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INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

TITLE: Internet of Things and its Applications

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Abstract

In this era of superfast as well as exotic living, we know that the most necessary aspect for living life is time. Shifting from the normal completely interdependent living to a smart IoT based living can be a smart choice. Here the devices with do almost every possible work. And all this work is done with very less or no human interference In this way, it is possible to control almost everything right from your place. As we know in the industries or even at any work where we need to monitor a device, we always need a human source to look over it. But if at the same place we use IoT system for monitoring the same device, time as well as money both can be saved. Also many time there arises a situation that we accidently forget to switch off the appliances while leaving home, and we wish we could turn it off from here itself or sort of shortcuts, this is possible by IoT. Not only such small applications but IoT is also implemented in many of the fields of which some are explained below. The controlling of these devices without any physical touch is possible by implementing small electrical and electronic circuits and by IoT. It is a technology where we can produce various useful applications by the use of internet.

Index Terms: IoT, Micro-controller, Sensors, etc.

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1. Introduction

In this paper, we have discussed about the new developing futuristic technology IoT [Internet of Things]. We have chosen few recent applications as mentioned further.
IoT is the technology that is based upon the accessing of the things without or with a negligible assistance of human beings. The most implementations are done by using Wi-Fi devices, cloud storage and the complete use of INTERNET.
IoT is the new beginning of the smart future.

2. IoT: Internet of Things

IOT or Internet of things is the interconnection of large number of computers via different protocols. It is the system of interconnection of various computing devices, various machines like mechanical and digital, not only mechanical but also objects, animals, everything that is provided by unique identifiers (UID) and has ability to transfer data without any human to human or human to computer interference.
A thing in IoT can be heart monitor implanted person, any animal with biochip transponder, an automobile having built-in sensors for various alerts or any artificial or natural object that has ability to transfer data over a network and can be assigned IP address.
Now a days, there is a huge increase in various communities and organizations that use IoT for enhancement in their efficiency, decision making curriculums, customer services, value addition of their business.

2.1 Working of IoT

The ecosystem of IoT consists of following parts as; embedded processors using web enabled smart devices, Operation on acquired data using collection hardware.
The data is collected by the sensors. It is then shared by various IoT devices by the means of transmitter and a receiver. Now the data is locally analysed as per the requirement of the user. Else is sent to cloud for analysation.
Whereas sometimes there is, intercommunication between these related devices and they operate according to their acquired information.
Most of the devices work with no or very less human interference, moreover people can interact with the devices

to access the data or for any additional instructions.

Their specific Iot applications decide their functions like networking , connectivity , communication protocols used with these web enabled devices. Briefly IoT can be explained from the following block diagram.
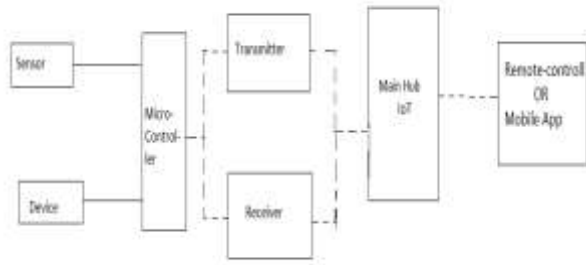

Fig. Block Diagram of IoT System

To understand IoT we need to understand few following terms:

➢ Sensors: Sensors are the sense organs of the IoT systems as like our body. They sense various factors like temperature, moisture, humidity. The commonly used sensors are, temperature-humidity sensor(DHT-11)/(LM-35), soil-moisture sensor, IR sensor, PIR sensor, LDR, etc.
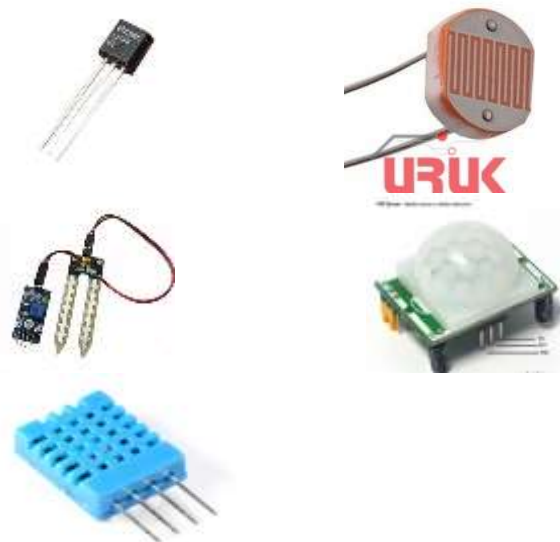

Fig. Sensors

➢ Device: Its an appliance or a device that we want to use or that is being operated.

Fig. Devices

➢ Microcontroller: It collects the data from the sensors and sends it to main processing unit by the means of transmitter and receiver. The generally used microcontrollers are, Arduino, Raspberry-pi, etc.

