

An Overview on Internet of Things

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ABSTRACT

A highbrow technology has been introduced in the present scenario named Internet of Things (IoT). Internet application development demand is very high .Hence IoT is solution for this approach. It is the system where all the items are being connected with the web through switches, gadgets and exchange data. The technology helps physical items to be accessed remotely. This paper focuses implementation on web of things. The technologies and application domains that uses IoT research in near future is discussed.

Keywords: Internet of Things, Wireless Sensor Network, Embedded system, smart system, RFID: Radio Frequency.

1. INTRODUCTION

What is IoT? Today the surrounding getting advanced revolves around information and cloud computing .It is the upcoming demand that is the world of sensors and chips. It is a platform which instructs other machine by passing commands to perform simple to complex functions. It predicts the pathway for various applications, devices and technology by establishing a link in a single and consistent network. It has a variety of views where our surroundings have been embodied with smart sensors to make our life easy. A car without a driver seems to be spooky, right? Today not with the technology advancement and advent of IoT, driverless car and self driven cars are quite possible. Although this sounds unthinkable but self driven car will be available soon in the market. [11].

The main aim of the Internet of Things (IoT) has been cutback of 2 years and has slay by many scientists and corporate in our daily lives and culture are expecting a great tremor. Multiple gadgets are connected to a network, they collaborate via network provide the service. This is quite useful for modern society as one can have smart home where air conditioner is on before the family arises or can check if any electric appliances left on while leaving the home. It is

valuable for person with disabilities as they can handle things from the place they are sitting [11].

In this paper [12] author provides genuine recognition through the internet. IoT block diagram in the Figure-1 is classified into 6 major layers:

1. Smart devices and Controllers
2. Connectivity and protocol Communication
3. Cloud Server
4. Data Storage and Accumulation
5. Data analysis and Computing
6. User Application and Report Generation.

There are two ways to connect Devices to the Internet in two ways i.e. it can be an active mode or passive mode. In passive mode there is no direct connection with the internet, but device information gets fed to internet. Unique identification of devices is obtained by bar coders like RFID technique. An improvised device, which is present in internet, is the reason to publish that information to cloud. Device has tendency to sense various data using multiple sensors and store it in active mode. Active mode information is fetched by the cloud. IoT has a tendency to enhance customer's requirement and gives the solutions to many fields like Healthcare, Education, Transport, Energy, Security, Agriculture, Retail etc. IoT improves power utility costs and makes our home smart enough via remote monitoring. This new emerging technology makes our life automated day by day and surroundings become automated by connecting nearby devices to over internet. Dealing smartly helps to face customization easily, avoids human hard work, optimizes usage of smart devices, reduces consumption of energy, diagnosis the problem remotely, efficient solution. [12].

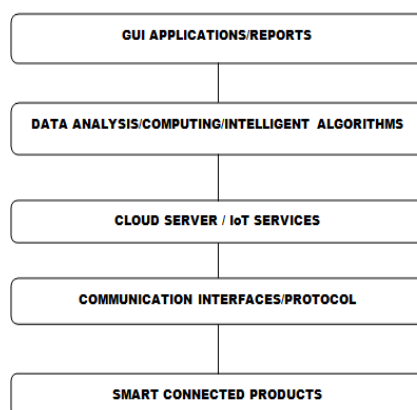


Figure 1: IoT Building Blocks [12]

This smart technique handles multiple processes like how to deal with the Messages size, provides various algorithms for multiple devices, carry Wired/wireless technology, deals with speed and tells us how to preserve data.

2. LITERATURE REVIEW

In every field, we have the work surface that provides useful content to people who are employed in that field. For providing such information many skilled staffs are required and they must be updated with the current news. In case, they miss some information then all the staffs working there faces many troubles. To resolve such issues, IoT provide us many smart devices to keep updated with the organization and the things happening around us. Many research scholars worked and elaborated much about IoT. Some of them discussed their work as [11]:

Stankovic et al [1] presents eight key research topics illustrating that how IoT can be used, where it can be used. These eight stages demonstrate different qualities about- IoT like massive scaling, dependencies, openness and robustness, relation with the big data, security, privacy and human-in-loop. New problems arise because of scaling multiple devices, providing connection with physical and cyber world, issues with privacy and security. Many new links are established between research communities for solving the problems.

The authors [2] defines this technology and refer it as a smarter device where physical devices and the systems are connected to explore the information collected in machines and other physical objects through embedded sensors and actuators. Solution from Machine to Machine (M2M) are given, which is subset of IoT. The Connected Living Program of this GSMA is an industry program that seeks to accelerate the development of mobile IoT services. It is hoped that mutual understanding of IoT characteristics would allow industry participants to work together more efficiently to drive the market forward for the good of customers and society.

Dogo, E. M. et al [3] develops Digital electronic display board. In this author explain the architecture microcontroller which depends on electronic message board. As in real time, this system displays the messages and information via SMS. This system offers the flexibility to a user by controlling display of message without notification or the news displayed without relating with users position, by providing Global System for Mobile Communication. This system also focuses on feedback mechanism that deals with the display of message.

CONS:

- We must pay extra amount to organization.
- A security issue occurs.

