used in many types of internet environment, such as e-commerce, mobile ad hoc networks [1], peer-to-peer network, and wireless sensor networks as because the traditional network security mechanisms such as Certificate Authority, Firewall and Access Control etc. cannot forecast and detect the user's behavior. User trust provides the proof to avoid the interaction with the unauthorized users. This paper consists of five parts as setting access patterns, computing user trust, clustering cloud users based their user trust

*S.D. Prabu Ragavendiran, Associate Professor, CSE, EBET Group of Institutions, Kangayam.  
Dr.B. Kalaavathi, Professor and Head, CSE, KSR Institute for Engineering and Technology, Tiruchengode.*

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## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 6, No. 8, August 2016, pp. 2461-2471.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2016.00756.5

Category: Science and Technology

Asian Journal  
of Research in  
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# Data Mining Models to Improve Clinical Decisions

Viveka S\*; **Dr. B. Kalaavathi\*\***

\*Assistant Professor,

Velalar College of Engineering and Technology,  
India.

\*\*Professor and HOD,

Department of Computer Science,  
KSR Institute for Engineering and Technology,  
Tiruchengode, India.

## Abstract

Data mining is one of the major research area in computer science, which is has the techniques to analysis the data that comes from various sources like transactions, finance, web, multimedia, health care and clinical trials. Clinical Data Mining (CDM) is the one of the major application of data mining, which uses clinical data. Sufficient analysis and research works has been given to clinical data mining, because it is a collaborative research area and it is consider as the result of applying the techniques of artificial intelligence, neural network, and genetic algorithms with data mining on healthcare data. This paper reviews the technique of data mining which is used to find the hidden knowledge from the health care system.

**Keywords:** Clinical Data Mining, Clinical Decision Support System, Adverse Reactions, Health Care, Learning Models.

## Introduction

Data mining also called knowledge discovery, it has methods to analysis the data from different perspectives and finds the hidden and useful knowledge. It has adequate techniques to retrieve and gather knowledge from the enormous collection of data. Data mining concepts are particular to identifying new knowledge and make predictions based on that. This knowledge selected from data, can be used to increase profit in the retail industry or to find out the usage of credit card use.

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(A)  
(B)

# Enhanced Scheduling Approach Using Heuristics Flow Equilibrium Based Load Balancing Algorithm In Cloud

S. Selvi\* and B. Kalaavathi\*\*

## ABSTRACT

Scheduling based on load balancing is a very big riddle in Cloud computing. Various techniques are available to optimize cloud scheduling so as to effectively utilize the cloud resources and thereby improving the response time of the users. Users on request for resources to execute their job, providers either allocate them a new Virtual Machine (VM) or an ideal existing Virtual Machine or schedule accordingly. Response time varies based on the distribution of load to the VMs. Though the load sharing is balanced statically, there may be unavoidable circumstances dynamically due to which load distribution becomes uneven. Many existing technologies are available to balance the load among the VMs, but still there are drawbacks and hence it is still in research. This paper proposes Heuristic Flow Equilibrium based Load Balancing (HFEL) algorithm to improve scheduling in the Cloud. HFEL algorithm would reduce the latency, reduce the response time and increase the throughput than compared to the existing systems

## 1. INTRODUCTION

Cloud is a massively using computing model in the internet world. Nowadays customers prefer cloud for doing their work, since it is a metered service. As the number of user requests increases, the challenges also gets increased which has to be solved by both the cloud providers and cloud users [1]. When the user submits the job to the providers, the provider analyzes the job, and checks the availability of resources. Then the provider assigns the tasks to the new virtual machines or to the existing one based on their load in a static manner [2].

Virtualization helps the providers to schedule the incoming tasks based on their needs. Each physical machine encompasses many virtual machines. Load balancing plays a significant role in the optimization of scheduling in Cloud. Scheduling gets optimized both in static and dynamic manner. Improved response time, increased resource utilization and achieving maximized QoS are the parameters to be concentrated in scheduling [3]. Though incoming loads are balanced among the virtual machines initially, there will be a high degree of unpredictability of resource utilization by the running tasks and there may be the over dump of new tasks to the overloaded machines which is a serious issue to be monitored and which may be the root cause for the deviation in the submission of results to the user, that leads to increase in the response time to the users than what he/she is expected. Balancing the loads helps in solving the above issue [4].

Load Balancing is achieved by migration of running tasks or infrastructure from heavy loaded machines to lightly loaded machines which will reduce the response time of the user. Migration is majorly classified into Process Migration and Live Migration [5]. Process Migration is further divided into Operating System migration, User level migration and Object based migration. Process Migration concentrates on the transferring of running tasks from higher tasks machine to a lower tasks machine, whereas Live Migration

\* Assitant Professor/CSE, Angel College of Engineering and Technology, Tirupur, E-mail: selviresearch@gmail.com

\*\* Professor & Head /CSE, K.S.R. Institute for Engineering and Technology, Tiruchengode.

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## Attack Resistant Analysis Using Secure Singular Value Decomposition and Markov Random Field Based on Rotation Scaling Transformation Invariant Image Watermarking for Video Frames

<sup>1</sup>S. Poongodi and <sup>2</sup>B. Kalaavathi

<sup>1</sup>Department of ECE, K.S.R. College of Engineering

<sup>2</sup>Department of CSE, K.S.R Institute for Engineering and Technology,  
Anna University, Chennai, Tamil Nadu, India

**Abstract:** This research proposes a novel video watermarking model for video frames based on Rotation Scaling Transformation (RST). Most of the available watermarking methods utilize image processing techniques to execute the watermarking task. This proposal adopts a K Dependency Bayesian (KDB) Model for the approximation of the frames according to probability values. In the study presented, video frames are segmented using the Markov Random Field (MRF) segmentation technique where KDB represents every part of the frame region. Singular Value Decomposition (SVD) is used for encryption of the selected feature points. The encrypted areas located at the feature points are utilized for watermark embedding and extraction. During the stage of embedding, the text files are converted into a matrix. Both the matrices are then merged using the sum of the matrices. The watermark embedding strength is adapted according to the noise visibility function and the analysis of the probability of error is performed mathematically. Simultaneously, the watermark embedding and extraction techniques are assessed based on a proven mathematical model. Experimental results prove that the proposed MRF-SVD video watermarking method performs better in terms of invisibility and robust behavior in comparison to the previous methodologies under potential attacks such as cropping, rotation, scaling, sharpening and Gaussian noise in case of videos.

**Key words:** Rotation Scaling Transformation (RST), K Dependency Bayesian (KDB) Model, Marko Random Field(MRF) segmentation technique, Singular Value Decomposition (SVD), watermark embedding and extraction techniques

### INTRODUCTION

The fast growth of new information methodologies has enabled easy access to digital information. On the other hand, it has also worsened the issue of illegal copying and redistribution of digital media. The technique of digital watermarking was introduced when there were attempts made to resolve issues in relation to the intellectual property rights of media management. A digital image watermarking scheme must be effective enough to tackle a variety of potential attacks. Geometric distortions pose more difficulty in thwarting in comparison to other types of attacks. The technology of digital watermarking was put into application when trying to resolve the troubling issues associated with the management of intellectual property of digital products (Zheng *et al.*, 2007).

A watermark is a digitized code which is implanted into the digital cover content i.e., text, audio or video

sequence. Digital video is basically a collection of sequential still images. A watermark can be used to carry any kind of data but the amount of the data that it can carry is limited. The amount of information that can be embedded into the video is referred to as payload. The level of vulnerability of information increases in proportion with the amount of the information a watermark carries. Again, the amount of information that a watermark can carry is purely restrained by the size of a specific video sequence. Watermarking gives more preference to robustness rather than capacity. Hence, a watermark basically carries tens to thousands of concealed data in bits per video frame (Jayamalar and Radha, 2010).

Digital watermarking is found to be an efficient solution to the issues of multimedia video frames and data authentication. Myriad of geometric invariant algorithms have been put forward in the last few years (Zheng *et al.*, 2007). Digital image watermarking technologies can be classified into three important categories: in planting the

**Corresponding Author:** S. Poongodi, Department of ECE, K.S.R. College of Engineering, Anna University, Chennai, Tamil Nadu, India

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# Lung Tumour Detection and Classification in Computed Tomography Images Using Multi Kernel SVM Classifier

N. Mohanapriya and **Dr.B. Kalaavathi**

**Abstract—** Computed Tomography (CT) is one of the most commonly used imaging modalities for tumour detection and diagnosis, because of its high spatial resolution. Nodules and pathological residues with different diameter can be observed by computed tomography. Nodules on the lungs are classified as benign or malignant. The nodules that are solid with abnormality can be identified as malignant and solid nodule with calcification is classified as benign. It is essential to diagnose nodules at early stages in order to accelerate the treatment process. Hence, lung tumour detection and classification is more important but a challenging task of computed tomography in medical image processing. The aim of this paper is to develop the algorithm which efficiently identifies and classifies tumour in the CT images. Initially the enhancement technique is applied by means of Wavelet based Adaptive Histogram Equalization (WAHE) to correct the contrast which in turn increases the accuracy of lung tumour segmentation. Next in the segmentation phase, Levelset based Cellular Automata (LCA) is proposed to extract the tumour region from CT images efficiently. Finally a tumour classification scheme is presented using Multi-Kernel Support Vector Machine with cellular automata (CAMKSV.M). After the process of tumour segmentation, wavelet-based second order statistical features are extracted from the segmented benign or malignant tumour region for classification purpose. Once the feature extraction is completed, the tumour classification is done to decide whether the lung image is benign or malignant. A comparative analysis has been performed with some existing tumour classification methods by means of accuracy, sensitivity and specificity. This algorithm was then tested on a real time data set of CT lung images, which were collected from hospitals. Experimental result shows that the proposed medical image enhancement, tumour detection and classification system achieves better performance than the existing systems.

**Keywords—** Medical Images, Enhancement, Classification, Kernel, Support Vector Machine, Level Set Automata, Segmentation, Detection, CT.Images.

## I. INTRODUCTION

Cancer is a dangerous disease nowadays. In order to discover and cure this malignant disease as early as possible, many kinds of examination, such as Computed Tomography (CT), Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), are required. Computer-aided tumour segmentation system is an important application in medical image analysis [1]. Developing a medical image analysis system not only lightens the workload and decreases complexity in the diagnosis and it provides a quantitative measure about variation of the

N. Mohanapriya, Assistant Professor, CSE, Vivekanandha College of Engineering for Women, Tiruchengode, Namakkal, Tamilnadu, India. E-mail:mohanapriya@vcew.ac.in

Dr.B. Kalaavathi, Professor, CSE, K.S.R Institute for Engineering and Technology, Tiruchengode, Namakkal, Tamilnadu. E-mail: kalabhuvanesh@yahoo.com



**EFFICIENT QUERY HANDLING ON BIGDATA BY USING FASTRAQ**

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**S.Hamsareka, Dr.B.Kalavathi**

PG Scholar, Professor,


Dept of CSE,

K.S.R Institute for Engineering and Technology, Tamil Nadu, India

E-Mail: [rekaselvam1993@gmail.com](mailto:rekaselvam1993@gmail.com)

**JUNE – 2016**

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## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 7, No. 2, February 2017, pp. 22-36.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2017.00068.5

*Category: Science and Technology*

Asian Journal  
of Research in  
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# An Efficient Path Completion Technique based on Auxiliary Pages for Web Usage Mining

P. Selvaraju\*, B. Kalaavathi\*\*

\*Department of Information Technology,

SSM College of Engineering,

Namakkal, Tamilnadu, India.

\*\*Department of Computer Science and Engineering,

K.S.R. Institute for Engineering and Technology,

Tiruchengode, Tamilnadu, India.

## Abstract

The frequent usage of website access the wide range of information in the internet world. There is a need of system to handle the web usage data efficiently. The preprocessing data is further used for knowledge discovery process. The data preprocessing system for web usage mining gives a new approach to the user with the help of path completion algorithm. The user session identification algorithm is also implemented to automatically append the user data and the missing pages of the user access paths are also identified and added using the referrer-based method which resolves the problems facing by proxy server and local caching. Maximal forward reference and reference algorithms are considered as a solution for the average reference length of the auxiliary pages which is estimated in advance. Web access log are used to retrieve data from the server which is generated by the client whenever the request is made. By using the proposed path completion algorithm with the web access log, it efficiently appends the lost information of the visitor and the reliability of the access data also shows better improvement.

**Keywords:** Web Access Log, Web Usage Mining, Data Preprocessing System, Reference Algorithms Path Completion.

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K. S. R. INSTITUTE FOR  
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K. S. R. KALSHANBAR,  
TIRUCHENGODE - 637 215,  
NAMAKKAL DT, TAMIL NADU.

# Segmentation of Handwritten Tamil Character from Palm Script using Histogram Approach

Paper ID	IJFR/4/E.5/023	Page No.	6418-6424	Subject Area	Computer Engineering
Key Words	Tamil Palm Manuscript, Line Segmentation, Character Segmentation, Vertical Projection, Bounding Box				

1 <sup>st</sup>	B. Kiruba	Assistant Professor,
2 <sup>nd</sup>	A. Nivethitha	Department of Computer Science & Engineering
3 <sup>rd</sup>	Dr. M. Vimaladevi	Hindusthan Institute of Technology, Coimbatore

## Abstract

Tamil Palm script character segmentation is one of the difficult phases in machine recognition. Tamil is the most popular script in India. Tamil palm script consist of vowels, consonants and various modifiers. Individual letter decides the accuracy of character recognition technique hence proper segmentation is needed. This paper presents an image segmentation of Tamil handwriting from palm leaf manuscripts. The process is includes of three steps: background elimination to separate text by Otsu's algorithm, line segmentation and character segmentation. A simple histogram based approach to segment Tamil palm script character is proposed in this paper. Various challenges in segmentation of Tamil script are also discussed.

## 1. INTRODUCTION

Tamil character segmentation from palm manuscript is an important task for Recognition System. Segmentation is the method of splitting the image into text lines, words and then into characters which are particularly useful for classification. Segmenting character from palm manuscript is extremely challenging, while the characters structure and content differ significantly. The correctness of the OCR system depends on the segmentation. If the characters are segmented correctly the recognition system gives best results. Regions or objects are divided from an image in segmentation phase. Mainly segmentation, tries to extract essential component of the script, which are certainly characters. This is desirable because the classifier recognizes these characters only [1]. Segmentation phase is also critical in contributing to this inaccuracy due to touching characters, which the classifier



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K. S. N. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY  
TIRUCHENGODE 637 019  
NANDAKUMAR, Tamil Nadu.

# Trust Based Energy Efficient Routing For Wireless Sensor Networks

A.Nivethitha<sup>1</sup>, Dr. M. Vimaladevi<sup>2</sup>, B.Kiruba<sup>3</sup>  
<sup>1,2,3</sup> Assistant Professors

Department of Computer Science and Engineering,  
Hindusthan Institute of Technology, Coimbatore

**Abstract:** In a networked environment, the physical conditions of the environment is monitored and recorded by a group of dedicated sensors referred to as Wireless sensor network (WSN). Organizing the collected data at a central location referred to as the sink node. WSNs measure environmental conditions like temperature, sound, pollution levels, humidity, pressure, etc. The nodes in an environment are susceptible to variety of attacks due to the dynamic behavior. In WSN, traditional authentication and cryptography solutions are not adaptable to encounter the nodes misbehavior attacks. However, the existing methods also not adaptable to consume the energy and increasing overhead while estimating the trust. The main objective of this concept is to deliver the data in an efficient manner and minimize the energy consumption of the network. In this paper, we propose a trust based energy efficient routing is used to identify the misbehaving nodes and upgrade network lifetime based on the trust, hop-count and residual energy of the sensor nodes. The simulation results demonstrate reduced energy consumption, improved throughput and network lifetime when compared with the existing work.

**Keywords-**Wireless Sensor Networks, Trust, Residual energy, misbehaving nodes, Throughput.

## 1. Introduction

Wireless Sensor Networks consists of widely distributed sensor nodes with limited battery power and it is suitable for most of the application scenarios in recent years. Normally the sensor nodes in an environment are capable of sensing abnormal events such as fire in a forest, temperature, humidity, weather monitoring, battlefield surveillance, inventory and manufacturing processes etc. In WSN, Energy depletion and nodes misbehavior attacks in an active route cannot be predictable due to the dynamic behavior of nodes in the network [6]. Several problems occur in an environment such as increasing dead nodes, data loss due to security issues, increased overhead etc. To avoid those obstacles in a network environment, different security based protocols has been proposed based on

the cryptography and authentication solutions but it is not capable of predicting the misbehavior attacks in the routing due to easy access of memory contents, invalid secret keys and it requires central administration. Also, consuming the energy of the sensor nodes is a challenging task. So, various energy efficient routing protocols were proposed based on the application in the sensing field for reducing energy consumption in the network [1]. In general, due to the sensory environments being harsh in most cases, the sensors in a WSN are not able to be recharged or replaced when their batteries drain out of power. The battery drained out nodes may cause several problems such as, incurring coverage hole and communication hole problems.

In this paper, we propose a method called Trust based Energy Efficient Routing method (TEER) which incorporates trust issues and energy consumption problems to overcome the limitations of existing methods and it is more suitable for wireless environment. The design of TEER is centered on two major parts i.e. trustworthiness and energy efficiency. Responsibility of TEER is dynamically detecting and isolating misbehaving nodes during trust evaluation phase while energy awareness feature is incorporated in route setup phase of routing protocol which helps in better load balancing among trusted nodes. Generally the nodes which is closer to the sink depletes its energy than far away node. It is important because excessive depleting the energy of some nodes in the network can lead to dead nodes and can compromise the lifetime of the network [5]. Moreover, TEER also gives better approach to select short routes and reduces interference on the wireless environment. Simulations based evaluation of TEER in NS-2 reveals better performance in terms of throughput, average energy consumption, and network lifetime. The rest of paper is organized as follows: Section II presents the review existing trust and energy aware routing solutions. Section III describes our proposed scheme TEER in detail. Section IV describes the simulation based performance evaluation of TEER. Finally, we conclude the paper in Section V.

# k-NN CLASSIFIER FOR SKIN CANCER CLASSIFICATION

Dr. M. Vimaladevi<sup>1</sup>

Department of Computer Science and Engineering

Hindusthan Institute of Technology, Coimbatore  
Email: [vimal.vcet@gmail.com](mailto:vimal.vcet@gmail.com)

B.Kiruba<sup>2</sup>

Department of Computer Science and Engineering

Hindusthan Institute of Technology, Coimbatore  
Email: [kirubamugesh@gmail.com](mailto:kirubamugesh@gmail.com)

A.Nivethitha<sup>3</sup>

Department of Computer Science and Engineering  
Hindusthan Institute of Technology, Coimbatore  
Email: [nivethi92@gmail.com](mailto:nivethi92@gmail.com)

**Abstract:** Skin cancer is now becoming a challenging issue to identify the exact location of affection on the skin tone. A novel hierarchical k-Nearest Neighbors (k-NN) classifier is more useful to find the affected level of skin and the type of cancer disease. The k-NN classifier is comparatively simple, quick and effective. The structure which is of hierarchical level mainly decomposes classification into a set of easy issues. At the first level of the classification, feature selection is done. The most relevant feature subsets such as color and texture features are extracted from skin lesions and passed to each node of the classification level. The efficiency of the proposed scheme is typically larger in discriminating cancer and pre-malignant cells from the benign cells and it reaches overall classification accuracy over a few common classes of skin lesions that include two non-melanoma cancer classifications. An automatic skin cancer classification system is developed and the relationships of skin image across different type of training networks are studied with different types of image preprocessing. To enhance the classification results, the image properties of the normal skin is eliminated from the skin affected area and the cancer cell is presented in the image..

**Keywords:** Skin Cancer, k-NN Classifier, Lesions classification, Hue, Saturation

## I. INTRODUCTION

Skin cancer may appear as tumors in the form of malignant or benign. Benign Melanoma is simply appearance of some pores and holes on skin such as mole, etc. Malignant melanoma is the look of sore like structures that create bleeding or the flow of blood. Malignant is the deadliest form of all skin affecting diseases. It gets arose from growth of cells in pigmented skin tone estimation and named after the cell from which it arises. Melanoma diagnosis is tedious and needs sampling tests. Melanoma can be spread out to all organs of our human body through the total system. The main issue to be considered covering with melanoma is that, the first trouble of the disease can to the future ones. Sampling often leads to the inflammation or even drastic surpass of lesion. Computer based diagnosis can enrich the speed of skin cancer detection which works according to the disease symptoms.

The similarities among lesions cause the diagnosis of malignant cells a tedious one. But, there are some similar symptoms of skin cancer, such as: Border irregularity, Color variation and Diameter. Asymmetry is part of the tumor that shouldn't match the other part. Color intensity change in the region is irregular. It also intimates about the Computer based Skin cancer identification. Automatic early detection system is a classification system which distinguishes Malignant Melanoma from other skin diseases. Artificial Intelligence is used for classification purpose.

Skin images for the classification process will be converted to the digital format. The image may contain noises and that could be eliminated by pre-processing techniques. To preserve the edges, few steps are too carried out at last. To separate the cancerous region from non-cancerous areas in skin, segmentation is done. There are similar features for the cancerous images. The features are extracted using Two Dimensional Wavelet Transformation method which is implemented using MATLAB software.

## II. LITERATURE REVIEW

Gordon .A.D., (1987) summarized the relationships within a set of objects by a set of hierarchically-nested classes of similar objects, representable by a rooted tree diagram. Methods for obtaining tree diagrams, comments on the selection of appropriate methods of analysis and the validation of classifications, distributions of different types of tree, and consensus trees were discussed.

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K. S. R. KALYANAGAR,  
TIRUCHENGODE-637 215,  
NAIDANJAL DISTRICT, TAMIL NADU. 7



# LBP-TOP DESCRIPTOR FOR DETECTING INTERESTING EVENTS

Pavithra M<sup>1</sup>, **Dr. M.Vimaladevi**<sup>2</sup> *ME,Phd*, Priyanga M<sup>3</sup>, Yamuna Devi S<sup>4</sup>

M.E. Student, Head of the Department, M.E Student, M.E Student

Hindusthan Institute of Technology, Coimbatore, Tamilnadu India

[Pavithramel1@gmail.com](mailto:Pavithramel1@gmail.com)

## Abstract

The prevalent use of surveillance systems in road side, railway stations, airports or malls has led to an enormous amount of data that wants to be analyzed for safety or even commercial reasons. The mission of automatically detecting frames with anomalous or interesting events from long duration video sequences has concerned the research community in the last decade. The existing system introduced a Swarm Intelligence based approach for Detecting Interesting Events in Crowded Environments. The Histograms of Oriented Gradients (HOG) is used for capture the appearance information and Histograms of Oriented Swarms (HOS) is used for capture the frame dynamics. Both are combined to form a new descriptor that effectively characterizes each scene. However it does not considered dynamic texture to achieve high accuracy. To solve this problem the proposed system introduced histogram of Local Binary Patterns from Three Orthogonal Planes (LBP-TOP) to represent dynamic texture. In a time window of each frame average triplets of HOG, HOS and LBP-TOP are consecutively computed. Then, these features are passed as an input to classifier. Here proximal support machine is used for classification. Proximal Support Vector Machine is based on Support Vector Machine, it is simpler and faster than traditional Support Vector Machines algorithm, which is especially suitable for large amounts of data or image classification and operations. The experimental results show that the proposed system achieves better performance compared with existing system.

