Programme Educational Objectives(PEOs)

PEO1 (Core Competency) : Graduates will acquire a strong foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze Computer Science and Engineering problems.

PEO2 (Professionalism) : Graduates will practice the profession with ethics, integrity and leadership to relate engineering to global perspective issues and social context.

PEO3 (Higher Studies and Entrepreneurship) : Graduates will be prepared for their careers in the software industry or in higher studies leading to research and for applying the spirit of innovation and entrepreneurship in their career and continuing to develop their professional knowledge on a life long basis.

Programme Outcomes(POs)

PO1: Engineering knowledge: Ability to apply the knowledge of mathematics, physical sciences and computer science and engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Ability to identify, formulate and analyze complex real life problems in order to provide meaningful solutions by applying knowledge acquired in computer science and engineering.

PO3: Design/development of solutions: Ability to design cost effective software / hardware solutions to meet desired needs of customers/clients.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions in the field of computer science and engineering.

PO5: Modern tool usage: Create, select and apply appropriate techniques, resources and modern computer science and engineering tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

PSO1: Software System Design and Development: The ability to apply software development life cycle principles to design and develop the application software that meet the automation needs of society and industry.

PSO2: Computing and Research ability: The ability to employ modern computer languages, environments and platforms in creating innovative career paths in SMAC (Social, Mobile, Analytics and Cloud) technologies.

☢ Having a connected kitchen could save the food and beverage industry as much as 15% annually ☢

K S R INSTITUTE FOR ENGINEERING AND TECHNOLOGY
K.S.R KALVI NAGAR, TIRUCHENGODE - 637 215
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TECH ZEST
Fuel Your Mind
July - 2017 - Volume V / Issue I

Internet of Things (IoT)

K S R Institute for Engineering and Technology

Vision

To become a globalLy recognized Institution in Engineering Education, Research and Entrepreneurship.

Mission

IM1: Accomplish quality education through improved teaching learning process.
IM2: Enrich technical skills with state of the art laboratories and facilities.
IM3: Enhance research and entrepreneurship activities to meet the industrial and societal needs

Department of Computer Science and Engineering

Vision

To produce globally competitive Computer Science Engineers and Entrepreneurs with moral values.

Mission

DM1 (Quality Education) : Provide quality education to enhance problem solving skills, leadership qualities, team spirit and ethical responsibilities.

DM2 (State of art Laboratory) : Enable the students to adapt to the rapidly changing technologies by providing advanced laboratories and facilities.

DM3 (Research and Development) : Promote research based activities in the emerging areas of techno-environment in order to meet industrial and societal needs.

☢ In 2015, over 1.4 billion smart phones will be shipped and by 2020 we will have a staggering 6.1 billion smartphone users ☢

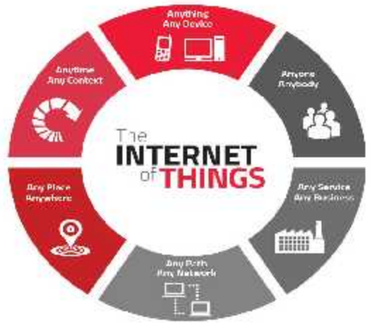
Introduction to Internet of Things(IoT)

The term "Internet of Things" (IoT) was coined by Kevin Ashton in a presentation to Proctor & Gamble in 1999. He is a co-founder of MIT's Auto-ID Lab. The 'Thing' in IoT can be any device with any kind of built-in-sensors with the ability to collect and transfer data over a network without manual intervention. The embedded technology in the object helps them to interact with internal states and the external environment, which in turn helps in decisions making process. In a nutshell, IoT is a concept that connects all the devices to the internet and let them communicate with each other over the internet. IoT is a giant network of connected devices – all of which gather and share data about how they are used and the environments in which they are operated. By doing so, each of your devices will be learning from the experience of other devices, as humans do. IoT is trying to expand the interdependence in human- i.e interact, contribute and collaborate to things.

S.Sruthi, II / CSE

Benefits of IoT

Since IoT allows devices to be controlled remotely across the internet, thus it created opportunities to directly connect & integrate the physical world to the computer-based systems using sensors and internet. The interconnection of these multiple embedded devices will be resulting in automation in nearly all fields and also enabling advanced applications. This is resulting in improved accuracy, efficiency and economic benefit with reduced human intervention. It encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.