Fig. Microcontrollers

➢ Transmitter & Receiver: As we are using wireless technology, we need transmitting and receiving devices namely transmitter and receiver respectively. The commonly used trans-receiver devices are, Bluetooth(HC-05), Node-MCU (ESP8266), GSM, etc.

Fig. Tans-Receiver Devices

➢ Main Hub: It is the main processing unit of the whole system. It processes all the collected data and sends the command accordingly to the devices to act upon.

➢ Remote Control: Remote control or some type of mobile application enables us to access our devices from any place. They also provide us with the feedback from the IoT based system.

Fig. IoT Remote Control

2.2 IOT: Benefits

Various benefits offered by IoT are as follows;
➢ It consumes less time and saves money;

➢ It enhance customer experience;
➢ It boosts employee productivity;
➢ It monitors Complete business Processes;
➢ It produces more revenue;
➢ It Adapts and integrates business models.
➢ IOT motivates companies to develop the way to approach their business, industries and markets, it also provides equipments to modify their business strategies.

3. IOT: Applications:

Fig. Applications of IoT

3.1. Smart City
3.2. Smart Farming
3.3. Industrial Internet
3.4. Smart Retail
3.5. Smart Grid
3.6. Smart Supply Chain
3.7. Smart Home
3.8. Smart Wearables
3.9. Connected / Smart Car
3.10. Connected Health (Telehealth / Digital Health)

3.1 . Smart City:

Smart City uses for variety of traffic management to water distribution, urban security, to waste management and environmental monitoring.
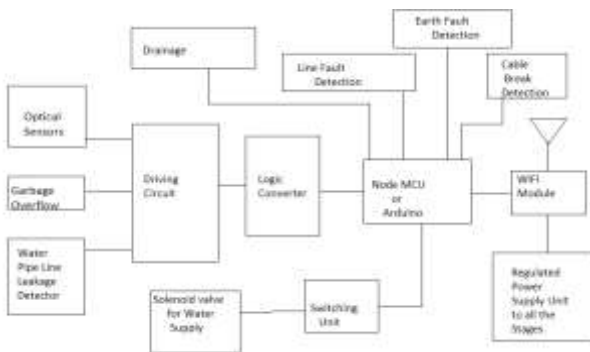

Fig. Block Diagram of Working of Smart City

➢ Optical sensing For street lights : These are the sensors that collect data of intensity of the light from the environment and send it for processing. Mostly LDR (Light Dependent Resistor) sensors are used for sensing light.
➢ Garbage/Drainage overflow: Garbage overflow detection can be done by using various sensors like Ultrasonic Sensors and IR(Infra-Red) . When the garbage fills in a particular container/collector up-to particular level , the sensors send the signal for further processing.
➢ Water Pipeline Detector: These sensors mostly preasure and vibration sensors detect the leakage by sensing the variations in the preasure and vibration with refrence to normal value of preasure and vibration.
➢ Line to Line Fault Detection: It is also one of the important part. To maintain constant supply we need to detect, maintain and resume the connection as fast as possible .
➢ Earth Fault Detection: A Smart city is incomplete without Earth Fault Detection system. This system enables the people know about the danger on the basis of their estimation.
➢ Driving Circuit: It is an Integrated circuit that amplifies or modulates the signals which it receives from various sensor inputs. And proceeds the signal to the Logic converter.
➢ Logic Converter: It is a device that is used to step-up or step-down the signal as per the requirement of the micro-controller or the next stage device.
➢ Micro-controller: It can be stated as the brain of the system. Its main function is to process the received data and send the commands to the system to act upon.
The commonly used micro-controllers are Arduino, Node-MCU, Raspberi-Pi etc.
➢ Switching Unit: It is the unit or a part of unit that has all the switches that can be operate manually or automatically by means of command.
➢ Solenoid Valve: It is an electro-mechanical device that works on the principal of electromagnetic induction. When an electric current is been passed through the solenoid it generates magnetic field and thus operates the mechanism which manipulates the opening of the fluid flow in the valve.
➢ Regulated Power Supply units to all stages: Here the power is maintained to a particular value and then is been supplied to all the stages.

3.1.1. Benefits:
➢ Enhanced government and citizen engagement.
➢ Improved digital quality.
➢ Efficient public utilities.
➢ Developed infrastructure.
➢ New economic development opportunities.
➢ Improved transportation.
➢ Safer communities, etc.

3.2. Smart Farming:

In the internet of thinking (IoT) Smart Farming is viewed as business-case because it does not really adjust into popular categories such as mobility , industrial or health etc.

This type of farming practice leisure our life to effortless farming.