**Keywords:** Histograms of Oriented Gradients, Histograms of Oriented Swarms and texture.

## 1. Introduction

Video analysis and video surveillance is an important research area. The key defy are video-based event discovery and large-scale data maintenance and retrieval. The detecting and tracking objects is a crucial capability for smart surveillance, the most critical defy in video-based surveillance (from the perspective of a human intelligence analyst) is retrieval of the analysis output to detect events of interest and identify trends. The task of automatic event detection from long duration video has gained an increasing attention. Crowds pose challenges for traditional computer vision and image/video processing methods, due to the presence of occlusions, varying crowd densities and the complex stochastic nature of their motion, so numerous alternative approaches have been developed to overcome these barriers.

VagiaKaltsa et al [2] proposed a method to detect anomalous events that occur in crowded scenes. Swarm theory was applied to create the motion feature. The Histograms of Oriented Swarm Accelerations (HOSA) that effectively capture a motion dynamics of the scenes. Histograms of Oriented Gradients (HOGs) along with the HOSA described the appearance and then combined to provide a final descriptor based on both motion and appearance, for characterizing a crowded scene effectively. Spatiotemporal volumes of moving pixels extracted only the Appearance and motion features to the robust nature to the local noise. It also allowed the detection of anomalies that occur only in a small region of the frame. The results and comparisons showed the effectiveness,



## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 7, No. 1, January 2017, pp. 1011-1029.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2017.00039.9

Category: Science and Technology

Asian Journal  
of Research in  
Social Sciences  
and  
Humanities

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# Firefly Resources Optimization Technique for Data Delivery in Wireless Multimedia Sensor Networks

**K. Gowsic\***; Dr. N. Shanthi\*\*; B. Preetha\*\*\*

\*Assistant Professor,

Sri Shanmugha College of Engineering and Technology,  
Salem, Tamil Nadu, India.

\*\*Dean,

Computer Science and Engineering,  
Nandha Engineering College,  
Perundurai, Tamil Nadu, India.

\*\*\*Assistant Professor,

Sri Shanmugha College of Engineering and Technology,  
Salem, Tamil Nadu, India.

## Abstract

Wireless Multimedia Sensor Networks (WMSNs) consists of small embedded audio/video nodes capable of extracting the surrounding environmental information, locally processing it and then wirelessly broadcasting it to sink/base station. Multimedia data such as image, audio and video is bigger in quantity than scalar data like temperature, pressure and humidity. Thus, to transmit multimedia information, more resources (i.e. energy, bandwidth, memory, buffer size and processing capability) are required. Recently, many research works have been developed for optimizing the resource constrained in WMSNs. But, WMSNs still need a new resource optimization technique for effective multimedia data delivery with reduced resource utilization. In order to overcome such limitation, a novel Firefly Resource Optimized Data Delivery (FRODD) technique is proposed in this paper. FRODD technique is designed for efficient transmission of multimedia data with higher scalability and stable quality of service in WMSNs surveillance applications. In FRODD technique, Firefly Resource Optimization (FRO) algorithm is designed for exploring the optimized resource routing path and transmitting the incoming data streams according to their demand requirements. The main goal of proposed FRODD technique is to reduce resource utilization of sensor nodes while delivering multimedia data from the source node to destination in WMSNs. Experimental evaluation of FRODD technique is done with the performance metrics such

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Tamil Nadu, India.



# Handling of DDoS Attack in Cloud Environment Using Cooperative Distributed Dynamic Load Balancing Algorithm

M. Jawahar and Dr.A. Sabari

*Abstract— Cloud computing is an evolving technology where resources can be shared among several users from anywhere at any time. Cloud computing provides various services such as platform-as-a-service, infrastructure-as-a-service and software-as-a-service. There are several security problems that arise in cloud computing during data sharing. One of the major problems is DDoS attack. The DDoS attack happens when there is more than one attacker who tries to attack the server by sending as many requests to the server. This action delays the server response to the legitimate user request. Thus, in order to handle this kind of DDoS attack, cooperative distributed dynamic load balancing algorithm is used.*

*Keywords— DDoS, Load Balancing, Cloud Security, Resource Availability.*

## I. INTRODUCTION

Since the cloud computing is used widely there are several issues associated with it. One of the major issues is the DDoS attack. The DDoS attack can happen when there is more number of attackers who are trying to delay the response of server by sending lot of request to deviate the server's attention from the authenticated user.

This kind of DDoS attack can be handled by using cooperative distributed dynamic load balancing algorithm. Dynamic load balancing can be classified by two types such as, centralized and distributed. In centralized algorithm, the responsibility of scheduling actually exists on a single node. Whereas, in distributed dynamic algorithm various nodes of the system involves in making assignment decisions. The problem accompanying with the centralized mechanism is that of reliability. If there is a failure in centralized server, then all the scheduling in the system will terminate. But in a distributed scheme there is no boundary in scheduling. It avoids bottleneck of gathering state information at a single node and permits the scheduler to respond quickly to dynamic changes in system state.

## II. RELATED WORK

Due to the cost effectiveness and capabilities cloud computing has been taking the interest of several organizations as well as academic entities. Even though cloud technology being accepted across the world, there is less works on its security issues and the increase in cloud attacks.

The major cloud attacks are the distributed denial of service (DDoS) or DoS attack, and Man-in-the-cloud attacks. The literature discovered cloud DoS attacks and examined how HTTP DoS and other DoS attacks affect cloud system using real attack traffic. In order to prevent DDoS attack in cloud, an entropy based anomaly detection system was studied, explored, inspected and projected as an alternative solution [1]. An experimented result that

M. Jawahar, Assistant Professor, Department of CSE, KSR Institute for Engineering and Technology, Tamilnadu, India.  
Dr.A. Sabari, Professor, Department of Information Technology, K.S.Rangasamy College of Technology, Tamilnadu, India.

ISSN 2320-4387 | © EDITOR IJPPAS

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NAMAKKAL DI, TAMIL NADU.

## A Misdirected Route Avoidance Using Topological Transform Adaptive Relational QoS Routing in Wireless Sensor Network

<sup>1</sup>P. Vijayalakshmi and <sup>2</sup>B.G. Geetha

<sup>1</sup>Department of Computer Science and Engineering,  
Shri Shanmugha College of Engineering and Technology, Tamil Nadu, India

<sup>2</sup>Department of Computer Science and Engineering,  
K.S.R. College of Technology, Tamil Nadu, India

**Abstract:** Wireless Sensor Network (WSN) continues to grow and consequently an effective routing scheme is required when the topological changes occur. Existing Distributed algorithm for Time-bounded Essential Localization (DTEL) over a sensor network minimizes the time taken for the broadcasting of packets. But, investigating the throughput level on the different topological route paths is not focused. Topological changes in the wireless sensor network measure the throughput level using Ternary Content Addressable Memory (TCAM)-based packet classification systems. TCAM based sensor network system improves the throughput level but the topological transformation sometimes lead to the misdirected routing in WSN. To improve the routing scheme on the different topological structure, Topological Transform Adaptive Relational Quality of Service Routing (TTA-RQoS) scheme is proposed in this study. TTA-RQoS scheme develops the framework with the three main objectives such as adaptively, avoiding the misdirected route and improving the throughput level. TTA-RQoS scheme uses the abstained misdirected routing to remove the misdirected route path of packet transfer from the source to the destination. The abstained misdirected routing adjusts the flow relationship exclusively on locally observed paths using the erlang's C formula. erlang's C formula uses the Poisson arrival process with arrival rate to avoid the misdirected route. Secondly, TTA-RQoS scheme uses the Relational QoS Routing to attain approximately 5% improved throughput level on changing mobility of sensor node and sink node in WSN. Experiment is conducted using the simulation tool on the factors such as throughput level on varying topological structure, avoidance rate of misdirected route and delay time.

**Keywords:** Relational QoS routing, wireless sensor network, Erlang's C formula, misdirected route path, topological change, abstained misdirected routing

### INTRODUCTION

Wireless sensor networks are normally composed of many low-powered sensors nodes with a few relatively robust sink nodes to perform the powerful communication. WSN usually gathers the data by the individual nodes where it is eventually routed to the sink nodes. A rate monitoring simply makes use of the idea to forward packets with user required topological structure. The topological structures of different forms are used in sensor network field. Topological structure in WSN is illustrated in Fig. 1.

Topological routing in WSN is very demanding due to the essential characteristics that distinguish from other wireless networks. Existing joint authentication and Topology Control (JATC) scheme in Guan *et al.* (2012) improve the throughput rate by as a discrete stochastic

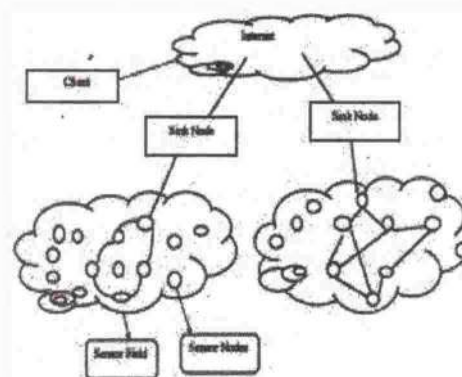


Fig. 1: Topological WSN Structure

optimization method. Joint authentication considers spanning over the entire protocol stack for the

**Corresponding Author:** P. Vijayalakshmi, Department of Computer Science and Engineering,  
Shri Shanmugha College of Engineering and Technology, Tamil Nadu, India  
3398

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K.S.R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVINAGAR,  
TIRUVALUR DISTRICT-607 215,  
NAMAKKAL DT, TAMIL NADU.

## Resource Optimized Spectral Route Selection Protocol for WMSN Surveillance Application

<sup>1</sup>K. Gowsic, <sup>2</sup>N. Shanthi and <sup>3</sup>B. Preetha

<sup>1,3</sup>AP/CSE, Sri Shanmugha College of Engineering and Technology, Salem,  
Tamil Nadu, India

<sup>2</sup>Dean, Computer Science and Engineering, Nandha Engineering College,  
Perundurai, Tamil Nadu, India

**Abstract:** Most of the energy-aware routing protocols used for routing in Wireless Multimedia Sensor Networks (WMSN) employ shortest path routing for efficient transmission of data. The increasing availability of low cost wireless sensor devices enable audio, video and text data being sensed and transmitted through wireless network. However, Wireless Multimedia Sensor Networks (WMSN) requires a new routing algorithm for effective multimedia transmission. In this study we plan to develop a Resource Optimized Spectral Route Selection (RO-SRS) technique for efficient transmission of multimedia content with high and stable quality of service in WMSN surveillance applications. Spectral route selection strategy is designed by aggregating the sensed multimedia data content with similar size and same destination sink into different groups. The possible routes between the sensed multimedia content sensors to respective sink are selected from the wireless sensor communication. This point allows more links to be available for RO-SRS to explore more routing paths and enables RO-SRS to be different from existing route selection technique. With possible routes, spectrum of routes is identified for efficient transmission with high throughput, minimal data loss and delay. Simulation comparison in this paper indicates that RO-SRS is highly suitable for multimedia transmission in WMSNs.

**Key words:** Wireless Multimedia Sensor Networks (WMSN), resource, spectral route selection, routing, employ

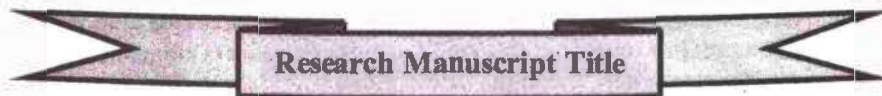
### INTRODUCTION

Wireless multimedia sensor networks are used to enhance existing surveillance applications against crime and terrorist attacks. Large scale networks with wireless multimedia sensor networks of video sensors extend the ability of law-enforcement agencies in monitoring more sensitive areas, keeping watch on public events, private properties criminal identification and so on. Multimedia sensors record potentially relevant activities (i.e. occurrence of thefts, road traffic patrol, traffic violations) and make multimedia content accessible for future query. Many prevalent research for sensing multimedia information using wireless technologies has received greater attention due to the increasing in surveillance applications. To achieve an improvement in (Quality of user Experience) QoE, Joint User Experience and Energy Efficiency (U-UEEE) (Singhal *et al.*, 2014) method was presented using scalable video coding. However, to improve the geographic routing, a Two Phase geographic Greedy Forwarding (TPGF) (Shu *et al.*, 2010) was presented owing to improvement in multimedia

transmission. Another method based on Ant model was introduced in (Cobo *et al.*, 2010) with the aim of providing significant QoS for multiple types of services in wireless multimedia sensor networks. Rapid advances for multimedia streaming have set the stage for layered multicasting (Shao *et al.*, 2011), optimal bandwidth assignment (Xia *et al.*, 2011) in WMSN. Layered multicast for multimedia streaming realized the full potential for network coding using flow optimization. On the contrary, the optimal bandwidth assignment for multiple coded video was performed aiming at achieving maximal user satisfaction. Reliable and fast content discovery was performed in (Wang and Yeo, 2011) using peer nodes to improve the rate of throughput and minimize the time delay using hybrid content discovery mechanism. Another method based on overall compression was presented by Wang *et al.* (2011) using spatial correlation model resulting in the improved data delivery through efficient identification of route path. The additional challenges created by the scalability for video multicasting must be addressed in order to deploy a model for improved video quality. Hua *et al.* (2011), an optimal

Corresponding Author: K. Gowsic, AP/CSE, Sri Shanmugha College of Engineering and Technology, Salem, Tamil Nadu, India  
3734

PRINCIPAL.  
K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL DIST. TAMIL NADU.



**EFFICIENT QUERY HANDLING ON BIGDATA BY USING FASTRAQ**

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**S.Hamsareka, Dr.B.Kalavathi**

PG Scholar, Professor,


Dept of CSE,

K.S.R Institute for Engineering and Technology, Tamil Nadu, India

E-Mail: [rekaselvam1993@gmail.com](mailto:rekaselvam1993@gmail.com)

**JUNE – 2016**

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TIRUCHENGODE-637 215,  
NAMAKKAL Dt, TAMIL NADU.

# Ride through Strategy for a Three-Level Dual Z-Source Inverter Using TRIAC

A. Nazar Ali<sup>1</sup>, Dr. R. Jeyabharath<sup>2</sup>

<sup>1</sup>K. Ramakrishnan College of Technology, Trichy, Tamilnadu, India

<sup>2</sup>K.S.R Institute for Engineering and Technology, Namakkal, Tamilnadu, India

Email: krthodeee@gmail.com

How to cite this paper: Nazar Ali, A and Jeyabharath, Dr.R. (2016) Ride through Strategy for a Three-Level Dual Z-Source Inverter Using TRIAC. *Circuits and Systems*, 7, 3911-3921.

<http://dx.doi.org/10.4236/cs.2016.711326>

Received: April 7, 2016

Accepted: May 1, 2016

Published: September 30, 2016

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## Abstract

A new ride through strategy is introduced in a three-level dual Z-source inverter, for isolation under semiconductor switching failure condition. Here the output will have no significant decrease in the amplitude and quality. Instead of diodes, the triacs are added to the inverter source ends, as it can perform a bidirectional power transfer also it can operate well in both low and high voltage operating conditions. The faulted part can be isolated by simply altering the firing pulses for turning on/off the triacs using the carrier based SPWM technique and resulting in a boosting output with zero common mode voltage. Consequently, it forms a common floating point or null point with a zero common mode voltage. It is experimentally verified by using MATLAB, and digital oscilloscope.

## Keywords

Common Mode Voltage, Fault Compensation, Three-Level Inverter, Sinusoidal Pulse Width Modulation, Z-Source Inverter

## 1. Introduction

The conventional converters have many blockades, such as high distortion, losses with a variation at the amplitude of the output during faulty conditions. To overcome the limitations and problems of the traditional converters, an impedance-source (or impedance-fed) power converter (that can be abbreviated as ZSC) is introduced. Figure 1 depicts the general structure of ride through strategy introduced in the dual ZSI. The ZSI is a special impedance network (or circuit) that connects the voltage source converter and current converter, main circuit to the power source, load, or another converter, for providing special features that cannot be seen in the conventional converters [1] [2].



# A High Step-up Boost Converter Integrated with Voltage Multiplier Cell

S. Ravivarman

*Department of Electrical and Electronics Engineering  
K. S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India*

R. Jeyabharath

*Department of Electrical and Electronics Engineering  
KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India*

P. Veena

*Department of Electrical and Electronics Engineering  
KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India*

**Abstract-** An interleaved quadratic boost converter integrated with capacitive voltage multiplier is proposed in this paper. Two quadratic boost switching cells are interleaved to minimize the current ripples in input side. Its output is coupled to a voltage multiplier to increase the static gain, resulting in a higher output voltage with moderate duty cycle. Compared with the conventional boost converter and quadratic boost converter, the proposed converter has reduced voltage stress in the switches and diodes. The detailed analysis of the converter is presented for continuous conduction. A prototype is simulated to validate the theoretical analysis and confirm the viability and significant performance of the converter.

**Keywords –** DC-DC power converters, distributed power generation, fuel cells, photovoltaic systems, switching converters

## I. INTRODUCTION

The challenge of generating a high voltage DC output bus, with values between 200V and 400V generally to power supply, UPS systems, motor drives, uninterruptible power systems, from a low input voltage, usually between 12V and 48V from batteries and photovoltaic panels, has been studied for some years, generating several proposals to overcome this difficulty.

The cascading of N conventional boost converters is a practical solution to obtain a high voltage gain with increased power losses. The voltage gain is increased by number of converter stages [1-4]. However, cascaded topologies are not suitable for high gain applications, because the voltage stress across the power switch and diodes are high which will reduce the efficiency of the converter. In [5,6] the conventional boost converter is combined with multiple switched capacitor cells to obtain a high conversion ratio. Topologies with coupled inductors [7-9] can provide high voltage gain with reduced voltage stress. However, the leakage inductance in the coupled inductors cause high voltage spikes on the switches. In [10-12], the coupled inductors and voltage multiplier cells are integrated with conventional boost converters to obtain large gain. However, the added stage increases the parts count and complexity of the design as well as introducing extra losses related to the multiplier cell. The conventional boost converters are interleaved with a voltage multiplier cell can extend the voltage gain, minimize the input current ripple [13,14]. Thus, an interleaved converter improves the performance, but at the expense of increased size, cost, and control complexity.

This work is a contribution to a new DC-DC converter topology without the use of high-performance switching devices or sophisticated control strategies while preserving a high voltage gain and compatible switching efforts with commercially available components. The proposed converter is obtained by integrating interleaved two quadratic boost cells and voltage multipliers. The principle of operation and analysis of the proposed converter is explained in Section 2 and Section 3. Section 4 gives the design methodology for the proposed converter. Simulated and experimental results are presented in Section 5 and some concluding remarks in Section 6.

## A High Step-Up Hybrid DC-DC Converter with Reduced Voltage Stress for Renewable Energy Applications

<sup>1</sup>S. Ravivarman, <sup>2</sup>R. Jeyabharath and <sup>2</sup>P. Vazna

<sup>1</sup>K.S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India - 637215

<sup>2</sup>KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India - 637215

**Abstract:** This paper proposes a high step-up dc-dc converter with voltage-lifted switched inductor cell, switched-capacitor and voltage multiplier cell. The voltage multiplier cell is used to reduce the voltage stress across the switch and to extend the voltage gain. In addition, this converter consists of simple control system, since there is only one active switch. The operating principle, key waveforms and design details are also presented. The proposed topology is simulated in PSIM to verify the performance of the proposed converter.

**Key words:** Boost converter · Switch voltage stress · Switched capacitor · Switched inductor · Voltage-lift

### INTRODUCTION

The International Energy Agency (IEA), forecasts that the global primary energy demand on 2030 increases by 1.5% annually from now. Developing Asian countries are the main contributors to this growth, followed by the Middle East region. Growth in per capita energy consumption in the past two decades has occurred in all parts of the world primarily because of increased participation in the transport sector, followed by manufacturing. Exceptions to this trend are China and India, where growth is mainly taken in the manufacturing sector, followed by the household sector. A large and sustainable economic growth in India is to develop a great demand for energy resources. Demand and the imbalance between the supply of energy sources is a widespread phenomenon that requires serious efforts of the Government of India to increase the energy supply. More than 50% of the population is little or no energy business for life and living. Renewable energy can make a significant contribution in each of the areas mentioned above. In this context, the role of renewable energy must be seen. Alternative energy such as photovoltaic, bio-fuel and chemical energy such as fuel cell become increasingly key part of the solution to the country's energy needs. The renewable energy is an important element in the energy planning process in India for more than two decades.

Power Electronic devices continues to innovate and the importance of switching power converter is increasing, in which boost converter is widely used in renewable energy systems. In order to boost the available low voltage to high voltage of 380 V, which is required by the full-bridge inverter to connect with a 220 V grid. A huge number of dc-dc converter topologies were proposed and implemented in the range of hundred watt to multiples of kW. The dc-dc converters are generally classified in to two: isolated converters and non-isolated converters. The isolated converters use transformer for isolation which may be necessary or not in some countries. In order to reduce the cost of the system without compromising gain and efficiency, the non-isolated dc-dc converters are to be used in renewable energy applications [1, 2]. The non-isolated dc-dc converters are classified into five categories, such as cascaded dc-dc converter, coupled inductor based boost converter, switched capacitor (SC) based boost converter, switched inductor (SL) based boost converter and voltage multiplier (VM) cell based boost converter.

The conventional boost converters are cascaded in series and/or parallel to increase the voltage gain of the converter [3-5]. The cascaded converters consist of large number of components, so it is not suitable for high power applications. Coupled inductors are a different method used to increase the voltage gain, reduce the reverse recovery problem of the output diode and to

Corresponding Author: S. Ravivarman, Department of EEE, K.S. Rangasamy College of Technology, Thokkavadi Post, Tiruchengode, Namakkal District, Tamilnadu, India- 637215.

PRINCIPAL,  
K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL DI, TAMIL NADU.

## Fuzzy Controlled Bridgeless Cuk Converter Fed Switched Reluctance Motor

<sup>1</sup>Kulandaivel Velusamy, <sup>2</sup>Veena Parasunath and <sup>3</sup>Jeyabharath Rajaiah

<sup>1</sup>Department of EEE, K.S. Rangasamy College of Technology, Tamil Nadu, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Tamil Nadu, India

**Abstract:** The research in this study aims at designing and modelling of a bridgeless cuk converter for driving a switched reluctance motor. Bridgeless Cuk converters are new series of AC-DC converters, it contain very less ripple of voltage and current and have output wave with good quality, high power concentration and good transfer voltage gain and no circuit elements parasitic limits of traditional converters. Bridgeless Cuk converters have good voltage transfer gains in arithmetic development on step by step. For the switched reluctance Motor drive, the C-dump converter is used. The present design aims at improving the effectiveness of the switched reluctance motor drive system by the incorporation of the Bridgeless Cuk converter between the electrical source and the drive system. The rule base of the fuzzy logic controller is modified to improve the stability of the controller without affecting the system performance. MATLAB simulation results are presented in this paper to explain the working of the proposed drive.

**Key words:** Bridgeless CUK converter, SRM, fuzzy logic controller, DC-DC converter, C-dump converter

### INTRODUCTION

Switched Reluctance Motors (SRM) have inherent merits such as easy structure with non-winding assembly in rotor side, better tolerance, lightness, low cost with no permanent magnet in the construction and it can operate with high temperatures or in extreme temperature variations (Ahn *et al.*, 2010). It is an electric machine which converts the reluctance torque into mechanical output. In SRM, the stator and rotor enclose a structure of salient-pole, due to salient poles it generate a high output torque. The torque is created by the arrangement inclination of poles (Ahn *et al.*, 2010).