- Improved Customer Engagement : IoT improves customer experience by automating the action. For e.g. any issue in the car will be automatically detected by the sensors.
- Technical Optimization: IoT has helped a lot in improving technologies and making them better. The manufacturer can collect data from different car sensors and analyze them to improve their design and make them much more efficient.
- Reduced Waste : Our current insights are superficial, but IoT provides real-time information leading to effective decision making & management of resources. For example, if a manufacturer finds fault in multiple engines, he can track the manufacturing plant of those engines and can rectify the issue with manufacturing belt

E.Sakthivel, III / CSE

DID YOU KNOW ?

☢ *87% of people don't actually know what "the Internet of Things" means.* ☢

Tech Update

Robot Operating System (ROS1)

Microsoft has announced an experimental release of "Robot Operating System (ROS1)" for Windows as a next step in bringing features like Machine Learning (ML), computer vision, Internet of Things (IoT), Cloud services and other Microsoft technologies to home, education, commercial and industrial robots. The announcement comes as part of the "ROSCon 2018" that is being in Madrid, Spain where Microsoft is demonstrating a "ROBOTIS Turtlebot 3" robot that recognises and steers towards the person closest to it and runs on the "Windows 10 IoT Enterprise"solution.

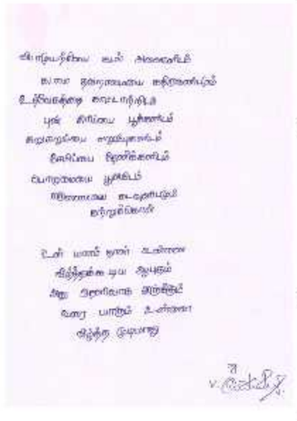
"This development will bring the manageability and security of 'Windows 10 Internet of Things (IoT) Enterprise' solutions to the 'ROS' ecosystem," Lou Amadio, Principal Software Engineer, Windows IoT, Microsoft wrote in a blog-post late on Friday. "ROS" is a set of libraries and tools that are used to build complex robots and "Windows 10 IoT Enterprise" delivers enterprise manageability and security solutions to industry based IoT devices used in retail, manufacturing, healthcare and other industries.

The tech giant has joined the ROS Industrial Consortium --an open source project that extends the advanced capabilities of the ROS software to manufacturing -- to extend and improve the productivity and return on investment of industrial robots. "Windows has been a trusted partner of robotic and industrial systems for decades and we're looking forward to bringing the intelligent edge to robotics by bringing more advanced features," Amadio added.

With the advancements of robots, Microsoft plans to experiment into advanced development tools. "Microsoft will host the Windows builds for 'ROS1' and shortly 'ROS2', as well as provide documentation, development and deployment solutions for Windows," wrote Amadio.

M.Rakul, IV / CSE

Student Corner



QUIZ ZONE

1. _____ allows us to control electronic components
   a) RETful API b) RESTful API
   c) HTTP d) MQTT

2. MQTT stands for _____
   a) MQ Telemetry Things
   b) MQ Transport Telemetry
   c) MQ Transport Things
   d) MQ Telemetry Transport

3. What is the estimated count of the IoT devices to be presented by 2010?
   a) 5 Billion b) more than 15 billion
   c) 10 billion d) 1 billion

4. Who invented the term Iot?
   a) Glen Macughty b) Steve Jobs
   c) Tim Berner's Aee d) Kevin Ashton

C.Aswin Sankar IV / CSE

DID YOU KNOW ?

☢ *In 2018, the number of IoT-connected devices will surpass mobile devices.* ☢

Aira

Aira is designed to make life a little easier for blind and visually impaired people. Using a pair of smart glasses or a phone camera, the system allows an Aira agent to see what the blind person sees in real-time, and then talk them through whatever situation they're in. Aira promises to make everything from grocery shopping, calling an Uber or world travel more accessible for blind people across the globe.

Aira doesn't replace existing assistance systems. Instead, it's designed to enhance them. A blind person navigates the world using whatever tools she normally would, such as a cane or guide dog, and calls the Aira agent only when needed. When the agent picks up, he or she sees a live video feed and the location of the person calling on Google Maps, alongside general biographical information.

A.Jiyathkhan , IV / CSE

Smart grids

Smart grids is another area of application that stands out. A smart grid basically promises to extract information on the behaviors of consumers and electricity suppliers in an automated fashion in order to improve the efficiency, economics, and reliability of electricity distribution. 41,000 monthly Google searches is a testament to this concept's popularity.

T.Madhubalan , IV / CSE

Connected Car

Connected car technology is a vast and an extensive network of multiple sensors like antennas, embedded software. and technologies that assist in communication to navigate in our complex world. It has the responsibility of making decisions with consistency, accuracy, and speed. It also has to be reliable. These requirements will become even more critical when humans give up entirely the control of the steering wheel and brakes to the autonomous or automated vehicles that are being successfully tested on our highways right now.

