RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Mechanical Engineering, VII-Semester

Departmental Elective ME- 702(B) Internet of Things

Course Objectives :
The explosive growth of the "Internet of Things" is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products at home. The Internet of Things (IoT) is a course about the new paradigm of objects interacting with people, with information systems, and with other objects. The course will focus on creative thinking and on hands-on project development.

After learning the course, the student will be able:
1. Understand the vision of IoT from a global context.
2. Understand the application of IoT.
3. Determine the Market perspective of IoT.
4. Use of Devices, Gateways and Data Management in IoT.
5. Building state of the art architecture in IoT.
6. Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Unit I: Internet of Things (IoT)
Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples . Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability .

Unit II: Hardware for IoT
Sensors, digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology. Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms such as Arduino, Raspberry pi, Beagle Bone, Intel Galileo .

Unit III: IoT PROTOCOLS
IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks, Zigbee – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT .

Unit IV: Security
Understanding the risks, Modes of attack - Denial of Service Guessing the credentials , Getting access to stored credentials, Man in the middle , Sniffing network communication , Port scanning and web crawling ,Search features and wildcards ,Breaking ciphers , Tools for achieving security - Virtual Private Networks , X.509 certificates and encryption , Authentication of identities , Usernames and passwords , Using message brokers and provisioning servers ,Centralization versus decentralization .

Unit V: IoT Applications

Home Automation- Smart Appliances , Smoke/ Gas Detection, Cities – Smart Parking ,Smart Lighting , Smart Road , Health and Lifestyle- Health and fitness monitoring, Retail- Smart Payments. Case Studies: Smart city streetlights:- control and monitoring

References:

1.Raj Kamal "Internet of Things", McGraw-Hill, 1st Edition, 2016

2.Olivier Hersent,David Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", Wiley

3. Peter Waher, "Learning Internet of Things", Packt publishing

4.Arshdeep Bahga, Vijay Madisetti, "Internet of Things (A hands on approach)" University Press (India)

5.Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013

.6. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Evaluation   Evaluation will be continuous an integral part of the class as well through external assessment