Bridgeless Cuk converters allow power transfer in both directions (Kavitha and Uma, 2008). Due to their capability to reverse the direction of flow of power and thereby the current direction of the motor is changed. Power quality issues are the major issue, for reducing the harmonics in supply current by various international power quality standard like the International Electro technical Commission (Bist and Singh, 2014) (IEC) 61000-3-2. In all AC-DC converters, the power transfer efficiency and output voltage are limited by power electronic elements. But in calculation, usual converters can produce high voltage with high efficiency. BL-Cuk converters (Luo and Ye, 2013) are new AC-DC converters that defeat the above disadvantages effects and for the

increasing of voltage and the power transfer efficiency. These converters produce improved voltage from low voltage of photovoltaic operation.

However, fundamental converters like as Boost converter and Buck converter cannot be use in the high-power circumstances and at the similar time have many limitations. In modern years, conversion methods have been improved rapidly and there are stacks of topologies of DC-DC converters. Bridgeless converters are more suitable in order to improve the power factor at Source of supply. The distinctive characteristic of a bridgeless PFC converter is which eliminates the need of a diode bridge rectifier at the input. Which reduce the power losses, so we get improves overall system efficiency as a result with equal cost savings. PFC rectifiers are used to recover the rectifier power density and to decrease noise emissions via soft switching methods or coupled magnetic techniques (Yang, 2012; Agirman *et al.*, 2001).

A usual PFC scheme has lower efficiency due to major losses in the diode bridge. Usually boost converters are used as front end rectifiers (Barnes and Pollock, 1998; Lee *et al.*, 2007). For low level voltage applications like computer industry or telecommunication an isolation transformer or extra converter is needed to step down the voltage level. Bridgeless PFC buck converters are restricted for step down applications (Tseng *et al.*, 2000). Input line current cannot trace the input voltage around zero crossings of the input line voltage.

Corresponding Author: Kulandaivel Velusamy, Department of EEE, K.S. Rangasamy College of Technology, Tamil Nadu, India

4662

PRINCIPAL,  
K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt. TAMIL NADU.



# Power Factor Enhancement in Bridgeless LUO Converter Fed Switched Reluctance Motor Using Fuzzy Controller

Kulandaivel V<sup>1</sup>, Veena P<sup>2</sup>, Jeyabharath R<sup>3</sup>

Assistant Professor, Department of EEE, K.S.Rangasamy College of Technology, Tamilnadu, India<sup>1</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>2</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>3</sup>

**ABSTRACT:** This paper presents about the Power Factor Correction based Bridgeless LUO converter fed Switched Reluctance Motor drive by using Fuzzy Controller. The proposed topology aims at designing and modelling of a Bridgeless LUO converter for driving a Switched Reluctance Motor in a simple and effective manner. The proposed control scheme has the concept of DC link voltage control relative to the desired speed of the Switched Reluctance Motor. Bridgeless LUO converters are the combination of two de to de converters with less semiconductor switches. The C-Dump converter is used for the Switched Reluctance Motor which results in power factor correction and phase de-fluxing component with reduced device count. The current regulation is achieved by this converter and it is suitable for low voltage applications. The result of fuzzy logic controller to a SRM drive gives the better performance and high robustness.

**KEYWORDS:** Bridgeless LUO converter, Switched Reluctance Motor, Fuzzy Logic Controller, Power Factor Correction, C- Dump Converter

## I. INTRODUCTION

The Switched Reluctance Motor is a type of electric motor that runs by reluctance torque. Switched Reluctance Motor is electro-magnetic and electro-dynamic equipment which convert electrical energy into mechanical energy. It provides high reliability, at constant power it provides high speed range, manufacturing cost is low, good dynamic response, ruggedness and fault tolerance. The switched reluctance motor drives are finding application in high volume appliances and industrial applications which can take good advantage of their characteristics with high starting torque.

Switched Reluctance Motors (SRM) have qualities such as easy structure with non-winding assembly in rotor side and low cost with no permanent magnet in the construction, and the switched reluctance motor operate by high temperatures or with temperature variations [1]. The switched reluctance motor is an electric machine which converts the reluctance torque into mechanical output. In switched reluctance motor the stator and rotor enclosed by a structure of salient-pole. The high output torque is obtained due to salient poles. The torque is obtained by the arrangement inclination of poles [1].

LUO converters are one of the simplest forms of DC to DC converters which operates on voltage lift technique [2]. Employing voltage lift technique has opened a way in designing high voltage gain converters. It allows voltage to be increased stage by stage, in arithmetic progression [2].

The growing awareness of industries towards SR drive is for the better performance as compared to inverter/converter fed ac and de motors [3]. This paper investigates the application of fuzzy logic controller for dynamic analysis of SRM drive.

## An Optimal Control Theory Based Analysis of Brushless DC Motor Drive

Murugan Marimuthu<sup>1</sup>, Jeyabharath Rajaiah<sup>2</sup>

<sup>1</sup>K. S. Rangasamy College of Technology, Tiruchengode, India

<sup>2</sup>K.S. R. Institute for Engineering and Technology, Tiruchengode, India

Email: marimurugan@rediffmail.com, Jeya\_psg@rediffmail.com

Received 5 May 2016; accepted 15 May 2016; published 31 August 2016

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### Abstract

The application of BLDC motor drives in industries is becoming more popular nowadays. An error will occur in the drive that is originated by some disturbances which are the major problems to reduce the stability of the system. To obtain the minimum performance index, the optimal control signal is formulated, which is the main objective of this paper. Based on quadratic performance index, the optimal control system of BLDC motor drive is a design which spotlights in this paper. The complexity of the mathematical expressions has been reduced by using state space approach to the BLDC system. The burden to the control engineers has reduced based on tedious computation by using thus optimal design. To provide the desired operating performance, this optimal design helps to realize the BLDC system with practical components.

### Keywords

BLDC Motor, Optimal Control, Performance Index, Stability Analysis and State Variables

### 1. Introduction

Presently, consumers demand for lower energy costs, higher efficiency, better performance, reduced acoustic noise and more convenient features. The traditional technologies like DC motor and AC motor cannot meet these demands. Hence, motor manufactures are gravitating towards Brushless Direct Current (BLDC) motor. The use of the BLDC motor in these applications is becoming very common due to the features of high efficiency, high flux density per unit volume and high power density due to the absence of field winding. In addition, the absence of brushes leads to high reliability, low maintenance requirements and low electromagnetic interference problems [1] [2]. This drive can be used for variable speed applications like Electrical Vehicles, Robotics, etc.

How to cite this paper: Marimuthu, M. and Rajaiah, J. (2016), An Optimal Control Theory Based Analysis of Brushless DC Motor Drive. *Circuits and Systems*, 7, 3384-3391. <http://dx.doi.org/10.4236/cs.2016.710288>

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K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt, TAMIL NADU.

# Harmonic Minimization in Seven-Level Cascaded Multilevel Inverter Using Evolutionary Algorithm

Jeyabharath Rajaiah<sup>1</sup>, Velmurugan Ramar<sup>2</sup>, Veena Parasunath<sup>1</sup>

<sup>1</sup>Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

<sup>2</sup>Department of EEE, PAC Ramasamy Raja Polytechnic College, Tamilnadu, India

Email: jeya\_psg@rediffmail.com

Received 18 April 2016; accepted 10 May 2016; published 19 July 2016

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## Abstract

Inverters are power electronic devices that change over DC to sinusoidal AC quantity. Be that as it may, in down to earth, these devices produce non-sinusoidal yield which contains harmonics, so as to blend a close sinusoidal component and to lessen the harmonic distortion multilevel inverters developed. Mathematical methods, which were developed, are derivative based and need initial considerations. To overcome this, evolutionary algorithms, which are derivative free and accurate, were developed for obtaining multi levels of output voltage. The proposed work uses two evolutionary algorithms, namely, Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) algorithm. These algorithms are used to generate the switching angles by satisfying the non linear transcendental equations that govern the low order harmonic components. A seven level cascaded full bridge inverter is designed using MATLAB/Simulink and the results validate the results for switching angles. The Total Harmonic Distortion (THD) value obtained for GA and PSO is 11.81% and 10.84% respectively. The solution obtained from GA algorithm was implemented in hardware using dspIC controller to validate the simulation results. The THD value obtained for cascaded seven-level multilevel inverter in the hardware prototype is 25.9%.

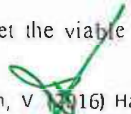
## Keywords

Multilevel Inverter, Selective Harmonic Elimination, Genetic Algorithm, Particle Swarm Optimization, Harmonic Minimization

## 1. Introduction

The inverters are relied upon to give sinusoidal yields yet the viable inverters produce non-sinusoidal yield and

How to cite this paper: Rajaiah, J., Ramar, V. and Parasunath, V. (2016) Harmonic Minimization in Seven-Level Cascaded Multilevel Inverter Using Evolutionary Algorithm. *Circuits and Systems*, 7, 2309-2322. <http://dx.doi.org/10.4236/cs.2016.79201>

  
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ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt, TAMIL NADU.

# Harmonic Minimization in Seven Level Cascaded Multilevel Inverter Using Selective Harmonic Elimination PWM Techniques

V. R. Velmurugan<sup>1</sup>, Jeyabharath Rajaiah<sup>2</sup>, Veena Parasunath<sup>2</sup>

<sup>1</sup>Department of EEE, PAC Ramasamy Raja Polytechnic College, Rajapalayam, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Namakkal, India

Email: jeya\_psg@rediffmail.com

How to cite this paper: Velmurugan, V.R., Rajaiah, J. and Parasunath, V. (2016) Harmonic Minimization in Seven Level Cascaded Multilevel Inverter Using Selective Harmonic Elimination PWM Techniques. *Circuits and Systems*, 7, 4322-4330.  
<http://dx.doi.org/10.4236/cs.2016.714353>

Received: April 26, 2016

Accepted: May 15, 2016

Published: December 22, 2016

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## Abstract

This paper concentrates on enhancing the productivity of the multilevel inverter and nature of yield voltage waveform. Seven level lessened switches topology has been actualized with just seven switches. Essential Switching plan and Selective Harmonics Elimination were executed to diminish the Total Harmonics Distortion (THD) esteem. Selective Harmonics Elimination Stepped Waveform (SHESW) strategy is executed to dispense with the lower order harmonics. Fundamental switching plan is utilized to control the switches in the inverter. The proposed topology is reasonable for any number of levels. The harmonic lessening is accomplished by selecting fitting switching angles. It indicates would like to decrease starting expense and unpredictability consequently it is able for modern applications. In this paper, third and fifth level harmonics have been disposed of. Simulation work is done utilizing the MATLAB/Simulink programming results have been displayed to accept the hypothesis.

## Keywords

Multilevel Inverter, PSIM, Fundamental Switching Scheme, Selective Harmonics Elimination

## 1. Introduction

These days, multilevel inverters have turned out to be more alluring for their utilization in high-voltage and high-control applications. In multilevel inverters, the fancied yield voltage is accomplished by appropriate blend of numerous low

# Improved Power Factor Correction for BLDC Drive Using Fuzzy Logic Controller

P.M.Dhanasekaran<sup>1</sup>, P.Veena<sup>2</sup>, R.Jeyabharath<sup>3</sup>

Research Scholar, Department of EEE, K. S. Rangasamy College of Technology, Tamilnadu, India<sup>1</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>2,3</sup>

**ABSTRACT:** This paper presents a DCM based PFC (Power Factor Correction) based BL (Bridgeless)-Single phase single ended primary inductance converter (SEPIC) converter fed BLDC (Brushless DC) motor drive. The proposed converter topologies are implemented to provide the near unity power factor in a successful manner. The proposed speed control scheme has the work of DC link voltage control proportional to the desired speed of the BLDC motor. The converter combines the PFC and DC link voltage control and uses a single controller. The bridgeless SEPIC converter topology is used to obtain the low conduction losses and low range of heat sinks for the switches. The proposed system is designed with Fuzzy controller and simulated to operate around a wide range of speed control with near unity power factor at input side. The proposed power factor correction converter limits the harmonic distortion (THD) below 5% of total current at AC mains.

**KEYWORDS:** BLDC, Bridgeless SEPIC converter, THD, Power factor correction, fuzzy logic controller

## I. INTRODUCTION

In recent years BLDC motors are considerably used in aerospace, Motion control and defence applications such as vehicle tracking, gyroscope, aircraft on swine instrumentation, fuel monitoring position and quick actuators because of their valuable efficiency, high starting torque, reliability, decline maintenance, less chat compared to brushed DC motor [1]. The stator of the BLDCM comprises of three-phase combined windings and rotor has dependable magnets. It is furthermore recognized as an electronically commutated motor (ECM) considering an electric commutation created on rotor position by a three-phase voltage source inverter (VSI) is used [16], [17]. Thus, the problems associated with brushes, one as sparking, and exasperate and roar of the commutator chamber of deputy are excluded. A conventional BLDC motor fed by a Diode bridge rectifier results in total harmonic distortion of supply current in the range of 60% which leads the reduced power factor. The IEC 61000-3-2 standard is recommended for the high power factor and improved power quality at a way with element and gone straight power action at the supply is chosen [18]. Hence an efficient drive system is necessary to give a wide range of speed act with power factor correction and righteous power action at the AC mains at an capable cost.

Due to growing concerns on the power quality, PFC has acquired an important issue. A boost converter is one of the well-known PFC topologies, due to its simple circuitry, simple control scheme and low number of passive elements. Even though a boost converter is accepted as a typical PFC converter, its produce voltage must be higher than its input voltage [5]. The de output voltage is interminably higher than the peak input voltage, Size of EMI filter is high, input-output isolation cannot be implemented plainly, larger PFC inductance, the startup inrush current is valuable, and there is a lack of current limiting during overload conditions [6],[7]. To overcome the problems associated with help type PFC converters, specifically in universal applications where the output voltage is degrade than the input voltage the step up/down converters one as buck-boost, cuk, SEPIC can be used. Generally, these kinds of converters include a full-bridge diode rectifier on an input path, so that switching losses on the full-bridge diode occur and it will be worse especially at the low line. To improve the power supply efficiency and the switching losses, the distinctive topologies for non isolated and isolated power converter circuits have been exposed in [8], [9].

## Three Phase 15 Level Cascaded H-Bridges Multilevel Inverter for Motor Drives

<sup>1</sup>M.S. Saravanan and <sup>2</sup>R. Je yabharath

<sup>1</sup>Department of ECE Mahindra College of Engineering, Salem, Tamilnadu, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology,  
Tiruchengode, Tamilnadu, India

**Abstract:** In this paper, the structure for three phase H-bridge cascaded power converters is presented. Large electrical drives and utility application require advanced power electronics Converter to meet the high power demands. As a result, multilevel power converter structure has been introduced as an alternative in high power and medium voltage situations. It is shown that the inverter can simultaneously maintain the dc voltage level and choose a SPWM switching pattern to produce a free harmonic sinusoidal output. HCMLI using only a single dc source for each phase is promising for high-power motor drive applications as it significantly decreases the number of required dc power supplies, provides high-quality output power due to its high number of output levels and results in high conversion efficiency. The proposed multilevel converter not only achieves high power rating but also improves the performance of the whole system in terms of harmonics. In this paper the proposed inverter can output more numbers of voltage levels with the advanced switching pattern. Finally, the simulation and experimental results validate the concept of this new topology.

**Key words:** H-Bridge multilevel inverter • Total Harmonic Distortion • 15-Level inverters • SPWM

### INTRODUCTION

Numerous industrial applications have begun to require high power application in recent years. Power electronic inverter become popular for various industrial drives and motor drive applications. The electrical industries have expanded and the variety of loads has increasingly grown. Recently, the industry has begun to apply high-voltage high-power equipment that has reached the megawatt range. Today, the direct connection of a single semiconductor switch to a system with Medium sized voltage grids will create problem. To overcome this problem, a multilevel inverter topology has been introduced as an alternative solution for medium voltage and high power situations. A multilevel inverter use renewable energy as source and can achieve high power rating. So, renewable energy sources such as solar, fuel cells and wind can be easily interfaced to a multilevel inverter structure for a high power application. The multilevel inverter concept has been used since past three decades. The multilevel

inverter begins with a three-level inverter. Thereafter, many multilevel inverter topologies have been developed. However, the main concept of a multilevel inverter is to achieve high power with use of many power semiconductor switches and numerous low voltage dc sources to obtain the power conversion that looklike a staircase voltage waveform. The dc voltage sources for multilevel inverter are given by battery, renewable energy and capacitor voltage sources. The proper switching of the power switches combines these multiple dc sources to achieve high power output voltage. The voltage rating of the power semiconductor devices depends only upon the total peak value of the dc voltage source that is connected to the device. There are different types of multilevel circuits involved to improve the efficiency of the Multilevel Inverter. The multilevel inverters are mainly classified as diode clamped, Flying capacitor inverter and cascaded multilevel inverter. The cascaded multilevel control method is very easy when compare to other multilevel inverter because it doesn't require any clamping diode and flying capacitor.

Corresponding Author: M.S. Saravanan, Department of ECE Mahindra College of Engineering, Salem, Tamilnadu, India.

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K. S. R. INSTITUTE FOR  
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K. S. R. KALVI NAGAR,  
TIRUCHENGODE -637 215,  
NAMARKKAL DI. TAMIL NADU.

# Capacitor Pattern H-Bridge Multilevel Inverter (CPHMLI) Using Phase Disposition Pulse Width Modulation for Grid Applications

M. S. Saravanan<sup>1\*</sup>, R. Jeyabharath<sup>2</sup>

<sup>1</sup>Department of ECE, Mahendra College of Engineering, Salem, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Tiruchengode, India

Email: [saravananphd2016@gmail.com](mailto:saravananphd2016@gmail.com)

Received 3 May 2016; accepted 15 May 2016; published 25 August 2016

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## Abstract

This work presents an implementation of an innovative single phase multilevel inverter using capacitors with reduced switches. The proposed Capacitor pattern H-bridge Multilevel Inverter (CPHMLI) topology consists of a proper number of Capacitor connected with switches and power sources. The advanced switching control supplied by Pulse Width Modulation (PDPWM) to attain mixed staircase switching state. The charging and discharging mode are achieved by calculating the voltage error at the load. Furthermore, to accomplish the higher voltage levels at the output with less number of semiconductor switches and simple commutation designed using CPHMLI topology. To prove the performance and effectiveness of the proposed approach, a set of experiments performed under various load conditions using MATLAB tool.

## Keywords

Switched Capacitor Multilevel Inverter, Phase Disposition Pulse Width Modulation, Capacitor Pattern Based Multilevel Inverter, Total Harmonic Distortion, Cascaded H-Bridge, 17-Level Inverter

## 1. Introduction

In recent years, the amount of power equipment is increasing rapidly. Nowadays, multilevel converters have

\*Corresponding author

Saravanan, M.S. and Jeyabharath, R. (2016) Capacitor Pattern H-Bridge Multilevel Inverter (CPHMLI) Using Phase Disposition Pulse Width Modulation for Grid Applications. *Circuits and Systems*, 7, 3310-3319. <http://dx.doi.org/10.4236/cs.2016.710282>

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K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL DI, TAMIL NADU.

# ANFIS Based Space Vector Modulation-DTC for Switched Reluctance Motor Drive

T. Srihari, R. Jeyabharath, P. Veena

Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, India  
Email: k.t.srihari@gmail.com, jeya\_psg@rediffmail.com, veena\_gce@yahoo.co.in

Received 11 April 2016; accepted 17 May 2016; published 12 August 2016

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## Abstract

Direct torque control (DTC) of Switched reluctance motor is known straightforward control structure with similar execution to that of field situated control strategies. In any case, the part of ideal determination of the voltage space vector is one of the weakest focuses in a routine DTC drive because of adjustable switching frequency and high torque ripple. In this paper, ideal choice of voltage space vectors is accomplished utilizing ANFIS (Adaptive Neuro Fuzzy Inference System) with space vector Modulation. SVM-DTC gives consistent switching frequency and the proposed ANFIS controller's structure manages the torque and stator flux error signals through the fuzzy deduction to get a yield that takes the type of space voltage vector. Simulation results accept the proposed evolutionary system with quick torque and flux reaction with minimized torque ripple and flux ripple.

## Keywords

ANFIS, Direct Torque Control, Flux Control, Space Vector Modulation, Switched Reluctance Motor

## 1. Introduction

Switched reluctance motor, the doubly salient, separately energized motor has basic and simple construction. In spite of the fact that, the induction motor is still the good horse of the industries, the promising component of the high torque to inertia ratio, high torque to mass ratio, less maintenance and incredible general execution of SRM make it an effective contender for alternating current drives. The simple converter topology and dynamic algorithm because of the unipolar operation staying away from shoot through deficiencies makes SRM invaluable in utilizations of aviation, which require high unwavering quality. Additionally, it finds wide application in commercial car enterprises, direct drive machine apparatus and so forth [1].

In any case, huge torque ripple, vibration and acoustic noise are the principle disadvantages of SRM to ac-



# New DCM Operated Single Phase Bridgeless Cuk Derived Converters for Power Factor Correction

P. M. Dhanasekaran<sup>1</sup>, Parasunath Veena<sup>2</sup>, Rajaiah Jeyabharath<sup>2</sup>

<sup>1</sup>Department of EEE, K. S. Rangasamy College of Technology, Thiruchengode, Tamil Nadu, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Thiruchengode, Tamil Nadu, India

Email: pmdsekar@gmail.com

Received 2 May 2016; accepted 20 May 2016; published 14 July 2016

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## Abstract

This paper presents a power factor corrected (PFC) new bridgeless (BL) Cuk Topologies for low power applications. A BL configuration of Cuk converter is proposed which eliminates the usage of diode bridge rectifier at the front end of the PFC converter, thus reducing the switching and conduction losses coupled with it. This new BL Cuk converter has two semiconductor switches. The current flow during each switching cycle interval of the converter reduces the conduction losses compared to the conventional Cuk PFC converter. It also reduces the input current ripple and Electromagnetic Interference (EMI). The inrush current during the starting period is limited and the input, output currents of the converter are continuous with minimum current ripple. Hence it is preferred mostly compared to other PFC circuits. The proposed topology works in the Discontinuous Conduction Mode (DCM) with simple control circuitry to achieve almost a unity power factor with less distortion in the input AC current. The switching of the power switches is done under zero current. The proposed PFC topologies are theoretically investigated and performance comparisons are made with the conventional rectifiers. The proposed PFC converter is simulated in MATLAB/SIMULINK with Fuzzy Logic Controller (FLC) and results are demonstrated to evaluate the effectiveness of the controller.