Gubbi et al [4] highlights the Iot as the first technology to be considered in the context of supply chain management. As compare to the previous statistics, IoT that covers many applications that are being used in our daily life. Although the word ‘technology’ overcomes the word ‘things’ yet the goal computer sense information without human interference remain same. The present IoT does not only interacts with the Network but also provides interaction with the environment but also uses the steps to transfer, analyze the knowledge and provides communication.

PROS:

- Student and employee easily get notified by sending information any time.
- With fraction of seconds the organization get clear their doubts by sending request and receiving response via messages.
- Admin has capability of changing the display message from anywhere at any time.

CONS:

- Sending message again and again becomes hectic for a student or a staff/employee.

N. Jagan Mohan Reddy et al [5] focused on interesting thing rather than innovative thing i.e. intimating the people by sending messages using wireless display board which being connected to GSM technology. This system does not delay while passing messages. The device designed to be used in public places, also enhances security systems and avoids danger. This command is used for message display onto display board. This developed system has many upcoming applications in various fields. This system is quite user friendly, faster and provides long range.

A. Menon¹, et al [6] proposes the research to viability of IoT in Singapore’s bus transportation network. The network in the Singapore which is technically very mature but badly needs the improvement in its transport field. To deal with this problem it establishes a platform by using web of things for the user to recognize and compare buses choices in efficient way. Secondly it focuses on arrival of buses as well as the crowd inside each bus.

In this paper author [7] expanded by explaining how much work has been done so far to bring this technology into effect of the researchers who focuses on resource-constrained nodes instead of connecting existing embedded systems . This paper highlights an architecture named uID-CoAP which designed to host embedded systems by providing IoT services. The paper combines application protocol with the uID .Aim of the paper is to provide range of elegant functions as compared to single sensor nodes. This framework helps to reduce the burden of manufactures by decreasing their manual work.

The literature [8] describes about convergence of micro electro-mechanical systems technology, elaborates design of wireless communication. These applications have been explored, studied thoroughly and according to that design of sensor networks is provided. The architecture of

sensor network is being highlighted in this paper. This explains various fields where IoT is being used efficiently. The main aim to make the surroundings smart than before.

Menon et al [9] explains Electronic Information Desk System which sends notifications in different style. This system works independently without interference of human. When a student requires information, student sends the request to the system. As per the user request, system responds by sending the SMS to the users. This system also contain disadvantage i.e. if a person wants any information, they must send message to system and even for any update they have to send message to the system in repeated form.

The literature [10] presents IoT communication method using three layer structures for high-voltage transmission line which consist of Wireless Sensor Network, OPGW and Navigation Satellite System. Each and every role of network layers plays vital role in development of applications and management in energy consumption. Every layer is studied in depth in this paper. The system satisfies the interconnection needs between the control center and the terminal minimize the configuration of the terminals and view point of OPGW and assures real-time and efficient online monitoring of data transmission in the remote region and other environmental conditions.

3. APPLICATIONS

This technique is designed to handle the things smartly [11]; various fields wherever the IoT is being used is highlighted .The places where this technology can be used are educational field or at Railway station, Bus stand and Airport to gather the information and notification. The air conditioners in mall can be handled remotely from any place, the humidity and the temperature level can be controlled via temperature sensors. In Industrial organization and in hospital it can be used in health monitoring. Some areas where IoT frequently used are as follows:

3.1 SMART CITIES:

- Ensure the use of technology for delivering services and managing complex civic problems.
- Safeguarding citizen security and privacy by designing the framework to address complex liability, security and privacy issues.
- Checks the availability of parking in the city.
- Detects the vibrations in buildings, bridges and historical monuments.
- Using Bluetooth interfaces or Wi-Fi, these technologies detects Android devices, iPhone or any other devices.
- Minimize the driving routes by check the vehicles and pedestrian levels.
- Detection of maintenance of waste collection routes.
- Figure 2 depicts how IoT is used to connect multiple devices. In this micro controller is being connected with different sensors like dustbin sensors, environmental sensors, light sensors etc. in order to operate all these sensors from a single place.

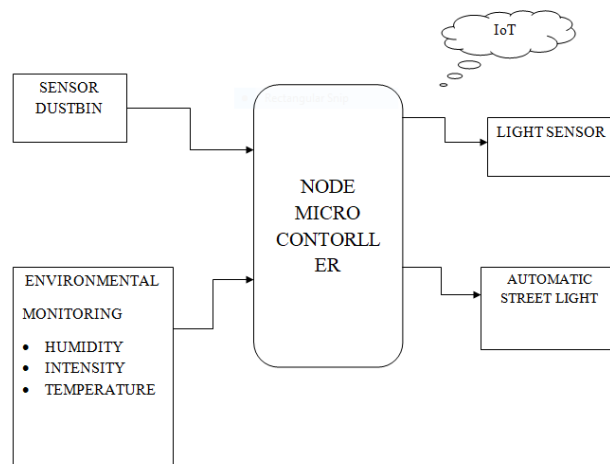


FIGURE 2: SMART CITY USING IoT

3.2 SMART AGRICULTURE: -

- To check the soil moisture in the yards and controls the level of sugar in grape wine health.
- Helps in controlling fruit and vegetable production and improvement of quality.
- Reducing the water resources required in the green by the selective irrigation.
- Helps to study the climatic conditions in fields to predict ice formation, rain and wind changes.
- Controls the humidity and temperature level in order to prevent fungus and bacteria's.
- Figure 3 shows how agriculture can be handled in a intelligent way, here the device depicts moisture of the field area and data is sent to the arduino which is further sent to microcontroller to internet and via internet to mobile.