It can be done with the help of using various Electrical and electronic devices and by implementation of few simple steps as shown in the following block diagram.
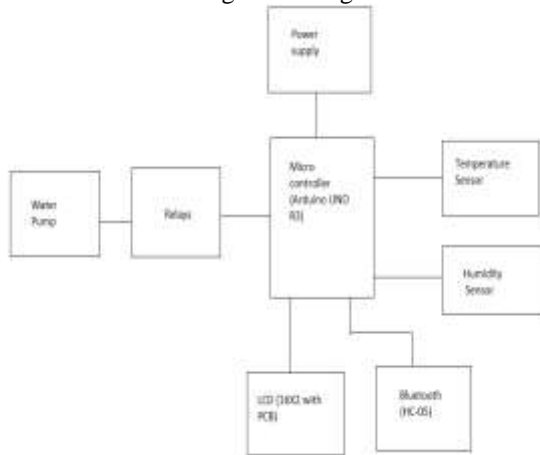
In the application of Internet of Things industrial internet is also the one of the most important aspect. Many of the industries have implemented automation using IoT. The working of these can be explained by following block diagram.
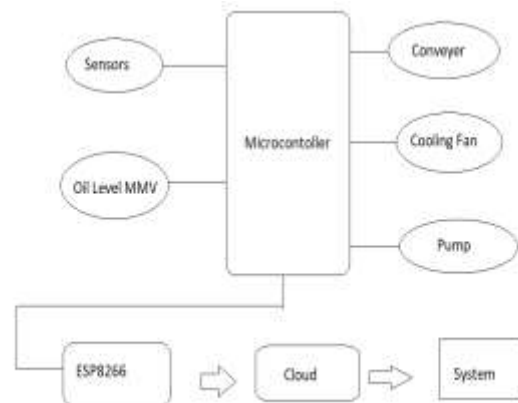

Fig. Block Diagram of Working of Smart Farming

Fig. Block Diagram of Working of Industrial Internet

➢ Micro-controller: It is the brain of the system. Its main function is to process the received data and send the commands to the system to act upon. We can use any of the microcontrollers but the most commonly used micro-controllers are Arduino, Node-MCU, Raspberry-Pi etc. In this system the micro-controller sends the commands to relay for the further operation.

➢ Sensors: We have used few sensors as stated, temperature-humidity sensor, soil-moisture sensor. These both the sensors collect the data from environment and send it to the micro-controller for processing.

➢ Bluetooth: It is a connectivity device which enables the user to to get handy information on his/her device. The person can also operate the devices using Bluetooth. The most commonly used Bluetooth device is HC-05.

➢ LCD: LCD or Liquid Crystal Display is used for displaying the outputs in numeric form or in any type of signal.

➢ Relays : A relay is a switching device which oprates to change or isolate the state of the electric circuit. The type of the relay used depends upon its area of application.

➢ Water Pump: A small electromechanical circuit is installed at the water pump which operates with respect to the commands it gets from the relay.

➢ Micro-controller: It is the brain of the system. Its main function is to process the received data and send the commands to the system to act upon. We can use any of the microcontrollers but the most commonly used micro-controllers are Arduino, Node-MCU, Raspberi-Pi , ATMEGA etc. In this system the ATMEGA micro-controller is used.

➢ Sensors: We have used few sensors namely temperature-humidity sensor and Voltage sensor. These both the sensors collect the data from environment and also from the machineries connected to it and send it to the micro-controller for processing.

➢ Oil Level Monostable Multivibrator: It is a time based operating device which time to time maintains the oil supply to the machineries for cooling and lubricating purposes.

➢ Conveyor: Conveyor can be a belt or a roller or any sort of a transporting machine which is used for transporting the good or raw material etc. from one place to another in an industry.

➢ Cooling Fan: Cooling fan plays an important role if it is in the industry. It is very necessary to maintain temperature of the machines and its components as a minute increase I temperature can result in a disaster.

➢ ESP8266: ESP8266 or NODE-MCU is used to upload the data to the cloud for the storage.

3.2.1. Benefits:
➢ Monitor the soil and many natural parameters.
➢ Saves time and cost.
➢ Obtain data in real time, etc.

3.3. Industrial Internet

3.3.1. Benefits:
➢ Greater energy efficiency.
➢ Higher product quality.
➢ Faster decision-making.
➢ Reduced Downtime.
➢ Predictive Maintenance.

4.Future of Internet of Things :

➢ By 2025 there would be more than 21 Billion IoT devices.
➢ More cities will get "Smart" & smart will get to become more smarter.
➢ Cyber-criminals will use more IoT devices to facilitate DDoS attacks.
➢ 5G network will continue to nourish the growing IoT.
➢ Cars will get even more smarter.
➢ DDoS attacks will take more hazardous forms.
➢ 5G's arrival will give new fresh opportunities to new privacy and security concerns.
➢ Legislation and regulatory activities would be driven by security and privacy concerns.
➢ ARTIFICIAL INTELEGENCE will continue to grow big.

5. CONCLUSION

From the above information we conclude that IoT is a vast field of futuristic applications of the things without really even touching them, or without the need of every time human commands.

ACKNOWLEDGEMENT

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