## Keywords

Bridgeless (BL) Cuk Converter Topology, Power Factor Correction (PFC), Total Harmonic Distortion (THD), Fuzzy Logic Controller (FLC)

\*Corresponding author

How to cite this paper: Dhanasekaran, P.M., Veena, P. and Jeyabharath, R. (2016) New DCM Operated Single Phase Bridgeless Cuk Derived Converters for Power Factor Correction. *Circuits and Systems*, 7, 2176-2188. <http://dx.doi.org/10.4236/cs.2016.79189>

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 K. S. R. INSTITUTE FOR  
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 K. S. R. KALVI NAGAR,  
 TIRUCHENGODE -637 215,  
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# ADVANCES in NATURAL and APPLIED SCIENCES

ISSN: 1995-0772  
EISSN: 1998-1090  
2016 June 10(8): pages 6-14

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## Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor

<sup>1</sup>T.Srihari, <sup>2</sup>R.Jeyabharathi, <sup>3</sup>P.Veena

<sup>1</sup>Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>2</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>3</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

Received 25 April 2016; Accepted 28 May 2016; Available 2 June 2016

**Address For Correspondence:**  
T. Srihari, Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

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### ABSTRACT

**Background:** Switched Reluctance Motor's (SRMs) doubly salient structure and its high torque feature make it as to play important role in electric vehicle industry. The good efficiency, high torque and variable speed ratio in addition to low cost, high reliability and fault-tolerance make the Switched Reluctance Motor (SRM) a candidate with real chances on the market of vehicle propulsion. The main drawbacks of the SRM related to the torque ripple, acoustic noise and vibration make the research object in R&Ds all over the world. **Objective:** In this paper the objective of the work is focused on the development of an efficient design of drive system for 8/6 switched reluctance motor based upon Direct Torque Control (DTC) using evolutionary computing technique. DTC is implemented through Space Vector Modulation (SVM) technique which reduces the torque ripple and provides significant control over torque than conventional technique. **Results:** Evolutionary computing involves in tuning the controller parameter through genetic algorithm. Matlab/Simulink model is constructed for the proposed scheme of switched reluctance motor drive model and validate the work with minimization of torque ripple. **Conclusion:** The simulation results show that the designed PI controller performs satisfactorily to track the reference torque with actual torque. This new technique can be implemented in real time with low cost microcontrollers and higher simplicity.

**KEYWORDS:** Direct Torque Control, Space Vector Modulation, Genetic Algorithm, Switched Reluctance Motor Drive

### INTRODUCTION

The policies to reduce emissions from transportation are focusing on the optimization of the efficiency of the existing vehicles, and the electrification of the vehicles. The continuously increasing price of the permanent magnets and the shortage of rare earths demand the finding of alternatives in several domains as hybrid and full electric propulsion due to their best overall performances. The good efficiency, high torque and variable speed ratio in addition to low cost, high reliability and fault-tolerance make the Switched Reluctance Motor (SRM) a candidate with real chances on the market of vehicle propulsion. The converter topology and switching calculation because of the unipolar operation, keeping away from shoot through errors makes SRM worthwhile in utilizations of aviation, which require high unwavering quality. Additionally it finds wide application in car commercial ventures, direct drive machine apparatuses and so forth.

ToCite: This Article: T. Srihari, R. Jeyabharathi, P. Veena, Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor, *Advances in Natural and Applied Sciences*, 10(8), Pages: 6-14

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Asian Journal of Research in Social Sciences and Humanities

Year: 2016, Volume : 6, Issue: 11

First page:( 703) Last page:(715)

Online ISSN: 2249-7315.

Article DOI:10.5958/2249-7315.2016.01223.5 (<http://dx.doi.org/10.5958/2249-7315.2016.01223.5>)

## Cascaded Multilevel Inverters for Reduce Harmonic Distortions in Solar PV Applications

All A Nazar\*, **Jeyabharath R.**, Udayakumar M D\*\*

\*K. Ramakrishnan College of Technology, Trichy, Tamilnadu, India

\*\*K.S.R Institute for Engineering and Technology, Namakkal, Tamilnadu, India

*Online published on 9 November, 2016.*

### Abstract

The paper presents, a reverse system for sustainable energy function developed using the Cascaded H-bridge Multilevel Inverter (CHMI) that is able to produce a desired voltage by changing levels of DC voltages. A CHMI using Photovoltaic (PV) as source cells model was developed by means of the MATLAB Simulink. It was used to explore and validate the quality of the AC output voltage, harmonic traces of the output voltage and effects of varying switching schemes. The paper examine Sinusoidal Pulse Width Modulation (SPWM) technique applied to the CHMI in order to make sure a proficient voltage utilization and good harmonic band. The system simulation results using simulink program are shown and discussed together with a distinguish study for the various control techniques of the CHMI. A FPGA based controller is utilized to produce the PWM pulses for triggering the switches. By using this control method THD value less than 5% in hardware set up was obtained.

### Keywords

Cascaded H-bridge Multilevel Inverter (CHMI), Field Programmable Gate Array (FPGA), harmonic band, multilevel converter.

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### Performance Analysis and Speed Regulation Estimation of SR Motor Using FT-ANN Controller with Steady State Stability and Fft Analysis

<sup>1</sup>Murugesan Arumugam and <sup>2</sup>Jeyabharath Rajaiah

<sup>1</sup>Research Scholar, Anna University/Assistant Professor/EEE,  
KSR Institute for Engineering and Technology, Tamilnadu, India

<sup>2</sup>Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

**Abstract:** A closed loop speed regulation estimation of Switched Reluctance (SR) Motor with Fuzzy Tuned Artificial Neural Network (FT-ANN) Controller has been simulated and presented in this paper. The FT-ANN has been used for the closed loop controller and the speed regulation of the SR motor has been estimated with Fuzzy Logic Controller (FLC) and FT-ANN. The comparative results are presents for both static and dynamic conditions. The mathematical model of the SR motor has been developed for steady state stability analysis and simulated using MATLAB. The Harmonic Spectrum (FFT) and steady state error for various speed and load condition have been obtained to validate the role of FT-ANN controller. The FT-ANN based system is expected to give better speed regulation for various load conditions. A prototype 300-W, 50Hz model is designed and built for experimental demonstrations; the transient and steady-state performances for the SR motor are compared from the simulation studies. The result of MATLAB simulation and execution it is clear that the FT-ANN can have better controller compared with Fuzzy Logic Controller (FLC).

**Key words:** Switched Reluctance Motor · Artificial Neural Network · Fuzzy Logic Controller · Stability analysis · PWM Inverter

#### INTRODUCTION

The design and developed of SR motor have been focused for variable speed applications with high power density in the recent past. It has been found that these types of special motor have several advantages such as simplicity, less maintenance, robustness, higher torque volume ratio, high starting torque, high efficiency, low manufacturing cost and high speed. The SR motor is highly nonlinear and it operates to steady state region to maximum torque region. This type of special motor having a torque is nonlinear function of rotor position and current. The many researchers has been experimentally demonstrated and reported related to SR motor to solve above problems using different controllers.

Hany M *et al.* [1] have developed the torque ripple minimization of the SR motor with digital controller. The model of SR motor has been presented with torque equation. There is no analysis of the performance of the motor. The speed control of the switched reluctance

generator with artificial neural network controller has been presented in. The performance of the generator has been analyzed with variable speed turbine connected in grid. Kioskeridis *et al.* [2] have demonstrated the single pulse controlled SR motor with high efficiency. This control technique is more complicate compare to FT-ANN controller. The dynamic and steady state performance of the motor was not presented.

Yana Zhou *et al.* [3] have developed the torque ripple minimization of the SR motor with sensor less controller using neural network. The neural network structural design was not present. The speed variation with load changes was not present. The speed controller of the SR motor has been developed and presented with adaptive neural network controller in. The dynamic behavior of the motor has been presented. The load disturbance of the motor has been presented with controller performance. Here there is no analysis of the steady state and stability of the motor. Any M *et al.* [4] have demonstrated the speed control of SR motor with adaptive neuro-fuzzy

Corresponding Author: Murugesan Arumugam, Research Scholar, Anna University/Assistant Professor/ EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

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K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt. TAMIL NADU.**

# FPGA SoC Based Multichannel Data Acquisition System with Network Control Module

C. Rajasekaran<sup>1</sup>, R. Jeyabharath<sup>2</sup>, P. Veena<sup>2</sup>

<sup>1</sup>Department of ECE, K S Rangasamy College of Technology, Tiruchengode, India

<sup>2</sup>Department of EEE, K S R Institute for Engineering and Technology, Tiruchengode, India

Email: raja7ksrct@gmail.com, jeya\_psg@rediffmail.com, veena\_gce@yahoo.co.in

How to cite this paper: Rajasekaran, C., Jeyabharath, R. and Veena, P. (2017) FPGA SoC Based Multichannel Data Acquisition System with Network Control Module. *Circuits and Systems*, 8, 53-75.  
<https://doi.org/10.4236/cs.2017.82004>

Received: April 20, 2016

Accepted: February 25, 2017

Published: February 28, 2017

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## Abstract

Normally, Data acquisition (DAQ) is used to acquire the signals from different devices like sensors, transducers, actuators etc. The data acquisition is also used to analyze the signals, digitizing the signals and acquiring the signals from different inputs. The main drawbacks in data acquisition system are data storage, hardware size and remote monitoring. The System-on-Chip Field Programmable Gate Array (SoC-FPGA) is used in the proposed system in the aim to reduce the hardware and memory size. Further to provide remote monitoring with Ethernet/Wi-Fi, the Network Control Module (NCM) is integrated with Data acquisition and processing module for the communication between the systems. This developed system achieves high resolution with memory reduction, reduced hardware size, fast remote monitoring and control. It is used for real time processing in DAQ and signal processing. For fault tolerance and portability, the full system reconfigurability based FPGA acts as the best solution and the system can be reused with different configurations. The control of data acquisition and the subsequent management of data are coded in LabVIEW. LabVIEW tool is used to design and develop a four-channel Data Acquisition and Processing (DAQP) unit. National Instruments Data Acquisition (NIDAQ) and National Instruments Field Programmable Gate Array (NIFPGA) are used to test and implement the design for real time processing. This is designed to provide high accuracy, storage and portability.

## Keywords

DAQ, Real Time Monitoring, SoC FPGA, Multichannel & Data Storage

## 1. Introduction

The data acquisition and processing system has many applications in measurement and control systems. The main work in data acquisition is to measure an

# A High Step-up Boost Converter Integrated with Voltage Multiplier Cell

S. Ravivarman

*Department of Electrical and Electronics Engineering  
K. S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India*

R. Jeyabharath

*Department of Electrical and Electronics Engineering  
KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India*

P. Veena

*Department of Electrical and Electronics Engineering  
KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India*

**Abstract-** An interleaved quadratic boost converter integrated with capacitive voltage multiplier is proposed in this paper. Two quadratic boost switching cells are interleaved to minimize the current ripples in input side. Its output is coupled to a voltage multiplier to increase the static gain, resulting in a higher output voltage with moderate duty cycle. Compared with the conventional boost converter and quadratic boost converter, the proposed converter has reduced voltage stress in the switches and diodes. The detailed analysis of the converter is presented for continuous conduction. A prototype is simulated to validate the theoretical analysis and confirm the viability and significant performance of the converter.

**Keywords –** DC-DC power converters, distributed power generation, fuel cells, photovoltaic systems, switching converters

## I. INTRODUCTION

The challenge of generating a high voltage DC output bus, with values between 200V and 400V generally to power supply, UPS systems, motor drives, uninterruptible power systems, from a low input voltage, usually between 12V and 48V from batteries and photovoltaic panels, has been studied for some years, generating several proposals to overcome this difficulty.

The cascading of N conventional boost converters is a practical solution to obtain a high voltage gain with increased power losses. The voltage gain is increased by number of converter stages [1-4]. However, cascaded topologies are not suitable for high gain applications, because the voltage stress across the power switch and diodes are high which will reduce the efficiency of the converter. In [5,6] the conventional boost converter is combined with multiple switched capacitor cells to obtain a high conversion ratio. Topologies with coupled inductors [7-9] can provide high voltage gain with reduced voltage stress. However, the leakage inductance in the coupled inductors cause high voltage spikes on the switches. In [10-12], the coupled inductors and voltage multiplier cells are integrated with conventional boost converters to obtain large gain. However, the added stage increases the parts count and complexity of the design as well as introducing extra losses related to the multiplier cell. The conventional boost converters are interleaved with a voltage multiplier cell can extend the voltage gain, minimize the input current ripple [13,14]. Thus, an interleaved converter improves the performance, but at the expense of increased size, cost, and control complexity.

This work is a contribution to a new DC-DC converter topology without the use of high-performance switching devices or sophisticated control strategies while preserving a high voltage gain and compatible switching efforts with commercially available components. The proposed converter is obtained by integrating interleaved two quadratic boost cells and voltage multipliers. The principle of operation and analysis of the proposed converter is explained in Section 2 and Section 3. Section 4 gives the design methodology for the proposed converter. Simulated and experimental results are presented in Section 5 and some concluding remarks in Section 6.

## A High Step-Up Hybrid DC-DC Converter with Reduced Voltage Stress for Renewable Energy Applications

<sup>1</sup>S. Ravivarman, <sup>2</sup>R. Jeyabharath and <sup>2</sup>P. Veena

<sup>1</sup>K.S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India - 637215

<sup>2</sup>KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India - 637215

**Abstract:** This paper proposes a high step-up dc-dc converter with voltage-lifted switched inductor cell, switched-capacitor and voltage multiplier cell. The voltage multiplier cell is used to reduce the voltage stress across the switch and to extend the voltage gain. In addition, this converter consists of simple control system, since there is only one active switch. The operating principle, key waveforms and design details are also presented. The proposed topology is simulated in PSIM to verify the performance of the proposed converter.

**Key words:** Boost converter · Switch voltage stress · Switched capacitor · Switched inductor · Voltage-lift

### INTRODUCTION

The International Energy Agency (IEA), forecasts that the global primary energy demand on 2030 increases by 1.5% annually from now. Developing Asian countries are the main contributors to this growth, followed by the Middle East region. Growth in per capita energy consumption in the past two decades has occurred in all parts of the world primarily because of increased participation in the transport sector, followed by manufacturing. Exceptions to this trend are China and India, where growth is mainly taken in the manufacturing sector, followed by the household sector. A large and sustainable economic growth in India is to develop a great demand for energy resources. Demand and the imbalance between the supply of energy sources is a widespread phenomenon that requires serious efforts of the Government of India to increase the energy supply. More than 50% of the population is little or no energy business for life and living. Renewable energy can make a significant contribution in each of the areas mentioned above. In this context, the role of renewable energy must be seen. Alternative energy such as photovoltaic, bio-fuel and chemical energy such as fuel cell become increasingly key part of the solution to the country's energy needs. The renewable energy is an important element in the energy planning process in India for more than two decades.

Power Electronic devices continues to innovate and the importance of switching power converter is increasing, in which boost converter is widely used in renewable energy systems. In order to boost the available low voltage to high voltage of 380 V, which is required by the full-bridge inverter to connect with a 220 V grid. A huge number of dc-dc converter topologies were proposed and implemented in the range of hundred watt to multiples of kW. The dc-dc converters are generally classified in to two: isolated converters and non-isolated converters. The isolated converters use transformer for isolation which may be necessary or not in some countries. In order to reduce the cost of the system without compromising gain and efficiency, the non-isolated dc-dc converters are to be used in renewable energy applications [1, 2]. The non-isolated dc-dc converters are classified into five categories, such as cascaded dc-dc converter, coupled inductor based boost converter, switched capacitor (SC) based boost converter, switched inductor (SL) based boost converter and voltage multiplier (VM) cell based boost converter.

The conventional boost converters are cascaded in series and/or parallel to increase the voltage gain of the converter [3-5]. The cascaded converters consist of large number of components, so it is not suitable for high power applications. Coupled inductors are a different method used to increase the voltage gain, reduce the reverse recovery problem of the output diode and to

Corresponding Author: S. Ravivarman, Department of EEE, K.S. Rangasamy College of Technology, Thokkavadi Post, Tiruchengode, Namakkal District, Tamilnadu, India- 637215.

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# Power Factor Enhancement in Bridgeless LUO Converter Fed Switched Reluctance Motor Using Fuzzy Controller

Kulandaivel V<sup>1</sup>, Veena P<sup>2</sup>, Jeyabharath R<sup>3</sup>

Assistant Professor, Department of EEE, K.S.Rangasamy College of Technology, Tamilnadu, India<sup>1</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>2</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>3</sup>

**ABSTRACT:** This paper presents about the Power Factor Correction based Bridgeless LUO converter fed Switched Reluctance Motor drive by using Fuzzy Controller. The proposed topology aims at designing and modelling of a Bridgeless LUO converter for driving a Switched Reluctance Motor in a simple and effective manner. The proposed control scheme has the concept of DC link voltage control relative to the desired speed of the Switched Reluctance Motor. Bridgeless LUO converters are the combination of two de to de converters with less semiconductor switches. The C-Dump converter is used for the Switched Reluctance Motor which results in power factor correction and phase de-fluxing component with reduced device count. The current regulation is achieved by this converter and it is suitable for low voltage applications. The result of fuzzy logic controller to a SRM drive gives the better performance and high robustness.

**KEYWORDS:** Bridgeless LUO converter, Switched Reluctance Motor, Fuzzy Logic Controller, Power Factor Correction, C- Dump Converter

## I. INTRODUCTION

The Switched Reluctance Motor is a type of electric motor that runs by reluctance torque. Switched Reluctance Motor is electro-magnetic and electro-dynamic equipment which convert electrical energy into mechanical energy. It provides high reliability, at constant power it provides high speed range, manufacturing cost is low, good dynamic response, ruggedness and fault tolerance. The switched reluctance motor drives are finding application in high volume appliances and industrial applications which can take good advantage of their characteristics with high starting torque.

Switched Reluctance Motors (SRM) have qualities such as easy structure with non-winding assembly in rotor side and low cost with no permanent magnet in the construction, and the switched reluctance motor operate by high temperatures or with temperature variations [1]. The switched reluctance motor is an electric machine which converts the reluctance torque into mechanical output. In switched reluctance motor the stator and rotor enclosed by a structure of salient-pole. The high output torque is obtained due to salient poles. The torque is obtained by the arrangement inclination of poles [1].

LUO converters are one of the simplest forms of DC to DC converters which operates on voltage lift technique [2]. Employing voltage lift technique has opened a way in designing high voltage gain converters. It allows voltage to be increased stage by stage, in arithmetic progression [2].

The growing awareness of industries towards SR drive is for the better performance as compared to inverter/converter fed ac and de motors [3]. This paper investigates the application of fuzzy logic controller for dynamic analysis of SRM drive.



## Fuzzy Controlled Bridgeless Cuk Converter Fed Switched Reluctance Motor

<sup>1</sup>Kulandaivel Velusamy, <sup>2</sup>Veena Parasunath and <sup>1</sup>Jeyabharath Rajaiah  
<sup>1</sup>Department of EEE, K.S. Rangasamy College of Technology, Tamil Nadu, India  
<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Tamil Nadu, India

**Abstract:** The research in this study aims at designing and modelling of a bridgeless cuk converter for driving a switched reluctance motor. Bridgeless Cuk converters are new series of AC-DC converters, it contain very less ripple of voltage and current and have output wave with good quality, high power concentration and good transfer voltage gain and no circuit elements parasitic limits of traditional converters. Bridgeless Cuk converters have good voltage transfer gains in arithmetic development on step by step. For the switched reluctance Motor drive, the C-dump converter is used. The present design aims at improving the effectiveness of the switched reluctance motor drive system by the incorporation of the Bridgeless Cuk converter between the electrical source and the drive system. The rule base of the fuzzy logic controller is modified to improve the stability of the controller without affecting the system performance. MATLAB simulation results are presented in this paper to explain the working of the proposed drive.

**Key words:** Bridgeless CUK converter, SRM, fuzzy logic controller, DC-DC converter, C-dump converter

### INTRODUCTION

Switched Reluctance Motors (SRM) have inherent merits such as easy structure with non-winding assembly in rotor side, better tolerance, lightness, low cost with no permanent magnet in the construction and it can operate with high temperatures or in extreme temperature variations (Ahn *et al.*, 2010). It is an electric machine which converts the reluctance torque into mechanical output. In SRM, the stator and rotor enclose a structure of salient-pole, due to salient poles it generate a high output torque. The torque is created by the arrangement inclination of poles (Ahn *et al.*, 2010).

Bridgeless Cuk converters allow power transfer in both directions (Kavitha and Uma, 2008). Due to their capability to reverse the direction of flow of power and thereby the current direction of the motor is changed. Power quality issues are the major issue, for reducing the harmonics in supply current by various international power quality standard like the International Electro technical Commission (Bist and Singh, 2014) (IEC) 61000-3-2. In all AC-DC converters, the power transfer efficiency and output voltage are limited by power electronic elements. But in calculation, usual converters can produce high voltage with high efficiency. BL-Cuk converters (Luo and Ye, 2013) are new AC-DC converters that defeat the above disadvantages effects and for the

increasing of voltage and the power transfer efficiency. These converters produce improved voltage from low voltage of photovoltaic operation.

However, fundamental converters like as Boost converter and Buck converter cannot be use in the high-power circumstances and at the similar time have many limitations. In modern years, conversion methods have been improved rapidly and there are stacks of topologies of DC-DC converters. Bridgeless converters are more suitable in order to improve the power factor at Source of supply. The distinctive characteristic of a bridgeless PFC converter is which eliminates the need of a diode bridge rectifier at the input. Which reduce the power losses, so we get improves overall system efficiency as a result with equal cost savings. PFC rectifiers are used to recover the rectifier power density and to decrease noise emissions via soft switching methods or coupled magnetic techniques (Yang, 2012; Agirman *et al.*, 2001).

A usual PFC scheme has lower efficiency due to major losses in the diode bridge. Usually boost converters are used as front end rectifiers (Barnes and Pollock, 1998; Lee *et al.*, 2007). For low level voltage applications like computer industry or telecommunication an isolation transformer or extra converter is needed to step down the voltage level. Bridgeless PFC buck converters are restricted for step down applications (Tseng *et al.*, 2000). Input line current cannot trace the input voltage around zero crossings of the input line voltage.

Corresponding Author: Kulandaivel Velusamy, Department of EEE, K.S. Rangasamy College of Technology, Tamil Nadu, India

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K. S. R. INSTITUTE FOR  
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K. S. R. KALVI NAGAR,  
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NAMAKKAL Dt. TAMIL NADU.

# Harmonic Minimization in Seven-Level Cascaded Multilevel Inverter Using Evolutionary Algorithm

Jeyabharath Rajaiah<sup>1</sup>, Velmurugan Ramar<sup>2</sup>, Veena Parasunath<sup>1</sup>

<sup>1</sup>Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

<sup>2</sup>Department of EEE, PAC Ramasamy Raja Polytechnic College, Tamilnadu, India

Email: jeya\_psg@rediffmail.com

Received 18 April 2016; accepted 10 May 2016; published 19 July 2016

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## Abstract

Inverters are power electronic devices that change over DC to sinusoidal AC quantity. Be that as it may, in down to earth, these devices produce non-sinusoidal yield which contains harmonics, so as to blend a close sinusoidal component and to lessen the harmonic distortion multilevel inverters developed. Mathematical methods, which were developed, are derivative based and need initial considerations. To overcome this, evolutionary algorithms, which are derivative free and accurate, were developed for obtaining multi levels of output voltage. The proposed work uses two evolutionary algorithms, namely, Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) algorithm. These algorithms are used to generate the switching angles by satisfying the non linear transcendental equations that govern the low order harmonic components. A seven level cascaded full bridge inverter is designed using MATLAB/Simulink and the results validate the results for switching angles. The Total Harmonic Distortion (THD) value obtained for GA and PSO is 11.81% and 10.84% respectively. The solution obtained from GA algorithm was implemented in hardware using dspIC controller to validate the simulation results. The THD value obtained for cascaded seven-level multilevel inverter in the hardware prototype is 25.9%.

