

## Internet of Things

Programme: B.Tech/M.Tech all braches  
Course: Open Course

Year: IIIrd year onward  
Credits: 3

Semester: XX  
Hours: 40

### Course Context and Overview:

Can a refrigerator connected to the internet with web/app based remote control facility will be termed as internet of things? Connecting a device to the internet was possible even 20 years ago when the term IoT was not coined at all. In this context IoT promises interaction and collaboration of refrigerator, geyser, cooking stove, windows and doors on internet platform to bring values which is not possible when they are connected to internet individually. IoT is a multidisciplinary subject that includes essence of embedded system, computer network and middleware and data analytics. This course teaches how to interplay among these technologies effectively.

### Prerequisites Courses:

CSE-215: C and Java programming, basics of electronics, first level course on mathematics

### Course outcomes(COs):

On completion of this course, the students will have the ability to:
CO1: Understand essence of sensor, embedded systems and data acquisition technology.
C02: Understand sensor network, middleware and sensor analytics tools and systems.
C03: Develop skill for sensor data analytics.
C04: Develop essential skills required to build IoT application independently

### Course Topics:

Contents	Lecture Hours
<b>UNIT 1</b>	7
<b>Embedded System for IoT:</b>	
1.1 Basics of Microcontroller	
1.2 Understanding and Managing Memory	
1.3 SPI, I2C, RS232 and Power line Communication	
1.4 Ethernet and EIA 485 communication	
1.5 Configuration of computing resources for IoT application	
1.6 Commonly used sensor in IoT	
1.7 Smart Phone from IoT Perspective	
<b>UNIT 2</b>	
<b>Devices and Platform for IoT</b>	
2.1 General RTOS	
2.2 RaspBerry Pi	
2.3 Aurdino Board	

2.4 Peripheral Device for Aurdino and RaspBerry Pi	6
2.5 Commonly used Middleware	
2.6 KNIME and HANA	
2.7 Case Study	
<b>UNIT 3</b>	
<b>Sensor Network Technology for IoT</b>	
3.1 Sensor Network at Large	7
3.2 Network Layer of Sensor Network	
3.3 Application Layer of Sensor Network	
3.4 Ecosystem of IoT based on core of Sensor Network	
3.5 Case Study on Sensor Network: University Projects	
3.6 Case Study on Sensor Network: Industry Project	
<b>UNIT 4</b>	
<b>Basics of Statistics and Analytics for IoT</b>	
4.1 Characteristics of IoT Data	6
4.2 Measurement of Central Tendency	
4.3 Measurement of Spread and Shape	
4.4 Test of Association and Inference	
<b>UNIT 5</b>	
<b>Lab Experiments</b>	
5.1 Basics of R	5
5.2 Analytics using R	
5.3 Porting of Analytics Code on a IoT Node	
5.4 Handson experiment on IoT node	
<b>UNIT 6</b>	
<b>Mini Project on IoT</b>	
6.1 Individual or group mini project.	15

**Textbook references:****Text Book:**

There is no text book reference as such.

**Other Reference:**

1. Atzori, Luigi, Antonio Iera, and Giacomo Morabito. "The internet of things: A survey." *Computer networks* 54.15 (2010): 2787-2805.
2. Gubbi, Jayavardhana, et al. "Internet of Things (IoT): A vision, architectural elements, and future directions." *Future Generation Computer Systems* 29.7 (2013): 1645-1660.
3. Weber, Rolf H., and Romana Weber. *Internet of Things*. Vol. 12. New York, NY, USA.: Springer, 2010.

**Evaluation Methods:**

<b>Item</b>	<b>Weightage</b>
Quiz/Assignment/Attendance	30
Lab Experiments	25
Mini Project	45

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**Prepared By:**

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