S.Sasikumar , IV / CSE

Connected Health (Digital Health/Tele Health/Telemedicine)

IoT has various applications in healthcare, which are from remote monitoring equipment to advance & smart sensors to equipment integration. It has the potential to improve how physicians deliver care and also keep patients safe and healthy. Healthcare IoT can allow patients to spend more time interacting with their doctors by which it can boost patient engagement and satisfaction. From personal fitness sensors to surgical robots, IoT in healthcare brings new tools updated with the latest technology in the ecosystem that helps in developing better healthcare. IoT helps in revolutionizing healthcare and provides pocket-friendly solutions for the patient and healthcare professional.

S.Thirumurugan , IV / CSE

☢ Roughly 80% of companies fear they lack the skills to make sense of all the data the IoT provides. ☢

Smart City

The smart city like the name suggests is a very big innovation and spans a wide variety of use cases, from water distribution to traffic management to waste management, environmental monitoring, and urban security. The reason why it is so popular is that it tries to remove the discomfort and problems of people who live in cities. IoT solutions offered in the Smart City area solve various city-related problems comprising of traffic, reduce air and noise pollution and help make cities safer.

Smart lighting is a lighting technology designed for energy efficiency. This may include high efficiency fixtures and automated controls that make adjustments based on conditions such as occupancy or daylight availability. Lighting is the deliberate application of light to achieve some aesthetic or practical effect. It includes task lighting, accent lighting, and general lighting.

A complete sensor consists of a motion detector, an electronic control unit, and a controllable switch/relay. The detector senses motion and determines whether there are occupants in the space. It also has a timer that signals the electronic control unit after a set period of inactivity. The control unit uses this signal to activate the switch/relay to turn equipment on or off. For lighting applications, there are three main sensor types: passive infrared, ultrasonic, and hybrid.

M.Meiyappan, III / CSE

Smart Retail

Retailers have started adopting IoT solutions and using IoT embedded systems across a number of applications that improve store operations such as increasing purchases, reducing theft, enabling inventory management, and enhancing the consumer's shopping experience. Through IoT physical retailers can compete against online challengers more strongly. They can regain their lost market share and attract consumers into the store, thus making it easier for them to buy more while saving money.

R.Priyadharshini, III / CSE

Smart Supply Chain

Supply chains have already been getting smarter for a couple of years. Offering solutions to problems like tracking of goods while they are on the road or in transit, or helping suppliers exchange inventory information are some of the popular offerings. With an IoT enabled system, factory equipment that contains embedded sensors communicate data about different parameters such as pressure, temperature, and utilization of the machine. The IoT system can also process workflow and change equipment settings to optimize performance.

A.Pavithra, III / CSE

Smart Farming

Smart farming is an often overlooked IoT application. However, because the number of farming operations is usually remote and the large number of livestock that farmers work on, all of this can be monitored by the Internet of Things and can also revolutionize the way farmers work. But this idea is yet to reach a large-scale attention.

Nevertheless, it still remains to be one of the IoT applications that should not be underestimated. Smart farming has the potential to become an important application field specifically in the agricultural-product exporting countries.

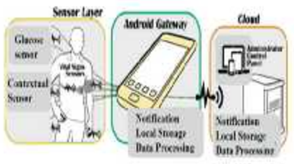
J.Dinesh, III / CSE

☢ It's projected that by 2020, 75% of new cars will come with built-in IoT connectivity. ☢

GlucoME

Glucome is a gluco meter which Keep your blood glucose trends on your smartphone. Used for diabetes.

It is a Blood glucose sensor with Bluetooth smartphone logging. Insulin use logging a microcontroller, a wireless communication block, energy harvesting and management components. The micro-controller performs primary tasks of the device such as data acquisition and transmission. Therefore, it consumes a large part of the device's total power consumption. Reducing power consumption micro-controller can save a lot of power consumption of the device.



The ultra low power micro-controller capable of operating with sleep modes is a suitable candidate for the target. In the device, the micro-controller receives glucose data from an implantable glucose sensor via a wireless inductive link receiver while it collects environmental and body temperature via data link wires such as UART, SPI or I2C. In the system, SPI is more preferable due to its lowest power consumption between these interfaces 11.

The nRF wireless communication block is responsible for transmitting data from the micro-controller to the gateway equipped with an nRF transceiver. The block includes a RF transceiver IC for the 2.4GHz ISM band and an embedded antenna. Due to 2Mbps supporting, nRF completely fulfills the requirements of transmission data rates in a CGM system. Transmission data rates of nRF can be configured for achieving some levels of energy efficiency.