## Keywords

Multilevel Inverter, Selective Harmonic Elimination, Genetic Algorithm, Particle Swarm Optimization, Harmonic Minimization

## 1. Introduction

The inverters are relied upon to give sinusoidal yields yet the viable inverters produce non-sinusoidal yield and

How to cite this paper: Rajaiah, J., Ramar, V. and Parasunath, V. (2016) Harmonic Minimization in Seven-Level Cascaded Multilevel Inverter Using Evolutionary Algorithm. *Circuits and Systems*, 7, 2309-2322.  
<http://dx.doi.org/10.4236/cs.2016.79201>

K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt, TAMIL NADU.

# Harmonic Minimization in Seven Level Cascaded Multilevel Inverter Using Selective Harmonic Elimination PWM Techniques

V. R. Velmurugan<sup>1</sup>, Jeyabharath Rajaiah<sup>2</sup>, **Veena Parasunath<sup>2</sup>**

<sup>1</sup>Department of EEE, PAC Ramasamy Raja Polytechnic College, Rajapalayam, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Namakkal, India

Email: jeya\_psg@rediffmail.com

How to cite this paper: Velmurugan, V.R., Rajaiah, J. and Parasunath, V. (2016) Harmonic Minimization in Seven Level Cascaded Multilevel Inverter Using Selective Harmonic Elimination PWM Techniques. *Circuits and Systems*, 7, 4322-4330.  
<http://dx.doi.org/10.4236/cs.2016.714353>

Received: April 26, 2016

Accepted: May 15, 2016

Published: December 22, 2016

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## Abstract

This paper concentrates on enhancing the productivity of the multilevel inverter and nature of yield voltage waveform. Seven level lessened switches topology has been actualized with just seven switches. Essential Switching plan and Selective Harmonics Elimination were executed to diminish the Total Harmonics Distortion (THD) esteem. Selective Harmonics Elimination Stepped Waveform (SHESW) strategy is executed to dispense with the lower order harmonics. Fundamental switching plan is utilized to control the switches in the inverter. The proposed topology is reasonable for any number of levels. The harmonic lessening is accomplished by selecting fitting switching angles. It indicates would like to decrease starting expense and unpredictability consequently it is able for modern applications. In this paper, third and fifth level harmonics have been disposed of. Simulation work is done utilizing the MATLAB/Simulink programming results have been displayed to accept the hypothesis.

## Keywords

Multilevel Inverter, PSIM, Fundamental Switching Scheme, Selective Harmonics Elimination

## 1. Introduction

These days, multilevel inverters have turned out to be more alluring for their utilization in high-voltage and high-control applications. In multilevel inverters, the fancied yield voltage is accomplished by appropriate blend of numerous low

# Improved Power Factor Correction for BLDC Drive Using Fuzzy Logic Controller

P.M.Dhanasekaran<sup>1</sup>, P.Veena<sup>2</sup>, R.Jeyabharath<sup>3</sup>

Research Scholar, Department of EEE, K. S. Rangasamy College of Technology, Tamilnadu, India<sup>1</sup>

Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India<sup>2,3</sup>

**ABSTRACT:** This paper presents a DCM based PFC (Power Factor Correction) based BL (Bridgeless)-Single phase single ended primary inductance converter (SEPIC) converter fed BLDC (Brushless DC) motor drive. The proposed converter topologies are implemented to provide the near unity power factor in a successful manner. The proposed speed control scheme has the work of DC link voltage control proportional to the desired speed of the BLDC motor. The converter combines the PFC and DC link voltage control and uses a single controller. The bridgeless SEPIC converter topology is used to obtain the low conduction losses and low range of heat sinks for the switches. The proposed system is designed with Fuzzy controller and simulated to operate around a wide range of speed control with near unity power factor at input side. The proposed power factor correction converter limits the harmonic distortion (THD) below 5% of total current at AC mains.

**KEYWORDS:** BLDC, Bridgeless SEPIC converter, THD, Power factor correction, fuzzy logic controller

## I. INTRODUCTION

In recent years BLDC motors are considerably used in a aerospace, Motion control and defence applications such as vehicle tracking, gyroscope, aircraft on swine instrumentation, fuel monitoring position and quick actuators because of their valuable efficiency, high starting torque, reliability, decline maintenance, less chat compared to brushed DC motor [1]. The stator of the BLDCM comprises of three-phase combined windings and rotor has dependable magnets. It is furthermore recognized as an electronically commutated motor (ECM) considering an electric commutation created on rotor position by a three-phase voltage source inverter (VSI) is used [16], [17]. Thus, the problems associated with brushes, one as sparking, and exasperate and roar of the commutator chamber of deputy are excluded. A conventional BLDC motor fed by a Diode bridge rectifier results in total harmonic distortion of supply current in the range of 60% which leads the reduced power factor. The IEC 61000-3-2 standard is recommended for the high power factor and improved power quality at a way with element and gone straight power action at the supply is chosen [18]. Hence an efficient drive system is necessary to give a wide range of speed act with power factor correction and righteous power action at the AC mains at an capable cost.

Due to growing concerns on the power quality, PFC has acquired an important issue. A boost converter is one of the well-known PFC topologies, due to its simple circuitry, simple control scheme and low number of passive elements. Even though a boost converter is accepted as a typical PFC converter, its produce voltage must be higher than its input voltage [5]. The de output voltage is interminably higher than the peak input voltage, Size of EMI filter is high, input-output isolation cannot be implemented plainly, larger PFC inductance, the startup inrush current is valuable, and there is a lack of current limiting during overload conditions [6],[7]. To overcome the problems associated with help type PFC converters, specifically in universal applications where the output voltage is degrade than the input voltage the step up/down converters one as buck-boost, cuk, SEPIC can be used. Generally, these kinds of converters include a full-bridge diode rectifier on an input path, so that switching losses on the full-bridge diode occur and it will be worse especially at the low line. To improve the power supply efficiency and the switching losses, the distinctive topologies for non isolated and isolated power converter circuits have been exposed in [8], [9].

# New DCM Operated Single Phase Bridgeless Cuk Derived Converters for Power Factor Correction

P. M. Dhanasekaran<sup>1</sup>, Parasunath Veena<sup>2</sup>, Rajaiah Jeyabharath<sup>2</sup>

<sup>1</sup>Department of EEE, K. S. Rangasamy College of Technology, Thiruchengode, Tamil Nadu, India

<sup>2</sup>Department of EEE, KSR Institute for Engineering and Technology, Thiruchengode, Tamil Nadu, India

Email: pmdsekar@gmail.com

Received 2 May 2016; accepted 20 May 2016; published 14 July 2016

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## Abstract

This paper presents a power factor corrected (PFC) new bridgeless (BL) Cuk Topologies for low power applications. A BL configuration of Cuk converter is proposed which eliminates the usage of diode bridge rectifier at the front end of the PFC converter, thus reducing the switching and conduction losses coupled with it. This new BL Cuk converter has two semiconductor switches. The current flow during each switching cycle interval of the converter reduces the conduction losses compared to the conventional Cuk PFC converter. It also reduces the input current ripple and Electromagnetic Interference (EMI). The inrush current during the starting period is limited and the input, output currents of the converter are continuous with minimum current ripple. Hence it is preferred mostly compared to other PFC circuits. The proposed topology works in the Discontinuous Conduction Mode (DCM) with simple control circuitry to achieve almost a unity power factor with less distortion in the input AC current. The switching of the power switches is done under zero current. The proposed PFC topologies are theoretically investigated and performance comparisons are made with the conventional rectifiers. The proposed PFC converter is simulated in MATLAB/SIMULINK with Fuzzy Logic Controller (FLC) and results are demonstrated to evaluate the effectiveness of the controller.

## Keywords

Bridgeless (BL) Cuk Converter Topology, Power Factor Correction (PFC), Total Harmonic Distortion (THD), Fuzzy Logic Controller (FLC)

\*Corresponding author

How to cite this paper: Dhanasekaran, P.M., Veena, P. and Jeyabharath, R. (2016) New DCM Operated Single Phase Bridgeless Cuk Derived Converters for Power Factor Correction. *Circuits and Systems*, 7, 2176-2188. <http://dx.doi.org/10.4236/cs.2016.79189>

PRINCIPAL,  
 K. S. R. INSTITUTE FOR  
 ENGINEERING AND TECHNOLOGY,  
 K. S. R. KALVI NAGAR,  
 TIRUCHENGODE -637 215,  
 NAMAKKAL DISTRICT, TAMIL NADU.

# Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor

<sup>1</sup>T.Srihari, <sup>2</sup>R.Jeyabharathi, <sup>3</sup>P.Veena

<sup>1</sup>Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>2</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>3</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

Received 25 April 2016; Accepted 28 May 2016; Available 2 June 2016

**Address For Correspondence:**

T. Srihari, Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

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## ABSTRACT

**Background:** Switched Reluctance Motor's (SRMs) doubly salient structure and its high torque feature make it as to play important role in electric vehicle industry. The good efficiency, high torque and variable speed ratio in addition to low cost, high reliability and fault-tolerance make the Switched Reluctance Motor (SRM) a candidate with real chances on the market of vehicle propulsion. The main drawbacks of the SRM related to the torque ripple, acoustic noise and vibration make the research object in R&Ds all over the world. **Objective:** In this paper the objective of the work is focused on the development of an efficient design of drive system for 8/6 switched reluctance motor based upon Direct Torque Control (DTC) using evolutionary computing technique. DTC is implemented through Space Vector Modulation (SVM) technique which reduces the torque ripple and provides significant control over torque than conventional technique. **Results:** Evolutionary computing involves in tuning the controller parameter through genetic algorithm. Matlab/Simulink model is constructed for the proposed scheme of switched reluctance motor drive model and validate the work with minimization of torque ripple. **Conclusion:** The simulation results show that the designed PI controller performs satisfactorily to track the reference torque with actual torque. This new technique can be implemented in real time with low cost microcontrollers and higher simplicity.

**KEYWORDS:** Direct Torque Control, Space Vector Modulation, Genetic Algorithm, Switched Reluctance Motor Drive

## INTRODUCTION

The policies to reduce emissions from transportation are focusing on the optimization of the efficiency of the existing vehicles, and the electrification of the vehicles. The continuously increasing price of the permanent magnets and the shortage of rare earths demand the finding of alternatives in several domains as hybrid and full electric propulsion due to their best overall performances. The good efficiency, high torque and variable speed ratio in addition to low cost, high reliability and fault-tolerance make the Switched Reluctance Motor (SRM) a candidate with real chances on the market of vehicle propulsion. The converter topology and switching calculation because of the unipolar operation, keeping away from shoot through errors makes SRM worthwhile in utilizations of aviation, which require high unwavering quality. Additionally it finds wide application in car commercial ventures, direct drive machine apparatuses and so forth.

To Cite: This Article: T. Srihari, R. Jeyabharathi, P. Veena, Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor, *Advances in Natural and Applied Sciences*, 10(8), Pages: 6-14

# ANFIS Based Space Vector Modulation-DTC for Switched Reluctance Motor Drive

T. Srihari, R. Jeyabharath, P. Veena

Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, India  
Email: k.t.srihari@gmail.com, jeya\_psg@rediffmail.com, veena\_gce@yahoo.co.in

Received 11 April 2016; accepted 17 May 2016; published 12 August 2016

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## Abstract

Direct torque control (DTC) of Switched reluctance motor is known straightforward control structure with similar execution to that of field situated control strategies. In any case, the part of ideal determination of the voltage space vector is one of the weakest focuses in a routine DTC drive because of adjustable switching frequency and high torque ripple. In this paper, ideal choice of voltage space vectors is accomplished utilizing ANFIS (Adaptive Neuro Fuzzy Inference System) with space vector Modulation. SVM-DTC gives consistent switching frequency and the proposed ANFIS controller's structure manages the torque and stator flux error signals through the fuzzy deduction to get a yield that takes the type of space voltage vector. Simulation results accept the proposed evolutionary system with quick torque and flux reaction with minimized torque ripple and flux ripple.

## Keywords

ANFIS, Direct Torque Control, Flux Control, Space Vector Modulation, Switched Reluctance Motor

## 1. Introduction

Switched reluctance motor, the doubly salient, separately energized motor has basic and simple construction. In spite of the fact that, the induction motor is still the good horse of the industries, the promising component of the high torque to inertia ratio, high torque to mass ratio, less maintenance and incredible general execution of SRM make it an effective contender for alternating current drives. The simple converter topology and dynamic algorithm because of the unipolar operation staying away from shoot through deficiencies makes SRM invaluable in utilizations of aviation, which require high unwavering quality. Additionally, it finds wide application in commercial car enterprises, direct drive machine apparatus and so forth [1].

In any case, huge torque ripple, vibration and acoustic noise are the principle disadvantages of SRM to ac-



## Designing of Real Time Controlled Area Network for automobiles using LabVIEW and cRIO

Manoj Kumar Palaniswamy\*; P Veena\*\*

\*Department of Electrical and Electronics Engineering,  
K. S. Rangasamy College of Technology,  
Tiruchengode, India.

\*\*Department of Electrical and Electronics Engineering,  
KSR Institute for Engineering and Technology,  
Tiruchengode, India.

### Abstract

Controller Area Network protocol is used in automobiles to communicate between the sensors and actuators. CAN coded through LabVIEW is flexible for the users to modify that easily according to the complexity of sensors and the speed requirements. CAN in current scenario coding for CAN is done in normal embedded C which makes the code difficult to understand. BITWISE CAN arbitration CAN be done in same principle but Baud rate can be increased from 128 to 256 Hz. Debugging errors in the code also takes time. Syntax errors can be debugged but logical error detection becomes almost a tough and impossible task. But if LabVIEW is used for coding the logical error identification and debugging is easy as the data flow is viewed through our eye. Embedded code for CAN is embedded into cRIO and CAN bus is controlled. Scanning rate of CAN Tx and Rx is increased from 48 MHz to 533MHz thus increasing speed of Rx and Tx to 3x per second.

**Keywords:** CAN, LabVIEW, cRIO, Vehicular Communication.

### 1. Introduction

Controlled networks, also known as CAN (Controlled Area Network), and is embedded in vehicle controllers and access points at every sensor and ECU (Electronic Control Unit). Such network is used for controlling every action taken by ECU. „CAN controller basics“ by Keith Pazul of Microchip Technology Inc., „Controller Area Network (CAN) Implementation“ by Dr. Conal Watters, „Introduction to the Controller Area Network (CAN)“ by Steve Corrigan mentions about

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K. S. R. KALVINAGAR,  
TIRUCHENGODE - 637 215,  
NAMAKKAL DISTRICT, TAMIL NADU.



# FPGA SoC Based Multichannel Data Acquisition System with Network Control Module

C. Rajasekaran<sup>1</sup>, R. Jeyabharath<sup>2</sup>, P. Veena<sup>2</sup>

<sup>1</sup>Department of ECE, K S Rangasamy College of Technology, Tiruchengode, India

<sup>2</sup>Department of EEE, K S R Institute for Engineering and Technology, Tiruchengode, India

Email: raja7ksrct@gmail.com, jeya\_psg@rediffmail.com, veena\_gce@yahoo.co.in

How to cite this paper: Rajasekaran, C., Jeyabharath, R. and Veena, P. (2017) FPGA SoC Based Multichannel Data Acquisition System with Network Control Module. *Circuits and Systems*, 8, 53-75.  
<https://doi.org/10.4236/cs.2017.82004>

Received: April 20, 2016

Accepted: February 25, 2017

Published: February 28, 2017

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## Abstract

Normally, Data acquisition (DAQ) is used to acquire the signals from different devices like sensors, transducers, actuators etc. The data acquisition is also used to analyze the signals, digitizing the signals and acquiring the signals from different inputs. The main drawbacks in data acquisition system are data storage, hardware size and remote monitoring. The System-on-Chip Field Programmable Gate Array (SoC-FPGA) is used in the proposed system in the aim to reduce the hardware and memory size. Further to provide remote monitoring with Ethernet/Wi-Fi, the Network Control Module (NCM) is integrated with Data acquisition and processing module for the communication between the systems. This developed system achieves high resolution with memory reduction, reduced hardware size, fast remote monitoring and control. It is used for real time processing in DAQ and signal processing. For fault tolerance and portability, the full system reconfigurability based FPGA acts as the best solution and the system can be reused with different configurations. The control of data acquisition and the subsequent management of data are coded in LabVIEW. LabVIEW tool is used to design and develop a four-channel Data Acquisition and Processing (DAQP) unit. National Instruments Data Acquisition (NIDAQ) and National Instruments Field Programmable Gate Array (NIFPGA) are used to test and implement the design for real time processing. This is designed to provide high accuracy, storage and portability.

## Keywords

DAQ, Real Time Monitoring, SoC FPGA, Multichannel & Data Storage

## 1. Introduction

The data acquisition and processing system has many applications in measurement and control systems. The main work in data acquisition is to measure an

# ADVANCES in NATURAL and APPLIED SCIENCES

ISSN: 1995-0772  
EISSN: 1998-1090  
2016 June 10(8): pages 6-14

Published BYAENSI Publication  
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## Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor

<sup>1</sup>T.Srihari, <sup>2</sup>R.Jeyabharathi, <sup>3</sup>P.Veena

<sup>1</sup>Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>2</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

<sup>3</sup>Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

Received 25 April 2016; Accepted 28 May 2016; Available 2 June 2016

**Address For Correspondence:**

T. Srihari, Assistant Professor, Department of Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.

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### ABSTRACT

**Background:** Switched Reluctance Motor's (SRMs) doubly salient structure and its high torque feature make it as to play important role in electric vehicle industry. The good efficiency, high torque and variable speed ratio in addition to low cost, high reliability and fault-tolerance make the Switched Reluctance Motor (SRM) a candidate with real chances on the market of vehicle propulsion. The main drawbacks of the SRM related to the torque ripple, acoustic noise and vibration make the research object in R&Ds all over the world. **Objective:** In this paper the objective of the work is focused on the development of an efficient design of drive system for 8/6 switched reluctance motor based upon Direct Torque Control (DTC) using evolutionary computing technique. DTC is implemented through Space Vector Modulation (SVM) technique which reduces the torque ripple and provides significant control over torque than conventional technique. **Results:** Evolutionary computing involves in tuning the controller parameter through genetic algorithm. Matlab/Simulink model is constructed for the proposed scheme of switched reluctance motor drive model and validate the work with minimization of torque ripple. **Conclusion:** The simulation results show that the designed PI controller performs satisfactorily to track the reference torque with actual torque. This new technique can be implemented in real time with low cost microcontrollers and higher simplicity.

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### INTRODUCTION

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To Cite: This Article: T. Srihari, R. Jeyabharathi, P. Veena, Evolutionary Computing Technique for Torque Ripple Minimization of 8/6 Switched Reluctance Motor, *Advances in Natural and Applied Sciences*, 10(8), Pages: 6-14

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ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVINAGAR,  
TIRUCHENGODE-637 215,  
TAMILNADU.

# ANFIS Based Space Vector Modulation-DTC for Switched Reluctance Motor Drive

**T. Srihari**, R. Jeyabharath, P. Veena

Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, India  
Email: k.t.srihari@gmail.com, jeya\_psg@rediffmail.com, veena\_gce@yahoo.co.in

Received 11 April 2016; accepted 17 May 2016; published 12 August 2016

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## Abstract

Direct torque control (DTC) of Switched reluctance motor is known straightforward control structure with similar execution to that of field situated control strategies. In any case, the part of ideal determination of the voltage space vector is one of the weakest focuses in a routine DTC drive because of adjustable switching frequency and high torque ripple. In this paper, ideal choice of voltage space vectors is accomplished utilizing ANFIS (Adaptive Neuro Fuzzy Inference System) with space vector Modulation. SVM-DTC gives consistent switching frequency and the proposed ANFIS controller's structure manages the torque and stator flux error signals through the fuzzy deduction to get a yield that takes the type of space voltage vector. Simulation results accept the proposed evolutionary system with quick torque and flux reaction with minimized torque ripple and flux ripple.

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In any case, huge torque ripple, vibration and acoustic noise are the principle disadvantages of SRM to ac-

### Performance Analysis and Speed Regulation Estimation of SR Motor Using FT-ANN Controller with Steady State Stability and Fft Analysis

<sup>1</sup>Murugesan Arumugam and <sup>2</sup>Jeyabharath Rajaiah

<sup>1</sup>Research Scholar, Anna University/Assistant Professor/EEE,  
KSR Institute for Engineering and Technology, Tamilnadu, India

<sup>2</sup>Professor, Department of EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

**Abstract:** A closed loop speed regulation estimation of Switched Reluctance (SR) Motor with Fuzzy Tuned Artificial Neural Network (FT-ANN) Controller has been simulated and presented in this paper. The FT-ANN has been used for the closed loop controller and the speed regulation of the SR motor has been estimated with Fuzzy Logic Controller (FLC) and FT-ANN. The comparative results are presents for both static and dynamic conditions. The mathematical model of the SR motor has been developed for steady state stability analysis and simulated using MATLAB. The Harmonic Spectrum (FFT) and steady state error for various speed and load condition have been obtained to validate the role of FT-ANN controller. The FT-ANN based system is expected to give better speed regulation for various load conditions. A prototype 300-W, 50Hz model is designed and built for experimental demonstrations; the transient and steady-state performances for the SR motor are compared from the simulation studies. The result of MATLAB simulation and execution it is clear that the FT-ANN can have better controller compared with Fuzzy Logic Controller (FLC).

**Key words:** Switched Reluctance Motor · Artificial Neural Network · Fuzzy Logic Controller · Stability analysis · PWM Inverter

#### INTRODUCTION

The design and developed of SR motor have been focused for variable speed applications with high power density in the recent past. It has been found that these types of special motor have several advantages such as simplicity, less maintenance, robustness, higher torque volume ratio, high starting torque, high efficiency, low manufacturing cost and high speed. The SR motor is highly nonlinear and it operates to steady state region to maximum torque region. This type of special motor having a torque is nonlinear function of rotor position and current. The many researchers has been experimentally demonstrated and reported related to SR motor to solve above problems using different controllers.

Hany M *et al.* [1] have developed the torque ripple minimization of the SR motor with digital controller. The model of SR motor has been presented with torque equation. There is no analysis of the performance of the motor. The speed control of the switched reluctance

generator with artificial neural network controller has been presented in. The performance of the generator has been analyzed with variable speed turbine connected in grid. Kioskeridis *et al.* [2] have demonstrated the single pulse controlled SR motor with high efficiency. This control technique is more complicate compare to FT-ANN controller. The dynamic and steady state performance of the motor was not presented.