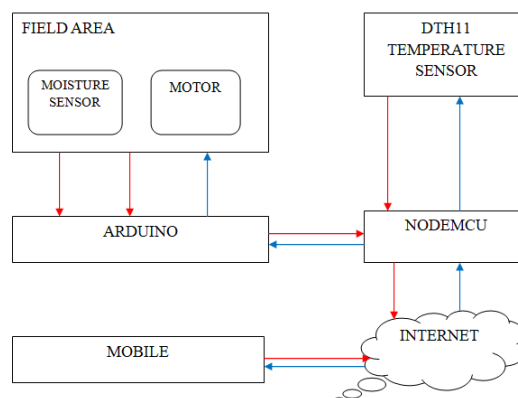


FIGURE 3: AGRICULTURE USING IoT

3.3 MEDICAL FIELD: -

- IoT helps elderly or disabled people to live independent.
- Controls the condition of freezers for storing medicines, injections, and organic elements.
- Monitors the high-performance in various centers and fields.
- Go through the condition of patient admitted inside the hospital.
- Prevent the people from being exposed to the sun rays in their critical situations.
- Figure 4 describes the usage of IoT in the medical field by gathering the information through sensors and passing to cloud to the particular users like doctor , caretaker.

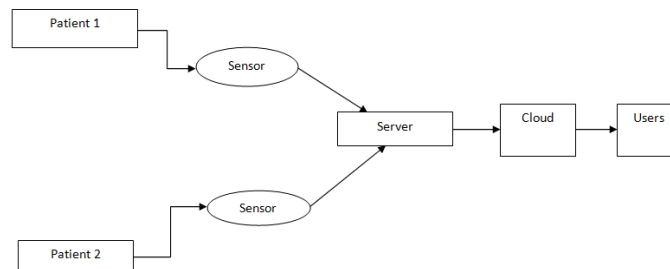


Figure 4: IoT in medical field.

3.4 SECURITY & EMERGENCIES: -

- Detection of non-authorized and control of people in restricted area.
- Detection of liquid in data centers by preventing breakdowns and corrosion in the grounds of building.
- Generating leakage alerts in nuclear power stations.
- Monitoring the gas leakage in the chemical factories and mines and sending them the alert.

3.5 INDUSTRIAL CONTROL: -

- Auto-diagnosis of the problem and control in machine.
- Maintaining the level of oxygen and checks the passage of toxic gases into chemical plants and ensure the safety of employees.
- Observe the conditions inside the industry.

- Keeps on eye in food industries, during drying meat process of ozone levels.
- Collects the information from Can Bus to intimate in case of emergency via alarms and provide advices.

3.6 DOMESTIC & HOME AUTOMATION: -

- Helps in saving cost and resources by checking the energy and water supply.
- Reduces the accident and saves energy by providing facility to switch on and off remote devices.
- Opening of doors and windows by an intruder are detected.
- Reporting the situations inside museums and art gallery.
- Figure 5 shows the way appliances get connected to Bluetooth, arduino and relay board to work smartly.

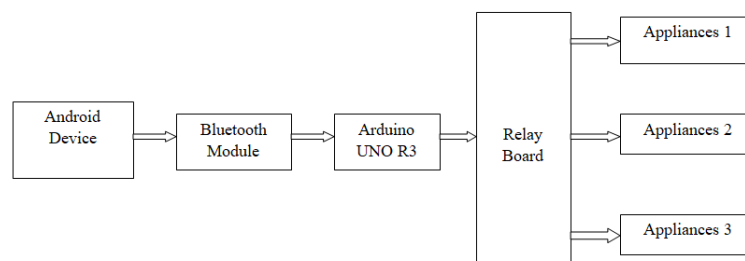


Figure 5: Home automation through IoT

CONCLUSION

The main motive of IoT is to bring the change in our daily life in every field. These changes are brought by making the physicals items get connected with the internet and establish network in order exchange data and receive data smartly. This technology has the strength to improve regular basis in the field like transport, logistics, safety, energy, education health care and other areas, although helps in creating an environment to establish new applications .This takes an efforts to move the industry into new level as compared to the previous records in the market. guided by a common understanding of the distinct existence of opportunity. The process of connection of nodes started slowly .Our new generation engineers come together to support the internet of things earlier than most of people thought. This paper elaborates different fields where IoT has been used. Apart from these applications IoT also used in various fields such as smart grids, Smart grids promises measure the data of electricity suppliers and consumers in an

automated fashion to improve reliability and efficiency. Connected car is the upcoming application of IoT. The future work will be to go in depth on working of IoT devices in various fields and to suggest sensors of reasonable prices.

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