For example, instead of using 2Mbps, a data rate of 256kbps can be used for saving power when sending glucose, temperature, and contextual data. In addition, nRF is capable of both short and long range transmission from a few centimeters to a hundred of meters. Depending particular applications, the transmission range and transmission power can be configured. With a short range communication, nRF consumes lower energy. In the sensor node, the energy harvesting unit and the power management unit described in the followings are two of the most important components because they directly impact on energy consumption and an operating duration of the sensor node.

P.Pugazhivelan, II / CSE & G.Praveen, III/ CSE

Waspmote Agriculture

The Waspmote Agriculture 2.0 Board allows to monitor multiple environmental parameters involving a wide range of applications, from growing development analysis to weather observation. For this, it has been provided with sensors for air and soil temperature and humidity, luminosity, solar visible radiation, wind speed and direction, rainfall, atmospheric pressure, leaf wetness and fruit or trunk diameter (dendrometer). Up to 15 sensors can be connected at the same time. With the objective of extending the durability of the device after the deployment, the board is endowed with a solid state switches system that facilitates a precise regulation of its power, prolonging the life of the battery.

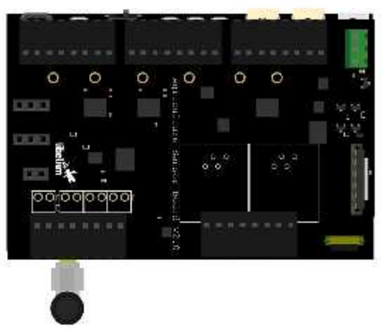
Sensors Used in Waspmote

Sensors in the Agriculture 2.0 Board:

- Temperature sensor MCP9700A by Microchip
- Humidity sensor 808H5V5 by Sencera
- Temperature and humidity sensor SHT75
- Soil moisture sensor Watermark by Irrometer
- Atmospheric pressure sensor MPX4115A
- Leaf wetness sensor LWS
- Weather Station WS-3000 (Anemometer, Wind Vane and Pluviometer)
- Luminosity sensor (LDR)

Sensors added in the PRO version:

- Solar radiation sensor SQ-110 by Apogee
- Ultraviolet radiation sensor SU-100 by Apogee
- DC2, DD and DF dendrometers by Ecomatik



A.Rajarajan, II / CSE

There is now a smart mirror that will analyze your face for wrinkles, It can also play music to you.

Applications of IoT

Smart Home

Whenever we think of IoT systems, the most important and efficient application that stands out every time is Smart Home ranking as highest IOT application on all channels. The number of people searching for smart homes increases every month with about 60,000 people and increasing. Another interesting thing is that the database of smart homes for IoT Analytics includes 256 companies and startups. More companies are now actively being involved in smart homes than similar other applications in the field of IoT.

R.Prasanth, III / CSE

Thermostat

A thermostat exerts control by switching heating or cooling devices on or off, or by regulating the flow of a heat transfer fluid as needed, to maintain the correct temperature. A thermostat can often be the main control unit for a heating or cooling system, in applications ranging from ambient air control, to such as automotive coolant control. Thermostats are used in any device or system that heats or cools to a set point temperature, examples include building heating, central heating, air conditioners, as well as kitchen equipment including ovens and refrigerators and medical and scientific incubators

Sensor types

Early technologies included mercury thermometers with electrodes inserted directly through the glass, so that when a certain (fixed) temperature was reached the contacts would be closed by the mercury. These were accurate to within a degree of temperature.

Common sensor technologies in use today include:

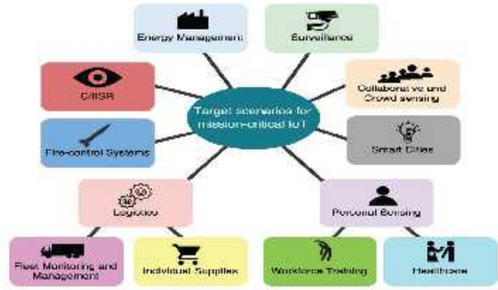
- Bimetallic mechanical or electrical sensors.
- Expanding wax pellets
- Electronic thermistors and semiconductor devices
- Electrical thermocouples

These may then control the heating or cooling apparatus using:

- Direct mechanical control
- Electrical signals
- Pneumatic signals

R.Arun, II / CSE
S.Nisha, III / CSE

Iot Sensors



The first IoT device came in 1982 when Carnegie Mellon University modified a Coke machine to report its inventory and give updates on whether newly loaded drinks were cold.