Yana Zhou *et al.* [3] have developed the torque ripple minimization of the SR motor with sensor less controller using neural network. The neural network structural design was not present. The speed variation with load changes was not present. The speed controller of the SR motor has been developed and presented with adaptive neural network controller in. The dynamic behavior of the motor has been presented. The load disturbance of the motor has been presented with controller performance. Here there is no analysis of the steady state and stability of the motor. Any M *et al.* [4] have demonstrated the speed control of SR motor with adaptive neuro-fuzzy

Corresponding Author: Murugesan Arumugam, Research Scholar, Anna University/Assistant Professor/ EEE, KSR Institute for Engineering and Technology, Tamilnadu, India

**K. S. R. INSTITUTE FOR  
ENGINEERING AND TECHNOLOGY,  
K. S. R. KALVI NAGAR,  
TIRUCHENGODE-637 215,  
NAMAKKAL Dt. TAMIL NADU.**

# ANALYSIS OF ABNORMALITIES IN COMMON CAROTID ARTERY IMAGES USING MULTI WAVELETS

**R. Nandakumar<sup>1</sup> and K.B. Jayanthi<sup>2</sup>**

<sup>1</sup>Department of Electronics and Communication Engineering, K.S.R. Institute for Engineering and Technology, India  
E-mail: <sup>1</sup>nandhur79@gmail.com

<sup>2</sup>Department of Electronics and Communication Engineering, K.S. Rangasamy College of Technology, India  
E-mail: <sup>2</sup>jayanthikb@gmail.com

## Abstract

According to the report given by World Health Organization, by 2030 almost 23.6 million people will die from cardiovascular diseases (CVD), mostly from heart disease and stroke. The main objective of this work is to develop a classifier for the diagnosis of abnormal Common Carotid Arteries (CCA). This paper proposes a new approach for the analysis of abnormalities in longitudinal B-mode ultrasound CCA images using multiwavelets. Analysis is done using HM and GHM multiwavelets at various levels of decomposition. Energy values of the coefficients of approximation, horizontal, vertical and diagonal details are calculated and plotted for different levels. Plots of energy values show high correlation with the abnormalities of CCA and offer the possibility of improved diagnosis of CVD. It is clear that the energy values can be used as an index of individual atherosclerosis and to develop a cost effective system for cardiovascular risk assessment at an early stage.

## Keywords:

Ultrasound, Common Carotid Artery, Multiwavelets, Energy Measurement, Classification

## 1. INTRODUCTION

For screening the cardiovascular diseases of the carotid artery, ultrasound imaging is a common procedure as the vessel is easily accessible with ultrasound probes [1]. Because of CVDs more people die annually than from any other cause. It has been reported by World Health Organization in a recent study that in the year 2008 nearly 17.3 million people died from CVDs. This represents 30% of all global deaths. In this 7.3 million people died due to coronary heart disease and 6.2 million were due to stroke [2].

Arteries are blood vessels that carry blood between the heart, different tissues and organs of the body. They have ability to expand or contract to allow more blood or control the flow. Hollow centre through which blood flows is called lumen. CCA supplies oxygenated blood to skull, brain, eyeballs, ears and external nose [3]. When the blood supply to parts of the brain is suddenly interrupted, stroke occurs. Aortic stiffness has been proven to be a strong independent predictor of all-cause and CVD. Estimation of regional stiffness of the carotid artery is of great clinical interest [4]. The changes in stiffness with age are accelerated in hypertension and highly amplified by the association with other CVDs and concomitant risk factors [5].

Atherosclerosis is the thickening and narrowing of the arteries due to formation of plaque on the walls of the artery. It causes enlargement of the arteries and thickening of the artery walls [6, 7]. The diameter of CCA decreases due to increase in the thickness. This causes a reduction of the lumen with possible vascular problems and alters the arterial properties elasticity and

stiffness. Precise segmentation of carotid artery allows the computation of various biomechanical and anatomical properties of the artery wall that may be useful to clinicians to follow the evolution of the atherosclerosis diseases [8].

Ultrasound imaging has the advantage that it is noninvasive and does not involve the use of ionizing radiation. It is therefore ideally suited to serial investigations. It is also relatively inexpensive and images are acquired in real time [9, 10]. Longitudinal B-mode ultrasound images are used in this work. The resolution of diagnostic ultrasound image is significantly limited by speckle noise. It is believed that speckle is a high frequency component of the image [11]. As the texture of speckle often carries useful information, it is not truly a noise in the typical engineering sense. Ultrasound experts with insufficient experience may not often draw useful conclusions from the images due to the presence of speckle.

Though different methods are investigated for the analysis of carotid artery, the need still exists for the development, implementation and evaluation of an integrated system enabling the automated diagnosis. In the previous work boundary of CCA was extracted using watershed and wavelet transforms. The diameter was measured from the extracted boundary and used for the analysis of plaque deposit in the vessel [12][13]. In this work an effort is made to analyse the CCA using multiwavelets and correlate the findings with the atherosclerosis.

Multi scale representation has proven to be useful in many image processing applications. Recently, multiwavelets have been introduced as a more powerful multi-scale analysis tool. A scalar wavelet system is based on a single scaling function and mother wavelet. But multiwavelet system is based on several scaling functions and mother wavelets. It has several useful properties such as symmetry, orthogonality, short support and a higher number of vanishing moments simultaneously [14].

Multiwavelets can simultaneously provide perfect reconstruction, while preserving length (orthogonality), good performance at the boundary (via linear phase symmetry) and a higher order of approximation (vanishing moments). These features of multiwavelets are responsible for the better performance of multiwavelets over scalar wavelets in image processing applications [15,16]. Geronimo, Hardin and Massopust constructed one of the most well-known multiwavelets called GHM. GHM basis provides a combination of orthogonality, symmetry and compact support that is unachievable by any other scalar wavelet basis [17]. HM and GHM multiwavelets are used in this work to analyse the normal and abnormal CCA images.

# Indian Traffic Sign Recognition Using HSV Color Model and Kernel Extreme Learning Machine

W. Devapriya and C. Nelson Kennedy Babu

**Abstract**— In Advance Driver Assistance System (ADAS), Traffic Sign Recognition (TSR) is one of the significant area where endless research works are carried out. In the proposed method, TSR system involves two modules: 1) extraction of deep perceptual feature using HSV color model and 2) classification of traffic signs under different categories using Kernel Extreme Learning Machine (KELM) algorithm. HSV color model stands a step toward positive direction than other color model by measuring discriminative ratio. The comparison of KELM under various kernel function like linear, polynomial, RBF, sigmoidal are analysed and it is concluded that the wavelet kernel function gives superior result than other kernel function. For classification purpose, the proposed algorithm has excellent generalization performance, classification accuracy and computational cost when compare to existing methods like ELM, SVM, Conventional Neural Network (CNN), random Forest etc. For analysing the performance two set of traffic sign databases are consider namely GTSDB and own Indian TSDB.

**Keywords**— Extreme Learning Machine, Kernel Extreme Learning Machine (KELM), Kernel, HSV, Traffic Sign, Wavelet, RBF.

## I. INTRODUCTION

TSR is one of vital area on Intelligent Transport System (ITS) for both safety and efficient transportation. A well programmed TSR framework is very useful for drivers and it is basic for independent automated cars. Traffic difficulties are city traffic congestion, safe driving, detection of sign board and speed bump and transportation efficiency. Though the traffic signs are clearly visible, at some time they are not noticed due to driver distraction or some other disturbances. This can be overcome by the new TSR systems. To be sure, they warn the driver perhaps about the missed traffic sign. The present challenging issues in TSR are changing viewpoint of the roadside, partial occlusion, motion blur, contrast degradation, colour distortion and etc.

Traffic signs and street markings are quiet speakers to the street customers. Each road customers ought to know about the signs and their significance. A wide range of traffic signs are seen on the streets. They give proper and required information about street conditions ahead. A street marking additionally gives requests, cautioning or direction to drivers or riders. Basically there are four categories of traffic sign in India as shown in Table 1. Compulsory Sign -These kinds of signs are used to alert driver about the laws and regulations they have to follow for safety and avoid congestion of traffic. These include prohibition or restrictions sign for which the road user must obey. They are circular in shape with red circumference may also contains cross line in black. The abuse of these signs is a legal offence. Sign like no U turn, no entry, no Horn, no left entry will fall under this category. Stop sign which have hexagon shape with red color is also include under this category.

W. Devapriya, Electronics and Communication Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Namakkal, Tamilnadu, India

C. Nelson Kennedy Babu, Computer Science Engineering, Dhanalakshmi Srinivasan College of Engineering, Coimbatore, Tamilnadu, India.

ISSN 2320-4387 | © EDITOR IJPPAS

  
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**NAMAKKAL Dt, TAMIL NADU.**

# Real Time Speed Bump Detection Using Gaussian Filtering and Connected Component Approach

W. Devapriya<sup>1</sup>, C. Nelson Kennedy Babu<sup>2</sup>, T. Srihari<sup>3</sup>

<sup>1</sup>Electronics and Communication Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Namakkal, India

<sup>2</sup>Computer Science Engineering, Dhanalakshmi Srinivasan College of Engineering, Coimbatore, India

<sup>3</sup>Electrical and Electronics Engineering, KSR Institute for Engineering and Technology, Tiruchengode, Namakkal, India

Email: w.devapriyya@gmail.com, cnkbabu63@gmail.com, k.t.srihari@gmail.com

Received 30 March 2016; accepted 20 April 2016; published 12 July 2016

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## Abstract


An Intelligent Transportation System (ITS) is a new system developed for the betterment of user in traffic and transport management domain area for smart and safe driving. ITS subsystems are Emergency vehicle notification systems, Automatic road enforcement, Collision avoidance systems, Automatic parking, Map database management, etc. Advance Driver Assists System (ADAS) belongs to ITS which provides alert or warning or information to the user during driving. The proposed method uses Gaussian filtering and Median filtering to remove noise in the image. Subsequently image subtraction is achieved by subtracting Median filtered image from Gaussian filtered image. The resultant image is converted to binary image and the regions are analyzed using connected component approach. The prior work on speed bump detection is achieved using sensors which are failed to detect speed bumps that are constructed with small height and the detection rate is affected due to erroneous identification. And the smartphone and accelerometer methodologies are not perfectly suitable for real time scenario due to GPS error, network overload, real-time delay, accuracy and battery running out. The proposed system goes very well for the roads which are constructed with proper painting irrespective of their dimension.

## Keywords

Intelligent Transportation System, Speed Bumps, Driver Assistance System, Gaussian and Median Filtering, Connected Component Analysis

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How to cite this paper: Devapriya, W., Nelson Kennedy Babu, C. and Srihari, T. (2016) Real Time Speed Bump Detection Using Gaussian Filtering and Connected Component Approach. *Circuits and Systems*, 7, 2168-2175.  
<http://dx.doi.org/10.4236/cs.2016.79188>

  
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NAMAIKAL Dt, TAMIL NADU.

# STUDY OF AIR FLOW THROUGH MODIFIED HVAC DUCTS IN A MULTI UTILITY VEHICLE USING CFD SOFTWARE

R.Sasidaran<sup>1</sup> | P.Murugesan<sup>2</sup> | R.Vasantha Kumar<sup>3</sup>

<sup>1</sup>(Dept. of Mechanical Engg., PG Scholar, KSR Institute for Engg. & Tech., Namakkal, TN, India, sasidaranfng@gmail.com)

<sup>2</sup>(Dept. of Mechanical Engg. Professor & HOD, KSR Institute for Engg. & Tech., Namakkal, TN, India)

<sup>3</sup>(Department of Mechanical Engineering, Assistant Professor, KSR Institute for Engg. & Tech., Namakkal, TN, India)

**Abstract**—The main objective is to enhance the thermal comfort by modifying the HVAC ducts inside a Multi Utility Vehicle (MUV) cabin. A modified Duct is presently established in a Sedan, a four/five seated vehicle. The study relates with a motive for utilizing the same duct for a (MUV) in this case a seven seated arrangement. Since the air flow is hard to model mathematically, multiphase flow analysis is to be carried out by means of CFD software. The interior of the cabin is designed using a CAD software and enables to easily understand the flow procedure within the duct and responsive to flow velocities inside the cabin. The flow parameter involves the selection of appropriate duct model for the prediction. The model of a car is made by SOLIDWORKS software. The air flow velocity and directivity due to the modification in ducts is analysed with the ANSYS fluent software.

**Keywords**—HVAC, Duct, Multi Utility Vehicle (MUV), ANSYS fluent.

## 1. INTRODUCTION

ISHRAE (Indian Society of Heating Refrigeration and Air-conditioning Engineers), proposed an Adaptive Thermal Comfort theory suggests that, indoor comfort is influenced by outdoor climate and aspects such as connection to outdoors and control over the immediate environment allow occupants to adapt to a wider range of thermal conditions. In this case, influence of outdoor air is acted only on the Condenser, and so the cooling rate is optimized with the duct arrangement, provided that the Indoor Air Quality (IAQ), is set to be purified by the circular action of the Automotive Air conditioning arrangement.

Like a normal housing HVAC structure, a Car's Air Conditioning duct is simplified in its design. In this case, a modification is proposed to a Formal HVAC duct. The arrangement is clearly simplified in order to perform Computational study without any drawback over meshing. The modified arrangement already exists, with different forms for different cars. This paper deals with the use of modified duct, replacing the formal duct in a seven seated car cabin. The interior arrangement in the duct enables the flow through system to be easily studied and improvised. The case is completely Transient (time based), model so the reaching of air velocity is studied using the computational model. The result suggested will be comparatively compensating the theoretical factors like cooling rate and Temperature reduction.

## 2. THERMAL COMFORT

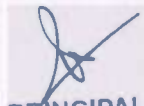
According to the ASHRAE, Air Conditioning is the science of controlling the temperature, humidity, motion and cleanliness of the air within an enclosure. In a passenger/driver cabin of a vehicle, air conditioning means controlled and comfortable environment in the passenger cabin during summer and winter, i.e., control of

temperature (for cooling or heating), control of humidity (decrease or increase), control of air circulation and ventilation (amount of air flow and fresh intake vs. partial or full recirculation) and cleaning of the air from odour, pollutants, dust, pollen, etc. before entering the cabin.

While the A/C system provides comfort to the passengers in a vehicle, its operation in a vehicle has twofold impact on fuel consumption: (1) burning extra fuel to power compressor for A/C operation and (2) carrying extra A/C component load in the vehicle all the time. In addition, the A/C running depends on the climatic condition of the concerned geographical region and the time of the year.

Of course, the impact on the fuel consumption is more significant when the A/C is installed in compact and sub-compact vehicles.

Next, in addition to the enhanced A/C system with R134a, the alternative refrigerants (CO<sub>2</sub>, R-152a, and HC blends) are briefly described to replace R134a for reduction in global warming. While the auto A/C is becoming very sophisticated, the newer systems are becoming more energy efficient for the desired high performance and the cost is continually reducing with the same or better durability and reliability.

  
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R.Sasidaran<sup>1</sup> | P.Murugesan<sup>2</sup> | R.Vasanth Kumar<sup>3</sup>

<sup>1</sup>(Dept. of Mechanical Engg., PG Scholar, KSR Institute for Engg. & Tech., Namakkal, TN, India, sasidaran\_fm@gmail.com)

<sup>2</sup>(Dept. of Mechanical Engg. Professor & HOD, KSR Institute for Engg. & Tech., Namakkal, TN, India)

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While the A/C system provides comfort to the passengers in a vehicle, its operation in a vehicle has twofold impact on fuel consumption: (1) burning extra fuel to power compressor for A/C operation and (2) carrying extra A/C component load in the vehicle all the time. In addition, the A/C running depends on the climatic condition of the concerned geographical region and the time of the year.

Of course, the impact on the fuel consumption is more significant when the A/C is installed in compact and sub-compact vehicles.

Next, in addition to the enhanced A/C system with R134a, the alternative refrigerants (CO<sub>2</sub>, R-152a, and HC blends) are briefly described to replace R134a for reduction in global warming. While the auto A/C is becoming very sophisticated, the newer systems are becoming more energy efficient for the desired high performance and the cost is continually reducing with the same or better durability and reliability.

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## Investigation of Mechanical Behaviour on Natural Fiber (Sisal/Banana) Reinforced Epoxy Composite

R. Karthikeyan<sup>1\*</sup>, M.V. Shanmugam<sup>2</sup>, P. Divyakumar<sup>3</sup>

<sup>1</sup>Department of Mechanical Engineering, Dr. N.G.P. Institute of Technology, Coimbatore, India

<sup>2</sup>Department of Mechanical Engineering, KSR Institute for Engineering and Technology, Tiruchengode, India

<sup>3</sup>Department of Mechanical Engineering, K.S. Rangasamy College of Technology, Tiruchengode, India

### Abstract

This project investigates tensile, flexural, impact and compression behavior of sisal & banana fiber reinforced epoxy composites. which is used for the purpose of decoration parts for constructions, inner parts and automobile and boat. Sisal fiber is a promising reinforcement for use in composites on account of its low cost, low density, high specific strength and modulus, no health risk, easy availability in some countries and renewability. Fiber is reinforced with epoxy resin in different volume fraction. The experimental values shows that the tensile and flexural properties of sisal & banana fiber reinforced composite increases with increase in fiber content and 40:60 volume fractions ( $V_f$ ) of sisal and banana fiber contained composite gives the maximum tensile and flexural strength. The 60:40 volume fractions ( $V_f$ ) of sisal and banana fiber contained composite gives the maximum impact strength. The 40:60 volume fractions ( $V_f$ ) of sisal and banana fiber contained composite gives the maximum compression strength. The experiment shows 40:60 volume fraction ( $V_f$ ) of the composite achieves better performance compare with other different Volume fractions ( $V_f$ ) of the sisal-banana fiber reinforced epoxy composite.

**Keywords:** impact and compression behavior, tensile, flexural, volume fraction –  $V_f$

\*Corresponding Author

E-mail: rkart7@gmail.com

### INTRODUCTION

In recent years, there has been an increase in interest in the use of natural fibers to reinforce composite materials. In comparison with synthetic fibers, natural fibers are low in cost, low density, and have highly specific properties. Epoxy matrix composites as the name indicate, consists of epoxy as the matrix, filled with other materials. This type of composites is easy to produce with minimum cost and have better performances. A composite material is a combination of two or more materials that give a unique combination of properties. One of the materials of stiff, long fibers and other is made of a binder or 'matrix' which holds the fiber in place.

More recently natural fibers have been used along with fiber materials. The natural fibers are extracted from the naturally available plants. The availability of natural fibers such as Jute, Coir, Bamboo, Banana, Sisal, Pineapple, etc. <sup>(1)</sup> To rise the development of natural fiber composite. In the field of automation and structural engineering this type of natural fibers composites are readily used. (1) Natural fibers are readily used as reinforcement in Epoxy composites. The use of coupling agent with Epoxy are discussed and evaluated. The thermo kinetic mixer is used to mix the sisal fiber with the polymeric matrix with speed rate of 5250 rpm, in which fiber where

## Characterisation of a grooved heat pipe with an anodised surface

A. Brusly Solomon<sup>1,2</sup> · A. M. Ram Kumar<sup>3</sup> · K. Ramachandran<sup>4</sup> · B. C. Pillai<sup>1</sup> · C. Senthil Kumar<sup>5</sup> · Mohsen Sharifpur<sup>2</sup> · Josua P. Meyer<sup>2</sup>

Received: 8 February 2016 / Accepted: 15 June 2016 / Published online: 21 June 2016  
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**Abstract** A grooved heat pipe (GHP) is an important device for managing heat in space applications such as satellites and space stations, as it works efficiently in the absence of gravity. Apart from the above application, axial GHPs are used in many applications, such as electronic cooling units for temperature control and permafrost cooling. Improving the performance of GHPs is essential for better cooling and thermal management. In the present study, the effect of anodization on the heat transfer characteristics of a GHP is studied with R600a as a working fluid. In addition, the effects of fill ratio, inclination angle and heat inputs on the heat transfer performance of a GHP are studied. Furthermore, the effect of heat flux on dimensional numbers, such as the Weber, Bond, Kutateladze and condensation numbers, are studied. The inclination angle, heat input and fill ratio of GHPs are varied in the range of 0°–90°, 25–250 W and 10–70 % respectively. It is found that the above parameters have a significant effect on the performance of a GHP. Due to the anodisation, the maximum enhancement

in heat transfer coefficient at the evaporator is 39 % for a 90° inclination at a heat flux of 11 kW/m<sup>2</sup>. The reported performance enhancement of a GHP may be due to the large numbers of nucleation sites created by the anodisation process and enhancement in the capillary force due to the coating.

### List of symbols

- $Bo$  Bond number  $\left( D \left[ \frac{g(\rho_l - \rho_v)}{\sigma} \right]^{\frac{1}{2}} \right)$
- $c_{pl}$  Specific heat of coolant fluid (J/kg K)
- $Co$  Condensation number  $\left( \frac{h}{k} \left[ \frac{\mu^2}{g \rho^2} \right]^{\frac{1}{3}} \right)$
- $D$  Diameter (m)
- $h$  Heat transfer coefficient (W/m<sup>2</sup> K)
- $I$  Current (A)
- $T$  Temperature (°C)
- $k$  Thermal conductivity (W/m K)
- $l$  Length (m)
- $\dot{m}_l$  Mass flow rate of coolant (kg/s)
- $Ku$  Kutateladze number  $\left[ \frac{q}{\left[ \rho_v h_{fg} \left( \frac{\rho_l - \rho_v}{\rho_v^2} \right) \right]^{\frac{1}{4}}} \right]$
- $Q$  Heat transfer rate (W)
- $q$  Heat flux (W/m<sup>2</sup>)
- $R$  Resistance (°C/W)
- $r$  Radius (m)
- $V$  Voltage (V)
- $W$  Width of groove (m)
- $We$  Weber number  $\left( \frac{Q^2}{\rho_v D^3 h_{fg}^2 \sigma} \right)$
- $\sigma$  Surface tension (N/m)
- $\theta$  Contact angle

✉ A Brusly Solomon  
abruslysolomon@gmail.com

<sup>1</sup> Centre for Research in Material Science and Thermal Management, Department of Mechanical Engineering, Karunya University, Coimbatore, India

<sup>2</sup> Department of Mechanical and Aeronautical Engineering, University of Pretoria, Pretoria, South Africa

<sup>3</sup> Department of Mechanical Engineering, KSR Institute for Engineering and Technology, Namakkal, India

<sup>4</sup> Department of Physics, Bharathiar University, Coimbatore, India

<sup>5</sup> Department of Mechanical Engineering, SNS College of Technology, Coimbatore, India

## An Efficient Crypto Based Security Authentication System for Detecting Deduplication on Cloud Storage

### Publication History

Received: 19 July 2016

Accepted: 16 August 2016

Online First: 26 August 2016

Published: July-September 2016

### Citation

Suriya L, Dhurga Devi M, Meenakshi Devi. An Efficient Crypto Based Security Authentication System for Detecting Deduplication on Cloud Storage. *Discovery Engineering*, 2016, 4(13), 400-405


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# PSO based Algorithm for Wireless Rechargeable Sensor Networks

**M. Dhurgadevi**  
KSR Institute for  
Engineering and Technology  
Tamilnadu

**P. Meenakshi Devi, PhD**  
KSR Institute for  
Engineering and Technology  
Tamilnadu

## ABSTRACT

Wireless energy transfer is a recent emerging technology in wireless sensor network. This technology is a promising alternative to the power constraint problem in wireless sensor networks. Energy is the important constraint in sensor network which can be improved by different technology. Energy harvesting techniques can scavenge some amount of energy but still it's not enough. Lots of researchers put effort to solve this problem which results in wireless energy transfer. With the development in the technology, multiple nodes can be charged simultaneously by wireless charging vehicle.

Scheduling of wireless charging vehicle helps to improve the network lifetime. In addition to optimizing the travel time of the wireless charging vehicle the cost arising from travel path of charger between the nodes must also be taken into account. In this paper a (psa) based heuristics to schedule the travel path of wireless charging vehicle that takes into account both the travel cost and travel time. The result is experiment with a sample environment by varying its travel cost and travel time. Our results show that PSO can achieve shortest travel path and cost is also saved as well as network lifetime is improved.

