

## *CHAPTER ONE*

# **Introduction in (IOT)**

## *Internet of Things*

- Embedded electronics to connect an internet
- Network of physical object

### **Example**

1. Smart agriculture
2. Energy consumption
3. Security and serval robotics
4. Healthcare

- **What is IOT?**

The Internet of Things is a network that creates a channel between the internet and physical devices to deliver the best output with maximum possibilities. Today, IoT applications are ruling the roots of the IT industry.

- **Purpose**

I am not merely writing this article to discuss the final year **IoT** projects for CSE and ECE but want to mention a possible list of creative thoughts for students and engineers. Aspiring students on projects use devices like microcontrollers, Raspberry Pi, Arduino, and other devices today.



**Smart City**



**Smart Park**



**Street Lighting**



**Tunnel Lighting**



**Commercial Lighting**



**Smart Factory**



**Parking lot Lighting**



**Solar lighting**

- **Shopping Cart using RFID**

It is a revolutionary technology all over the world. This particular product technology is awesome, and nobody can avoid it, and business owners and customers depend literally to buy products based on it. RFID and [Raspberry Pi](#) sensors - a Note MCU microcontroller and mobile application connected to each other. In this IoT-based Smart shopping cart, RFID tags are the source of business calculations for every product. This application can scan the given code and translate it into the price of the product. Today, no product is seen without an RFID tag. Based on the RFID tag, any business will run in the market. It is the technology that is enhanced in IoT.

- **Virtual Doctor Robot**

Doctors should be in the hospital to treat the patients by observing patients' diagnosed reports. It is natural to expect doctors at hospitals to provide medication. But, IoT has changed the scenario completely. No matter wherever doctors can be, they can treat the patient with the help of an IoT virtual robot.

- **Anesthesia Machine Control**

Anesthesia is mandatory for patients who undergo surgeries. But, if the surgery takes a long time, doctors cannot give a heavy dose to perform operations. So, a right is given to patients for a long time in surgery in intervals based throughout the surgery time. But, every time the same dose is not required and cannot be given by doctors. To avoid this unexpected circumstance at the operation theater, the Raspberry PI project allows doctors to set the anesthesia levels on an hourly basis for the patient during surgery with a syringe infusion pump.

- **Charging Station for E-Vehicle**

Solar power is turning out to be a new way for all that is off the grid to enjoy. This energy is used to recharge e-vehicles, and the purpose is to control the usage of greenhouse emissions and fossil fuels. Now, IoT technology-designed devices help in a way to charge E-Vehicles. Proteus software is used for this simulation design, and the entire setup is connected to Arduino UNO R3. The battery level charging process is displayed on LCD. The status of charging is available on a webpage to view.

- **Water Supply Control using Raspberry pi**

Raspberry pi enables the embedded-based water supply control system that can monitor theft prevention systems and record the flow rate of the water at the user's end. The complete process consists of one or more central PCs that work with internal functions built inside the pumping channels.

- **Parking System**

This is one of the best and most advanced methods to find space at parking from anywhere to anyplace. IoT-based smart parking system – Node MCU, handles the entire process and shows the availability of parking space time info to this platform.

- **Gas Level Detection and Booking**

LPG is the preferred fuel for domestic purposes. It is not only convenient but also economical for domestic usage. IoT came onto the board to measure and display gasoline content in an LPG cylinder. It can easily monitor the automatic booking of gas and leakage in case. The measuring process will take place by the SEN-10245 load sensor. The output is connected with Arduino R3. This GSM module allows the user to get the SMS automatically. In the case of leakage detection, it is enabled by the MQ-6 sensor. Booking, leakage detection, and usage of gas percentage will be monitored easily by IoT.

- **Wet and Dry Waste Segregation**

Separation of wet and dry is needed to keep the environment clean and healthy. IoT-enabled systems have been helped in this regard by Node MCU.

It can identify the bin filling and inform the municipality department to ensure that they must be active in cleaning all the necessary things. The system helps in the segregation of wet and dry wastage. If not, garbage filling is more troublesome in cities. This monitor system can indicate employees to be alert and clean and keep the environment healthy.

- **Baggage tracking in airport**

RFID handles security systems at the airport for baggage tracking by using Node MCU. This security system will help travelers feel comfortable during their journey.

- **Wireless Black Box**

You might have heard that the black box provides accident information from different sources. This system is developed by Raspberry Pi.

- **IOT Solar Power Plant Monitoring System**
- **IOT based intelligent traffic management system**
- **IOT based Predictive Maintenance of machines powered with AI and ML algorithms**

In factories, Diesel generators, heavy equipment, heavy motors, etc. it is very crucial to keep track of the maintenance as it affects the smooth functioning and it may cause loss or catastrophe. For example, it may cause accidents, production loss. So to address the above issue, using sensors we acquire some important parameters from the machine and we will develop an ML model, detect minute changes and predict the fault for predictive maintenance.

- **Smart Door Camera with Facial Recognition with visitor management.**

Ever since IoT has come onto board to provide technology-based services by applying for various programs, final year ECE students are thronging to institutes to do projects that can enhance their practical knowledge to get into companies. This article will help you with key aspects to follow and put into practice.



## Technology

IOT is possible at fast on possible when low low power technology  
EX: - Bluetooth

## OIC

OIC means Open System inter connection.  
OIC is use on to connect all equipment.

## **Why these batches are merged?**

- **Robot:** An epitome of an embedded system.
- **IOT:** Implementation based on embedded system.
- **IOT:** instead of creating network that connects people once connected the things can communicate with each other for variety of useful purposes.

## Robotics:-

- **Mechanical**

- 1- Mechanical Aspect : mechanical construction like a frame form or shape designed to achieve a particular task
- 2- The mechanical aspect is mostly the creator's solution to completing the assigned task and dealing with the physics of the environment around it

- **Electrical**

Electronics and electrical components which power and control the machinery

The electrical aspect of robots is used for:-

- a) movement through motors
- b) sensing: where electrical signals are used to measure things like heat sounds and energy
- c) operation: robots need some level of electrical energy supplied to their motors and sensors in order to active and perform basic operation

- **Computer science**

1. programs are the core essence of robots
2. there are three different types of robotic programs:-
  - a) remote control program: preexisting commands responds to a remote control signal
  - b) Artificial intelligence: interaction with the environment
  - c) hybrid: combination of both RC&AI

### **Applications OF Robots:-**

1. Military robots
2. Medical robots
3. Agricultural robots

### **What is the difference for IOT&IIOT?**

IIOT: the industrial internet of things

The adoption of the IIOT is being enabled by improved availability and affordability of sensors, processors and other technologies that have helped facilitate capture of and access to real-time information.

## IIOT requirements:

1. Cloud computing
2. Access (anywhere, anytime)
3. Security
4. Big data, Analytics
5. UX (User Experience)
6. Assets Management
7. Smart machines

## IIOT benefits:-

1. **vastly improved** operational efficiency (e.g., improved uptime, asset utilization) through predictive maintenance and remote management
2. **the emergence** of an outcome economy, fueled by software-driven services; innovations in hardware; and the increased visibility into products, processes, customers and partners
3. **new connected ecosystems**, coalescing around software platforms that blur traditional industry boundaries
4. **Collaboration** between humans and machines, which will result in unprecedented levels of productivity and more engaging work experiences.

## Other challenges

- many iot systems are poorly designed and implemented using diverse protocols and technologies that create complex configurations
- lack of mature IOT technologies and business processes
- limited guidance for life cycle maintenance and management of IOT devices
- The IOT introduces unique physical security concerns
- IOT privacy concerns are complex and not always readily evident
- limited best practices available for IOT developers