## Keywords

Wireless energy transfer, sensor networks, Particle swarm optimization (PSO), Wireless charging Vehicle (WCV), travel path.

## 1. INTRODUCTION

The recent promising wireless charging technology provides a solution to sensor nodes by means of charging wirelessly. The wireless charging technology was initiated by Kurs et al [1]; By means of the two strongly coupled magnetic resonant objects he tried to transfer energy from one storage device into other device wirelessly. In Wireless power charging Technology [2], power can be transferred from the transmitting antenna of a power charger to the receiving antennas of a power charger to sensor nodes receiving antennas. The power is transferred to DC voltage for the purpose of sensor utilization or else it can be stored in batteries.

Wireless sensor networks (WSN) are mainly powered by batteries. The battery storage capacity is limited and so a WSN can only remain operational for a limited amount of time. To extend the lifetime of sensor networks lot of efforts are put by various researchers. But still it remains as a bottleneck. This area of research leads to the growth of wireless energy in fields of electronics, health care, electrical vehicles, etc. For example, wireless charging pads is used to charge mobile devices without connecting charging cables whenever they are placed on the pad [3]. In case of health care applications wireless charging of implanted batteries is replaced by surgical operation to dispose old batteries.

Wireless charging technology provides a new research solution to the emerging Electrical Vehicle (EV) industry. This can be introduced with high efficiency to deliver hundreds of watts of energy, where the charging system are placed at power stations, parking lots or even under the road surface to recharge EV's battery packs [4]. For the next generation WSNs, wireless charging technology has to grow up with hybrid technology to power the sensor nodes and these networks are known as Wireless Rechargeable Sensor Networks (WRSNs).

There are lots of applications that utilize commercial products from Powercast to charge the sensor nodes wirelessly [5]–[8]. The Radiation-based wireless charging techniques have very low efficiency and can only transfer a small amount of energy whereas magnetic resonant coupling proposed in [9] has high efficiency and supports transferring hundreds of watts of energy over a large air gap. To implement futuristic WRSNs, this technique is adopted in mobile vehicles where resonant coils and high-density battery packs are used in very close proximity and deliver wireless energy to the nodes with high efficiency [10]–[16]. To schedule more than one vehicle to recharge all the sensors is a great challenge [15], [16]. In addition to it vehicle's recharge capacity, travelling cost pose great research issue [16]. These problems are NP-hard and new algorithms arrived with good results which are more desirable [14]–[16].

In this paper, the main focus is on minimizing the total travelling cost of wireless charging vehicles to recharge the sensors. In order to achieve this fair scheduling algorithm should be implemented. This is achieved by using a meta-heuristics method called Particle Swarm Optimization (PSO). Kennedy and Eberhart introduced a self-adaptive global search based optimization technique which is called as Particle Swarm Optimization (PSO) [17]. The algorithm is similar to Genetic algorithms but, the difference is only no direct recombination of individuals of the population. It is based on the social behavior of the particles. In PSO each particle adjusts its trail based on its best position (local best) and the position of the best particle (global best) of the entire population. This increases the stochastic nature of the particle and converges quickly to a global minimum with a good solution.

The advantage of using PSO is its simplicity and its effectiveness in wide range of application with low computational cost. Some examples of PSO application are: the reactive voltage control problem [18], data mining [19], pattern recognition [20] and environmental engineering [21], Scheduling [22, 23] and task allocation [24, 25].

The works contributed in this paper are as follows:

- A model is formulated for WCV-SN mapping to minimize the overall cost of Recharging.

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# An Analysis of Hierarchical Routing Protocol in Wireless Sensor Networks

M.Dhurgadevil<sup>1\*</sup>

Department of Information Technology  
KSR Institute for Engineering and Technology,  
Tiruchengode, India  
E-mail: cdhurgasakthi3@gmail.com

Dr.P.Meenakshi Devi<sup>2<sup>nd</sup></sup>

Department of Information Technology  
KSR Institute for Engineering and Technology,  
Tiruchengode, India  
E-mail: drpmeenakshidevi@gmail.com

**Abstract:** Wireless Sensor Networks is composed of small nodes indulged for sensing, computation, and wireless communications capabilities. Routing is essential task of sensor node which collects and forwards the data to the sink node. To improve the energy efficiency various routing protocols are introduced. Each protocol has its own advantages and disadvantages. We presented a survey of the hierarchical routing protocols in WSNs. We highlight the advantages and performance issues of each hierarchical routing protocol.

**Keywords:** Wireless sensor network, Routing, Energy efficiency, Sensor node, Hierarchical routing protocol.

## I. INTRODUCTION

Wireless sensor network (WSN) plays a significant application is most of the application in this new century [1]. Wireless sensor networks consist of sensor nodes with sensing, communication and computation where sensor nodes is of low-cost, low-power, and multifunctional [2]. The roles of these sensor nodes is sense then communicate via wireless medium and collaborate to accomplish a common task [3]. The sensor nodes are deployed in as hoc fashion in most of the applications. Once deployed these nodes organize them into the network autonomously. The sensor nodes operate under battery-powered and are expected to operate until the battery die. Actually to change or replace the battery is very difficult and impossible.

WSNs are characterized with levels of sensor node deployment, power constraints, computation, and memory constraints. Therefore, the unique characteristics and constraints made many researchers to present many new challenges for the development and application of WSNs

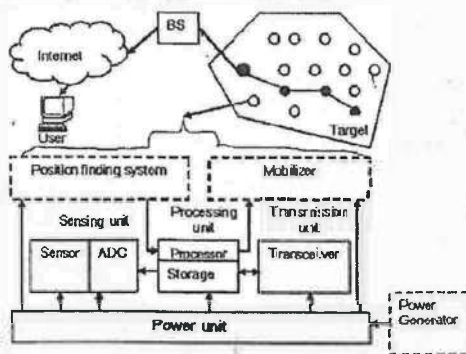


Figure 1. The components of a sensor node

Figure 1 shows the graphic diagram of sensor node components. Each of the sensor nodes consists of sensing, Processing, transmission, mobilizer, position finding system, and power units. Basically the sensor nodes are scattered in a sensor field which is termed as deploying of sensor nodes in the field. Sensor nodes coordinate among themselves to produce the sensed data about the physical environment. The role of sensor nodes is to collect and route data either to other sensors or, back to the base station. A base-station may be either fixed or a mobile node that is capable of connecting the sensor network to an existing network.

The advantages of sensor network include no fixed infrastructure, the cost microprocessor chip is cheap and it is ideal for all types of application. The disadvantages include less secure, lower speed compared to a wired network and more complex to configure than a wired network.

Applications area of wireless sensor networks includes military where monitoring of equipment, and missiles, Reconnaissance of opposing forces and terrain, Nuclear, biological, and chemical attack detection, and Battlefield surveillance and Battle damage assessment

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## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 6, No. 8, August 2016, pp. 303-317.

ISSN 2249-7315  
A Journal Indexed in Indian Citation Index  
DOI NUMBER: 10.5958/2249-7315.2016.00611.0

Category: Science and Technology

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# RDCG-Randomized Distributed Cluster Grid Topology for Wireless Power Transfer Technology in Wireless Sensor Network

M Dhurga Devi\*; Dr. P Meenakshi Devi\*\*

\*Assistant Professor,

Anna University,  
India.

\*\*Professor,

Anna University,  
India.

## Abstract

Wireless sensor networks operate under the control of power where power is related to the battery. Network topologies will have impact on network properties like energy consumption. Energy efficiency can be improved by improving the lifetime of battery of the sensor nodes. For that, topology also plays a vital role. Researchers put various efforts on finding a best topology for wireless sensor network with high efficiency. In this paper different topologies of wireless sensor network are studied and a new topology is proposed. The simulation result shows that the proposed topology is highly efficient than the existing ones.

**Keywords:** Wireless sensor networks, topologies, Energy efficiency, Battery, Power.

## 1. Introduction

Wireless sensor network is formed by collection of sensor nodes where each sensor node consists of transceiver, microcontroller and a battery which is shown in figure 1.1. The purpose of wireless sensor network is to periodically monitor /sense different parameters like temperature, pressure, sound, vibration, etc., and to report it to the sink node [1]. The application areas of wireless sensor

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## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 6, No. 6, June 2016, pp. 1924-1934.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2016.00337.3

Asian Journal  
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# Comparative Study of Manet Routing Protocols

A. V. Santhosh Babu\*; Dr. P. Meenakshi Devi\*\*; B. Sharmila\*\*\*

\*Research Scholar,

Sengunthar College of Engineering,

Tiruchengode, India.

\*\*Professor & Head,

KSR Institute for Engineering and Technology,

Tiruchengode, India.

\*\*\*Assistant Professor,

CSE, EBET Group of Institutions,

Kangayam, India.

## Abstract

MANET is a network in which the nodes are connecting without any physical medium. The expansion of MANET is Mobile Ad hoc Network. Infrastructure is not necessary to create MANET. In MANET, the nodes are communicating each other with in the surrounding area. The attackers can theft from the MANET by using Open Medium and open infrastructure. Protection can make in the MANET is possible through the Intrusion Detection System. Intrusion Detection techniques have been implemented through many protocols. In this paper, survey the protocols, which are using in routing. Finally will conclude which routing protocol is efficient protocol to protect the system from the anomaly user.

**Keywords:** MANET, Intrusion, Packet delivery ratio, Routing protocol, Routing Algorithms.

## 1. Introduction

Intrusion Detection in MANET is the process of finding the attacker who is enters in the network without permission. Intrusion Prevention in MANET is the process of prevents the system from the attacker who is entering in the network without permission. Various protocols are using to find the Intrusion Detection and Prevention. The attacking process can found the delay time of the file transfer. The delay time can evaluate by using packet delivery ratio (PDR). The packet delivery

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# TTRP-Three Level Threshold and Round Robin with Priority Scheduling for Wireless Rechargeable Network

M.Dhurgadevi<sup>1</sup>, Dr.P.Meenakshi Devi<sup>2</sup>

<sup>1</sup>Assistant Professor, KSR Institute for Engineering and Technology, India

<sup>2</sup> Professor, KSR Institute for Engineering and Technology, India

**Abstract**— Energy is the most exploiting factor in wireless sensor networks. The most recently growing technology in wireless sensor networks is wireless energy transfer. A new technology named wireless energy transfer helpful to research in improving the energy efficiency of wireless sensor networks. In this paper a Hybrid Network is designed which considers various factors to prolong the lifetime of network by wireless energy transfer technology. The main aim is to improve the network lifetime by making most of the sensor to work at most of the time. WCD wireless charger and data collector is integrated to recharge the sensors and to collect the data from the cluster head. The travel time of WCD, cost of the network is reduced and energy efficiency is increased.

**Index Terms** - Wireless Charging, Wireless Charger, data collector, Energy Efficiency.

## I. INTRODUCTION (HEADING 1)

The demand of sensors is growing day to day in our life which plays a vital role in all the major application area like agriculture, medical, military etc., Wireless sensor network is formed by collection of sensor nodes organized as network which sense, process, collect and pass the information to the sink node or base station. Lots of research areas are there in WSN. Energy is the major constraint in WSN. The energy efficiency improvement is one of the main research areas going on. Sensor nodes are powered by batteries that can operate for only a short period of time, which results in short network lifetime. The short lifetime disables the application of WSNs or long term tasks such as structural health monitoring for bridges and tunnels, border surveillance, road condition monitoring, and so on. Hence many methods are employed to battle the constraint.

First Energy harvesting techniques are proposed to extract energy from the environments. This can be done by installing external devices such as solar panels and wind turbines, sensors can scavenge ambient energy [1]-[2]. But harvesting environmental energy such as solar, wind is subject to their availability which is of uncontrollable by people. Next energy conservation techniques are proposed. Existing energy conservation schemes [3] can slow down energy consumption rate, but energy depletion cannot be compensated. Researchers are done to find new technologies to solve the energy constraint problem.

Later on wireless power transfer techniques are proposed as an alternative to address the energy constraint problem in sensor networks. Pioneered by Tesla over a century ago, it is only until recently that the technology enjoys so much popularity attributed to the work of Kurs *et al.* [4]. It has been shown that energy can be transferred between magnetically coupled coils in excess of 2 meters with efficiency of 40. The method of Wireless charging provides a efficient way to power sensor nodes and these networks are referred to as Wireless Rechargeable Sensor Networks (WRSNs)[5]. Wireless charging technology allows a mobile charger to transfer energy to sensor nodes wirelessly without any alignment between the charger and nodes. Wireless Charging Vehicle (WCV) periodically travels inside the network and charges each sensor node wirelessly without any plugs or wires. A renewable energy cycle is introduced. WCV can charge multiple nodes simultaneously on its travelling path.

For the next generation WSNs, wireless charging offers a novel, unique and reliable way to power sensor nodes and these networks are referred to as wireless Rechargeable sensor networks (WRSNs). Earlier works utilize commercial products from power cast [6] to charge sensor nodes wirelessly [7]. However, radiation-based wireless charging techniques have very low efficiency and can only transfer a small amount of energy, which makes it difficult to meet many demanding applications. Another wireless charging technique called magnetic resonant coupling has high efficiency that is still going on. To implement this in WRSNs, mobile vehicles equipped with resonant coils and high density battery packs are placed in very close proximity and deliver wireless energy to the nodes with high efficiency. Hence, how to schedule a fleet of vehicles to meet dynamic energy demands forms nodes such that no one depletes energy is a major research issue. In addition, practical constraints such as vehicles recharge capacity. Another research issue of

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Jan-Mar 2017



## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 7, No. 1, January 2017, pp. 852-870.

ISSN 2249-7315

A Journal Indexed in Indian Citation Index

DOI NUMBER: 10.5958/2249-7315.2017.00027.2

Category: Science and Technology

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# Fuzzy Logic based Reliable Multicast Routing Protocol (FLRMRP) for Mobile Ad Hoc Networks

S. Russia\*; Dr. R. Anita\*\*

\*Assistant Professor,

K.S.R.Institute of Engineering and Technology,

Tiruchengode, India.

\*\*Professor and Head,

Department of EEE,

Institute of Road and Transport Technology,

Erode, India.

### Abstract

MANET is a lively effective network implemented with no fixed network infrastructure. Thereby MANET is thin –skinned when attack provokes. Mobility decides the soundness in MANET. In this, paper Fuzzy Logic based Reliable Multicast Routing Protocol (FLRMRP) is formulated to equip staunching execution in terms of stability and mobility. An unfailing multicast backbone is elevated on the basis of convex hull procedure. Arbitrating the link and node reliability empowers the novel routing where stability is on concern. Fuzzy logic control procedure paramount's network performance by enforcing reliability. Fuzzy if then rule procedure appends fuzzy interference system through which reputable system is exposed. By implementing these solutions using Network Simulator (NS2) tool, we have achieved better stability and node connectivity towards the ultimate goal of proposed multicast routing scheme. This reliable multicast routing scheme is proposed for handling link, node failures and malicious attackers in ad hoc networks. The proposed scheme is based on threshold value to maintain the reliable multicast routing which enhances the stability and mobility of the network. And it supports to improve the network performance based on stability of link and node. In general, reliability is measured in terms of mobility of nodes and energy efficiency.

**Keywords:** Multicast, stability rate, node reliability, link reliability, fuzzy logic control, convex hull, delivery ratio, control overhead and end to end delay.


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An Efficient Crypto Based Security Authentication System for Detecting Deduplication on Cloud Storage

An Efficient Crypto Based Security Authentication System for Detecting Deduplication on Cloud Storage

Publication History  
Received: 19 July 2016  
Accepted: 16 August 2016  
Online First: 26 August 2016  
Published: July-September 2016

Citation  
Suriya L, Dhurga Devi M, Meenakshi Devi. An Efficient Crypto Based Security Authentication System for Detecting Deduplication on Cloud Storage. *Discovery Engineering*, 2016, 4(13), 400-405

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NAMAKKAL DISTRICT, TAMIL NADU.

# PSO based Algorithm for Wireless Rechargeable Sensor Networks

M. Dhurgadevi  
KSR Institute for  
Engineering and Technology  
Tamilnadu

P. Meenakshi Devi, PhD  
KSR Institute for  
Engineering and Technology  
Tamilnadu

## ABSTRACT

Wireless energy transfer is a recent emerging technology in wireless sensor network. This technology is a promising alternative to the power constraint problem in wireless sensor networks. Energy is the important constraint in sensor network which can be improved by different technology. Energy harvesting techniques can scavenge some amount of energy but still it's not enough. Lots of researchers put effort to solve this problem which results in wireless energy transfer. With the development in the technology, multiple nodes can be charged simultaneously by wireless charging vehicle.

Scheduling of wireless charging vehicle helps to improve the network lifetime. In addition to optimizing the travel time of the wireless charging vehicle the cost arising from travel path of charger between the nodes must also be taken into account. In this paper a (ps) based heuristics to schedule the travel path of wireless charging vehicle that takes into account both the travel cost and travel time. The result is experiment with a sample environment by varying its travel cost and travel time. Our results show that PSO can achieve shortest travel path and cost is also saved as well as network lifetime is improved.

## Keywords

Wireless energy transfer, sensor networks, Particle swarm optimization (PSO), Wireless charging Vehicle (WCV), travel path.

## 1. INTRODUCTION

The recent promising wireless charging technology provides a solution to sensor nodes by means of charging wirelessly. The wireless charging technology was initiated by Kurs et al [1]; By means of the two strongly coupled magnetic resonant objects he tried to transfer energy from one storage device into other device wirelessly. In Wireless power charging Technology [2], power can be transferred from the transmitting antenna of a power charger to the receiving antennas of a power charger to sensor nodes receiving antennas. The power is transferred to DC voltage for the purpose of sensor utilization or else it can be stored in batteries.

Wireless sensor networks (WSN) are mainly powered by batteries. The battery storage capacity is limited and so a WSN can only remain operational for a limited amount of time. To extend the lifetime of sensor networks lot of efforts are put by various researchers. But still it remains as a bottleneck. This area of research leads to the growth of wireless energy in fields of electronics, health care, electrical vehicles, etc. For example, wireless charging pads is used to charge mobile devices without connecting charging cables whenever they are placed on the pad [3]. In case of health care applications wireless charging of implanted batteries is replaced by surgical operation to dispose old batteries.

Wireless charging technology provides a new research solution to the emerging Electrical Vehicle (EV) industry. This can be introduced with high efficiency to deliver hundreds of watts of energy, where the charging system are placed at power stations, parking lots or even under the road surface to recharge EV's battery packs [4]. For the next generation WSNs, wireless charging technology has to grow up with hybrid technology to power the sensor nodes and these networks are known as Wireless Rechargeable Sensor Networks (WRSNs).

There are lots of applications that utilize commercial products from Powercast to charge the sensor nodes wirelessly [5]-[8]. The Radiation-based wireless charging techniques have very low efficiency and can only transfer a small amount of energy whereas magnetic resonant coupling proposed in [9] has high efficiency and supports transferring hundreds of watts of energy over a large air gap. To implement futuristic WRSNs, this technique is adopted in mobile vehicles where resonant coils and high-density battery packs are used in very close proximity and deliver wireless energy to the nodes with high efficiency [10]-[16]. To schedule more than one vehicle to recharge all the sensors is a great challenge [15], [16]. In addition to it vehicle's recharge capacity, travelling cost pose great research issue [16]. These problems are NP-hard and new algorithms arrived with good results which are more desirable [14]-[16].

In this paper, the main focus is on minimizing the total travelling cost of wireless charging vehicles to recharge the sensors. In order to achieve this fair scheduling algorithm should be implemented. This is achieved by using a meta-heuristics method called Particle Swarm Optimization (PSO). Kennedy and Eberhart introduced a self-adaptive global search based optimization technique which is called as Particle Swarm Optimization (PSO) [17]. The algorithm is similar to Genetic algorithms but, the difference is only no direct recombination of individuals of the population. It is based on the social behavior of the particles. In PSO each particle adjusts its trail based on its best position (local best) and the position of the best particle (global best) of the entire population. This increases the stochastic nature of the particle and converges quickly to a global minimum with a good solution.

The advantage of using PSO is its simplicity and its effectiveness in wide range of application with low computational cost. Some examples of PSO application are: the reactive voltage control problem [18], data mining [19], pattern recognition [20] and environmental engineering [21], Scheduling [22, 23] and task allocation [24, 25].

The works contributed in this paper are as follows:

- A model is formulated for WCV-SN mapping to minimize the overall cost of Recharging.

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TRICHENGODE - 637 215,  
NAMAKKAL DI, TAMIL NADU.

# An Analysis of Hierarchical Routing Protocol in Wireless Sensor Networks

M.Dhurgadevil<sup>1st</sup>

Department of Information Technology  
KSR Institute for Engineering and Technology,  
Tiruchengode, India  
E-mail: cdhurgasakthi3@gmail.com

Dr.P.Meenakshi Devi<sup>2nd</sup>

Department of Information Technology /  
KSR Institute for Engineering and Technology  
Tiruchengode, India  
E-mail: drpmeenakshidevi@gmail.com

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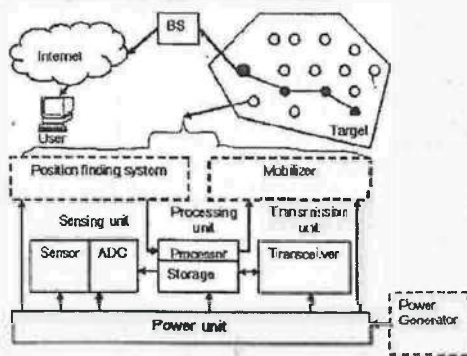


Figure 1. The components of a sensor node

Figure 1 shows the graphic diagram of sensor node components. Each of the sensor nodes consists of sensing, Processing, transmission, mobilizer, position finding system, and power units. Basically the sensor nodes are scattered in a sensor field which is termed as deploying of sensor nodes in the field. Sensor nodes coordinate among themselves to produce the sensed data about the physical environment. The role of sensor nodes is to collect and route data either to other sensors or, back to the base station. A base-station may be either fixed or a mobile node that is capable of connecting the sensor network to an existing network.

The advantages of sensor network include no fixed infrastructure, the cost microprocessor chip is cheap and it is ideal for all types of application. The disadvantages include less secure, lower speed compared to a wired network and more complex to configure than a wired network.

Applications area of wireless sensor networks includes military where monitoring of equipment, and missiles, Reconnaissance of opposing forces and terrain, Nuclear, biological, and chemical attack detection, and Battlefield surveillance and Battle damage assessment

Area monitoring is one of the applications of WSN where WSN is deployed over a region for monitoring. In health care it can be wearable and implanted category. Wearable devices can be sensors fixed devices that can be wearable by the humans for monitoring. The implantable medical devices are can be inserted inside human body. It can be used for overall monitoring of ill patients. The recent trend is body-area networks which collect information about person's health, fitness, and energy expenditure. There are many applications in monitoring environmental parameters which includes Air pollution monitoring, Forest fire detection, Landslide detection, and disaster prevention.



## Asian Research Consortium

Asian Journal of Research in Social Sciences and Humanities  
Vol. 6, No. 8, August 2016, pp. 303-317.

ISSN 2249-7315  
A Journal Indexed in Indian Citation Index  
DOI NUMBER: 10.5958/2249-7315.2016.00611.0

Category: Science and Technology

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M Dhurga Devi\*; Dr. P Meenakshi Devi\*\*

\*Assistant Professor,

Anna University,  
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# TTRP-Three Level Threshold and Round Robin with Priority Scheduling for Wireless Rechargeable Network

M.Dhurgadevi<sup>1</sup>, Dr.P.Meenakshi Devi<sup>2</sup>

<sup>1</sup>Assistant Professor, KSR Institute for Engineering and Technology, India

<sup>2</sup> Professor, KSR Institute for Engineering and Technology, India

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Asian Journal of Research in Social Sciences and Humanities  
 Year: 2016, Volume: 6, Issue: 7  
 First page: ( 296) Last page: ( 306)  
 Online ISSN: 2249-7315  
 ACOM DOI: 10.58958/2249-7315.2016.00426.3

## A New Adaptive Filter for Removal of Impulse Noise with Uncertainty

Dr. Lalithamani N., Dr. Prabakaran K., Jagatheswari S., Kruthika P.  
 Department of Mathematics, K. S. Rangasamy College of Technology, Tiruchengode, Tamilnadu, India  
 Online published on 2 July, 2016


### Abstract

Image Denoising remains a fundamental problem in the field of image processing. It is necessary to apply an efficient denoising technique to compensate for data corruption. In this paper, different filters such as AM, MMEM, BCND, FM, etc., are used to denoise an image. But the above filtering method does not produce good image quality when the noise level is higher than 60%. To represent the uncertainties better and resolve the image quality problems, a novel effective filter is presented based on Cloud Model (CM) for impulse noise removal. The CM filter has the better performance in image denoising across a wide range of noise levels. Even if the noise level is close to 95% the CM filter can restore the images with good detail preservation. Comparisons of denoised images are done using the quality metrics measurements which includes Peak Signal to Noise Ratio (PSNR) and Mean Squared Error (MSE).

### Keywords

Cloud model, image denoising, impulse noise, median filter.

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Asian Journal of Research in Social Sciences and Humanities  
Year : 2016, Volume : 6, Issue : 6  
First page : ( 148) Last page : ( 159)  
Online ISSN : 2249-7315.  
Article DOI : [10.5958/2249-7315.2016.00202.1](https://doi.org/10.5958/2249-7315.2016.00202.1)

## Speckle Reduction Algorithm for Medical Ultrasound Imaging

Dr. Prabakaran K., **Dr. Lalithamani N.**, Kiruthika P.  
Department of Mathematics, K. S. Rangasamy College of Technology, Tamilnadu, India

Online published on 1 June, 2016.


### Abstract

Image denoising has remained a fundamental problem in the field of medical image processing. Ultrasound images are most commonly used in medical diagnostics. Unfortunately the quality of ultrasound imaging is degraded by the presence of signal dependent noise called speckle noise. It is necessary to apply an efficient despeckling technique to compensate for data corruption. Recently, wavelet and multi scale based methods, due to their excellent localisation property, have rapidly become very popular for image denoising. In this paper, a new noise variance estimation technique is proposed which attempts to map the median value of the pixelwise noise standard deviation. Then, an adaptive threshold is applied to shrink the noisy coefficients. The experimental results show that the proposed algorithm performs well for different ultrasound images and over a large range of noise variances.

### Keywords

Wavelet Transform, Adaptive threshold, Despeckling, Speckle noise, Ultra sound.

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# ANALYZED ON DOMINATION AND DIAMETER IN GRAPHS

Dr. K.Prabakaran and Dr. N. Lalithamani

Department of Mathematics  
 K.S. Rangasamy College of Technology  
 Tiruchengode, India  
 prabakaran@ksrct.ac.in, lal175bass@yahoo.co.in

**Abstract**—Let  $\gamma(G)$ ,  $\gamma_t(G)$ ,  $\gamma_c(G)$ , and  $\text{diam}(G)$  denote respectively the domination number, total domination number and connected domination number and the diameter of a connected graph  $G$  of order  $p$ . In this paper, we prove that  $\gamma(G) + \text{diam}(G) \leq 2p-3$  and characterize the extremal graphs. Similar results for domination number and total domination number are also obtained.

**Keywords**— Domination number; total domination number; connected domination number; diameter.

## I. INTRODUCTION

Let  $G = (V, E)$  be an undirected, connected simple graph of order  $p$ . The degree of a vertex  $u$  is the number of edges incident with  $u$  and is denoted by  $d(u)$ . The maximum degree is denoted by  $\Delta$ . The distance between two vertices  $u$  and  $v$  is the length of the shortest  $u$ - $v$  path. The diameter of  $G$  is the maximum distance between any two vertices in the graph and is denoted by  $\text{diam}(G)$ . The paths and cycles on  $n$  vertices are respectively denoted by  $P_n$  and  $C_n$ . A subset  $S$  of  $V$  is called a *dominating set* in  $G$  if every vertex in  $V-S$  is adjacent to at least one vertex in  $S$ . The minimum cardinality taken over all minimum dominating sets in  $G$  is called the domination number of  $G$  and is denoted by  $\gamma(G)$ . A dominating set  $S$  is called *total* if the induced sub graph  $\langle S \rangle$  has no isolated vertices and connected if  $\langle S \rangle$  is connected. The minimum cardinality taken over all minimal total (connected) dominating sets in  $G$  is called the *total (connected) domination number* of  $G$  and is denoted by  $\gamma_t(G)$  ( $\gamma_c(G)$ ). A lot of research work has been done in this area [1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15]. In [16], Joseph and Arumugam proved that  $\gamma_c + \kappa \leq p$ , where  $\kappa$  is the connectivity of  $G$  and characterized the extremal graphs. In [17], they proved  $\gamma_c + \chi \leq p+1$ , where  $\chi$  is the chromatic number of  $G$  and characterized the extremal graphs. In this paper we prove that  $\gamma_c(G) + \text{diam}(G) \leq 2p-3$  and characterize the extremal graphs. Similar results for  $\gamma(G)$  and  $\gamma_t(G)$  are also obtained. In recent years, many authors focused on domination in graphs. The domination and diameter graphs applied to several fields, electrical power networks, monitoring communication, land surveying, number of facilities (hospital, fire house) and

location problem. Terms not defined in this paper, are used in the sense of Balakrishnan and Ranganathan. We use the following results and notations in the sequel.

## II. PRELIMINARIES AND NOTATIONS

**Theorem 1.1** [13] Let  $G$  be a connected graph of order  $p$  and maximum degree  $\Delta$ . Then  $\gamma_c(G) \leq p-\Delta$ .

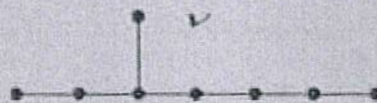
**Theorem 1.2** If  $G$  is connected and  $\Delta < p-1$ , then,

$$(i) \gamma_t \leq p-\Delta \quad (ii) \gamma \leq \gamma_t \leq \gamma_c.$$

**Observation 1.3** For any graph  $G$  of order  $p$ ,  $\text{diam}(G) \leq p-1$ , and equality holds if and only if  $G = P_p$ .

**Notation 1.4** The graphs obtained by introducing a new vertex  $v$  and joining it to exactly one vertex of degree  $\geq 2$  in a graph  $G$  is denoted by  $G(v)$ . If  $v$  is joined to the unique centre of  $G$ , it is denoted by  $G(Cv)$ . A graph in the family  $P_p(v)$  and  $P_p(Cv)$  are given in figure 1.1.

$P_7(v)$ :



$P_7(Cv)$ :



Fig 1.1

**Notation 1.5** The identification of a single vertex  $v$  of a graph  $H$  to exactly one pendent vertex of  $G$  is denoted by  $G(H)$ . The graphs  $P_6(C_3)$  and  $P_5(C_3)$  are given in figure 1.2.

$P_6(C_3)$ :



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## Edge regular property of cartesian product and composition of two fuzzy graphs

**K. Radha**

P.G. Department of Mathematics  
Periyar E.V.R. College  
Tiruchirappalli – 620 023, Tamil Nadu, India.  
radhagac@yahoo.com

**N. Kumaravel**

Department of Mathematics  
K S R Institute for Engineering and Technology  
Namakkal – 637 215, Tamil Nadu, India.  
kumaramaths@gmail.com

### Abstract

In this paper, a necessary and sufficient condition for the cartesian product and composition of two edge regular fuzzy graphs to be an edge regular fuzzy graph is determined.

**Keywords:** Cartesian product, composition, regular fuzzy graph, edge regular fuzzy graph.

**Subject Classification (2010):** 03E72, 05C72, 05C76.

### 1 Introduction

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975 [11]. Mordeson and Peng introduced the concept of operations on fuzzy graphs [2]. The degrees of vertices in fuzzy graphs obtained from two given fuzzy graphs using these operations were discussed by Nagoor Gani and Radha [5]. Radha and Kumaravel introduced the concept of degree of an edge and total degree of an edge in fuzzy graphs [8]. We study the cartesian product and composition of two fuzzy graphs. In general, cartesian product and composition of two edge regular fuzzy graphs  $G_1$  and  $G_2$  need not be edge regular. In this paper, we find necessary and sufficient condition for cartesian product and composition of two fuzzy graphs to be edge regular fuzzy graph. First we present some basic concepts.

A fuzzy subset of a set  $V$  is a mapping  $\sigma$  from  $V$  to  $[0, 1]$ . A fuzzy graph  $G$  is a pair of functions  $G:(\sigma, \mu)$  where  $\sigma$  is a fuzzy subset of a non-empty set  $V$  and  $\mu$  is a symmetric fuzzy relation on  $\sigma$ , (i.e.)  $\mu(xy) \leq \sigma(x) \wedge \sigma(y)$  for all  $x, y \in V$ . The underlying crisp graph of  $G:(\sigma, \mu)$  is denoted



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RESEARCH ARTICLE

A Peer Reviewed International Research Journal



ISSN:2348-0580

THE EDGE DEGREE AND THE EDGE REGULAR PROPERTIES OF TRUNCATIONS OF FUZZY GRAPHS

K. RADHA<sup>1</sup>, N. KUMARAVEL<sup>2</sup>

<sup>1</sup>P.G. Department of Mathematics, Periyar E.V.R. College, Tiruchirappalli, Tamil Nadu, India.

<sup>2</sup>Department of Mathematics, K S R Institute for Engineering and Technology, Namakkal, Tamil Nadu, India.



K. RADHA



N. KUMARAVEL

ABSTRACT

In this paper, degree of an edge in truncations of fuzzy graphs is obtained and edge regular properties of truncations of fuzzy graphs are studied. Truncations of fuzzy graph of an edge regular fuzzy graph need not be edge regular. Conditions under which it is edge regular are provided.

**KEYWORDS:** Strong fuzzy graph, complete fuzzy graph, edge regular fuzzy graph, totally edge regular fuzzy graph, truncations of fuzzy graph.

**2010 Mathematics Subject Classification:** 03E72, 05C72

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1. INTRODUCTION

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975 [10]. Though it is very young, it has been growing fast and has numerous applications in various fields. During the same time Yeh and Bang have also introduced various connectedness concepts in fuzzy graphs [11]. A. Nagoorgani and K. Radha discussed the concepts of lower and upper truncations of a fuzzy graph [7]. K.Radha and N.Kumaravel (2014) introduced the concept of edge regular fuzzy graphs [8]. In this paper, we study about edge regular property of truncations of fuzzy graphs.

First we go through some basic definitions in the next section from [1] – [11].

2. BASIC CONCEPTS

Let  $V$  be a non-empty finite set and  $E \subseteq V \times V$ . A fuzzy graph  $G:(\sigma, \mu)$  is a pair of functions  $\sigma: V \rightarrow [0, 1]$  and  $\mu: E \rightarrow [0, 1]$  such that  $\mu(x, y) \leq \sigma(x) \wedge \sigma(y)$  for all  $x, y \in V$  [4]. The underlying crisp graph is denoted by  $G^* : (V, E)$ . The order and size of a fuzzy graph  $G:(\sigma, \mu)$

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## On Edge Regular Fuzzy Line Graphs

K. Radha <sup>1</sup> and N. Kumaravel <sup>2</sup>

<sup>1</sup> P.G. Department of Mathematics, Periyar E.V.R. College,  
Tiruchirappalli – 620 023, Tamil Nadu, India.  
E-mail: radhagac@yahoo.com

<sup>2</sup> Department of Mathematics, K S R Institute for Engineering and Technology,  
Namakkal – 637 215, Tamil Nadu, India.  
E-mail: kumaramaths@gmail.com

### Abstract

In this paper, degree of an edge in fuzzy line graph is obtained and some properties of edge regular fuzzy line graphs are studied. Fuzzy line graph of an edge regular fuzzy graph need not be edge regular. Conditions under which it is edge regular are provided.

**Keywords:** Strong fuzzy graph, complete fuzzy graph, edge regular fuzzy graph, totally edge regular fuzzy graph, fuzzy line graph.

*2010 Mathematics Subject Classification:* 03E72, 05C72

### 1. INTRODUCTION

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975 [11]. Though it is very young, it has been growing fast and has numerous applications in various fields. During the same time Yeh and bang have also introduced various connectedness concepts in fuzzy graphs [12]. J.N.Mordeson (1993) introduced the concept of fuzzy line graph [2]. K.Radha and N.Kumaravel (2014) introduced the concept of edge regular fuzzy graphs [9]. In this paper, we study about edge regular property of fuzzy line graphs.

First we go through some basic definitions in the next section from [1] – [5], [8] and [9].

### 2. BASIC CONCEPTS

Let  $V$  be a non-empty finite set and  $E \subseteq V \times V$ . A fuzzy graph  $G: (\sigma, \mu)$  is a pair of functions  $\sigma: V \rightarrow [0, 1]$  and  $\mu: E \rightarrow [0, 1]$  such that  $\mu(x, y) \leq \sigma(x) \wedge \sigma(y)$  for all

  
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## The Degree of an Edge in Subdivision, Middle and Total Fuzzy Graphs with Their Edge Regular Properties



### Mathematics

**KEYWORDS :** edge regular fuzzy graph, totally edge regular fuzzy graph, subdivision fuzzy graph, middle fuzzy graph and total fuzzy graph.

K. Radha

P.G. Department of Mathematics, Periyar E.V.R. College, Tiruchirappalli – 620 023, Tamil Nadu, India

N. Kumaravel

Department of Mathematics, K S R Institute for Engineering and Technology, Namakkal – 637 215, Tamil Nadu, India

### ABSTRACT

*In this paper, the degree of an edge in subdivision, middle and total fuzzy graphs are obtained. In general subdivision and total fuzzy graphs of an edge regular fuzzy graph need not be edge regular. Conditions under which they are edge regular are provided. A necessary and sufficient condition for subdivision fuzzy graph of a regular fuzzy graph to be edge regular is determined.*

### 1. INTRODUCTION

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975 [11]. Though it is very young, it has been growing fast and has numerous applications in various fields. During the same time Yeh and bang have also introduced various connectedness concepts in fuzzy graphs [12]. A.Nagoorgani and J.Malarvizhi discussed the concept of subdivision, middle and total fuzzy graphs and its properties [2]. K.Radha and N.Kumaravel (2014) introduced the concept of edge regular fuzzy graphs [9]. In this paper, we study about edge regular properties of subdivision, middle and total fuzzy graphs using their edge degrees.

First we go through some basic definitions in the next section from [1], [2], [4], [5] and [8].

### 2. BASIC CONCEPTS

Let  $V$  be a non-empty finite set and  $E \subseteq V \times V$ . A fuzzy graph [5]  $G: (\sigma, \mu)$  is a pair of functions  $\sigma: V \rightarrow [0, 1]$  and  $\mu: E \rightarrow [0, 1]$  such that  $\mu(x, y) \leq \sigma(x) \wedge \sigma(y)$  for all  $x, y \in V$ . The order and size of a fuzzy graph [4]  $G: (\sigma, \mu)$  are defined by  $O(G) = \sum_{x \in V} \sigma(x)$  and  $S(G) = \sum_{xy \in E} \mu(xy)$ . A fuzzy Graph  $G: (\sigma, \mu)$  is strong [4], if  $\mu(xy) = \sigma(x) \wedge \sigma(y)$  for all  $xy \in E$ . A fuzzy Graph  $G: (\sigma, \mu)$  is complete [5], if  $\mu(xy) = \sigma(x) \wedge \sigma(y)$  for all  $x, y \in V$ . The underlying crisp graph is denoted by  $G^* : (V, E)$ .

The degree of a vertex [5]  $x$  is  $d_G(x) = \sum_{x \neq y} \mu(xy)$ . If each vertex in  $G$  has same degree  $k$ , then  $G$  is said to be a regular fuzzy graph or  $k$  – regular fuzzy graph [5]. Let  $G^* : (V, E)$  be a graph and let  $e = uv$  be an edge in  $G^*$ . Then the degree of an edge [1]  $e = uv \in E$  is defined by  $d_{G^*}(uv) = d_{G^*}(u) + d_{G^*}(v) - 2$ . If each edge in  $G^*$  has same degree, then  $G^*$  is said to be edge regular. The degree of an edge [8]  $xy \in E$  in  $G: (\sigma, \mu)$  is  $d_G(xy) = \sum_{x \neq z} \mu(xz) + \sum_{z \neq y} \mu(zy) - 2\mu(xy)$ . If each edge in  $G$  has same degree  $k$ , then  $G$  is said to be an edge regular fuzzy graph or  $k$  – edge regular fuzzy graph [8].

If every line of  $G^*$  is subdivided, the resulting graph is the subdivision graph  $S(G^*)$ . Let  $G: (\sigma, \mu)$  be a fuzzy graph with  $G^* : (V, E)$ . A subdivision fuzzy graph [2]  $sd(G): (\sigma_{sd}, \mu_{sd})$  is defined as follows:

The nodes and edges of  $G$  are taken together as node set, in  $sdG$ , each edge 'e' in  $G$  is replaced by a new vertex and that vertex is made as a neighbour of those vertices which lie on 'e' in  $G$ . Let the node set of  $sd(G)$  be  $V \cup E$ .

Here, fuzzy subset  $\sigma_{sd}$  is defined on  $V \cup E$  as,

$$\sigma_{sd}(v_i) = \begin{cases} \sigma(v_i), & \text{if } v_i \in V \\ \mu(e_j), & \text{if } e_j \in E \end{cases}$$

The fuzzy relation  $\mu_{sd}$  is defined as,

$$\mu_{sd}(v_i e_j) = \begin{cases} \sigma(v_i) \wedge \mu(e_j), & \text{if } v_i \in V, e_j \in E \text{ and the node } v_i \text{ lies on the edge } e_j \\ 0, & \text{otherwise} \end{cases}$$

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## On Edge Regular Square Fuzzy Graphs

K. Radha<sup>1</sup> and N. Kumaravel<sup>2</sup>

<sup>1</sup> P.G. Department of Mathematics, Periyar E.V.R. College,  
Tiruchirappalli – 620 023, Tamil Nadu, India.  
E-mail: radhagac@yahoo.com

<sup>2</sup> Department of Mathematics, K S R Institute for Engineering and Technology,  
Namakkal – 637 215, Tamil Nadu, India.  
E-mail: kumaramaths@gmail.com

### Abstract

In this paper, degree of an edge in square fuzzy graph is obtained. Square fuzzy graph of an edge regular fuzzy graph need not be edge regular. Conditions under which it is edge regular are provided. A necessary and sufficient condition for square fuzzy graph to be edge regular is determined.

**Keywords:** Strong fuzzy graph, complete fuzzy graph, edge regular fuzzy graph, totally edge regular fuzzy graph, square fuzzy graph.

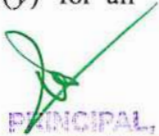
**2010 Mathematics Subject Classification:** 03E72, 05C72

### 1. INTRODUCTION

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975. Though it is very young, it has been growing fast and has numerous applications in various fields. During the same time Yeh and bang have also introduced various connectedness concepts in fuzzy graphs. A.Nagoorgani and J.Malarvizhi discussed the concept of square fuzzy graph and its properties. K.Radha and N.Kumaravel (2014) introduced the concept of edge regular fuzzy graphs. In this paper, we study about edge regular property of square fuzzy graphs. First we go through some basic definitions in the next section from [1], [2], [3], [4], [5] and [7].

### 2. BASIC CONCEPTS

Let  $V$  be a non-empty finite set and  $E \subseteq V \times V$ . A fuzzy graph  $G: (\sigma, \mu)$  is a pair of functions  $\sigma: V \rightarrow [0, 1]$  and  $\mu: E \rightarrow [0, 1]$  such that  $\mu(x, y) \leq \sigma(x) \wedge \sigma(y)$  for all



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TIRUCHENGODE - 637 215,  
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# Synthesis, structural and optical properties of Mn doped ZnO nanoparticles and their antibacterial application

**A. Srithar**

The Kavery College of Engineering, Salem, Tamilnadu-636 453, India.

**J.C. Kannan**

KSR Institute of Engineering and Technology, Tiruchengode - 637215.

**T.S. Senthil**

Erode Sengunthar Engineering College, Erode - 638 057, India.

**DOI:** <https://doi.org/10.24297/jac.v12i12.803>


**Keywords:** ZnO, Precipitation method, Nanoparticles, Band gap, Antibacterial activity.

## Abstract

In the present investigation,  $Mn_xZn_{1-x}O$  ( $x = 0.05, 0.075$  and  $0.1\%$ ) nanoparticles have been synthesized by simple precipitation method. Their structural, morphological and optical properties were examined by using X-ray diffraction (XRD), Field emission scanning electron microscopy (FESEM), Energy dispersive X-ray spectroscopy (EDX), High resolution transmission electron microscopy (HRTEM), Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy, Differential scanning calorimetry (DSC) and UV-Visible spectroscopy. The Powder X-ray diffraction studies confirmed that the manganese doped ZnO have a single phase nature with hexagonal wurtzite structure and Mn successfully incorporated into the lattice position of Zn in ZnO lattice. The FESEM and HRTEM images are coincided with each other for aggregation of particles in nature. The elemental analysis of doped samples has been evaluated by EDX. The antibacterial activity of Mn doped ZnO nanoparticles has also been examined.

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## Atwood's Surfacing: A Feminine Protest against Gender Bias

C Muhuntarajan\*; Dr. C. Rengarajan\*\*; Dr. Y. L. Sowntharya\*\*\*

\*Associate Professor,  
Department of English,  
KSR Institute for Engineering and Technology,  
Tiruchengode, Tamilnadu, India.

\*\*Professor and Head,  
Department of English,  
Muthayammal Engineering College,  
Rasipuram, Tamilnadu, India.

\*\*\*Assistant Professor,  
PG and Research Department of English,  
Vellalar College for Women,  
Erode, Tamilnadu, India.

### Abstract

Gender disparity or Gender bias is an issue faced all over the world. The word „Gender“ itself is related with sexes. The assertion of self by a woman in a society has been a great struggle, since women are always considered as inferior to men. The society has assigned different roles to the male and female sexes and also imposes different aspects of behavior upon them. As the order of the society is created by man, a woman is always held back or discouraged as a weaker sex. Her equality is never assured, but changes are inevitable and there is a change in women's role in today's society. The „new woman“ has emerged to fight against bias and gain a position of her own. In spite of all the challenges she faces, the new woman accomplishes her mark in every field she indulges and competes with man in all areas. Atwood through her fiction depicts women's deep anxieties and passions for revenge against male domination. This paper attempts to highlight the protest against the disparity of sex in Atwood's Surfacing and projects the protagonist of the novel who strives hard to make her free from the male dominance to gain her uniqueness.

**Keywords:** Society, gender, discrimination, suppressed, feminism, new woman.