Internet Of Things [IOT] for Smart Systems & Applications

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Abstract: With every second, in today's era a new technology is being created either by humans or by existing technology. Talking about one of the computing technology that is growing day by day and will soon become the future of the parenting technology for each and every existing technology is popularly known as IOT [Internet of Things]. Machine to environment, machine to infrastructure, Machine to machine, intelligent systems, the Internet of everything, the Internet of Intelligent things, and many more. It has many names, but the thing is its happening and it has a huge potential to change the future. Internet of Things [IOT] is a kind of "universal global neural network" in the cloud, which creates a platform through which all the devices get connected. The IOT is an intelligent system in which all the smart devices comprised of sensor and actuator are connected which interact and communicate with other machines, environment, objects and infrastructure with the help of the Radio Frequency Identification (RIFD) and sensor network technologies that helps in rise to meet this new challenge. The huge amount of data is created for the proper functioning. After that it is stored and processed into useful action that can "command and control" the things to make our life much easier and safer which will result in reduction in the impact of environment.

Keywords: Internet of Things, IOT, RFID, Wi-Fi, Sensors, Actuators, AMI, Scada

I. INTRODUCTION

The term IOT illustrates the capability of the smart networking devices to receive, process and collect and manipulate data from all over the world, and after that share all the present data over the internet where it will be further utilized as well as processed for various useful purposes. Now days every person in the planet is connected through one or the other connected communication means. But the most popular communication one is through internet, so in other words we can say that internet is something which connects people [1-2].

The crucial idea of IOT has been implemented from nearly two decades, which attracted many industrialist and researchers to become a part of its great influence in refining the daily lives and society. Now if we talk about our daily life for example things like home appliances which if are connected to networking system then they can implement as a complete system to deliver an ideal service but not as a collective system of individually working devices. IOT is functional for many real-world challenges and services for example if someone would build a smart residence by using IOT applications in which windows would close automatically when the room air conditioner will get turned on or can be automatically open for oxygen when gas oven is turned on. Therefore, in simple words IOT creates a network for physical objects such as homes and buildings, vehicles, devices such as cellphones etc. and other items embedded with actuators, sensors and network connectivity that enables these objects to transfer and collect data. The IOT allows devices to control and sense remotely across existing network which creates an opportunity for direct integration of the physical world into computer-based system thus resulting in improved accuracy, efficiency and overall economic benefit. When we augment IOT

with sensors and actuators, it becomes a class of cyber physical system, which results in technologies such as smart cities or smart homes, smart grids, intelligent transportation etc [2].

The idea of IOT is most valuable to those persons who are physically disabled to perform their daily work routine. The IOT technologies can support human activities and make all the devices to work as a whole system. Experts in IOT believe that there will be approx. 25 billion devices will get connected to Internet of Things by 2020 according to Gartner.inc. All manuscripts must be in English. These guidelines include complete descriptions of the fonts, spacing, and related information for producing your proceedings manuscripts.

II.   SMART APPLICATIONS BASED ON INTERNET OF THINGS [IOT]

IOT is such a vast platform which includes many devices, sensors and actuators, thus the application based on IOT is not confined to some of the applications only rather it can be applicable to wide variety of domains whether infrastructure, industry or individual. The classification on IOT devices are based on their application type which can be smart home, smart enterprise, smart environment, smart wearable or a whole smart city, some of the major applications areas are based on IOT are discussed below [1-6]:

A.   Building and Home automation

In homes and buildings there are many electrical, electronic and mechanical systems which can be monitored and controlled with the help of IOT to upgrade convenience and safety. The tasks such as safety system and gas detection or mobile apps based on web application enabling wireless and internet connected lights. If we talk about security intrusion detection system, alarm systems and surveillance system can be control and managed with more cautiously and with very less effort. At last home audio and entertainment system can also be controlled with the IOT from anywhere in the world.

B.   Transportation

When IOT establish an interconnection between users or drivers and vehicles it can inform process, integrate control and communicate across countless transportation systems such as smart traffic control,

smart parking, electronic toll collection, inter and intra vehicular communication and unmanned autonomous navigation.

C.   *Environment*

IOT in this sector is used for supervising of several environmental parametric aspects such as water, soil, air, etc. with the connection of application through cloud computing, so that the monitoring of weather, air and water pollution checking and early warning systems for fire, earthquake and tsunami etc. can be achieved effectively. Also, some tasks of IOT in this field are soil condition monitoring and fire and temperature rising detection system.

D.   *Medical and Healthcare Systems:*

With the development of IOT in other fields it has also gained some attention towards development in mobile digital medical systems. These days IOT technology with combine medical system can perform tasks such as

- Medication reminder
- Remote health monitoring
- Real time infant monitoring
- Emergency notification systems
- Wearable IOT healthcare devices

With the help of human wearable multi parameter sensor network IOT can obtain multiple physiological parameters of human body to medical service center.

III.   APPLICATION OF IOT IN ELECTRIC POWER INDUSTRY

If we talk about the power industry the things that have been transformed the way things were being done in usual manner since the introduction of IOT. With the help of IOT technology the use of wireless technology has been increased which links the power industry assets and infrastructure in order to reduce the comprehensive cost as well as power consumption. The evolution of IOT in power industry is further discussed below [1-6]:

### A.   *AMI(Automatic Metering Infrastructure)*

AMI is a kind of a two-way communication system of both the utility and the customer side of the meter. AMI uses the IOT technology to transform the traditional energy infrastructure, hence becomes

one of the essential element in smart grid implementation. It is also known as key component of the "Smart Grid". With the help of IOT smart meter reduces the operating cost by managing meter operations remotely. They are used for more improved forecasting and reduction in loss as well as energy theft. Their main function is to apprehend the data and dispatch it back to effective companies over highly dependable communication infrastructure. In United States the use of smart meter is rising around 50 percent with millions of smart meters connected to the grid and regularly communicating data.

B. Public Lights

In the public lightening the different IP based lights are connected to the wireless IOT solutions are deployed. Being the part of the projects under smart cities, it functons with the help of the intelligent connected outdoor LED lights which are connected to head station and controlled by it. This kind of infrastructure is based on dynamic adjustment of illumination dependin upon the environment changing conditions. Thus resulting in lower power consumtion and operating cost.
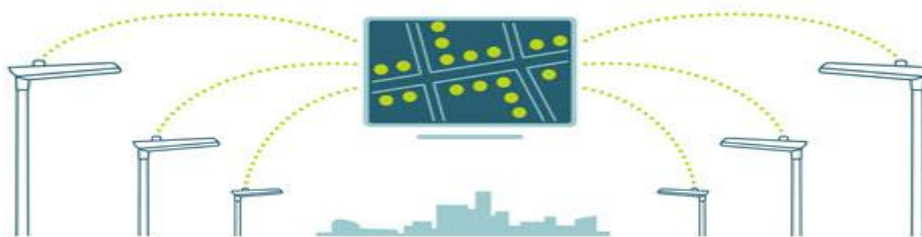
C. Scada

One of the leading application of IOT popularly called as SCADA is allowed for a centralised control and monitoring of remote site generation and transmission system. It consist of controllers, actuators, sensors and communication devices situated at far-off places connected with the master unit with the communication system at the command site connected with HMI (Human Machine Interface) which has a function of providind all the data collected from sensors in the field. It also stores time trampled data for further analysis.

Talking about IOT's SCADA which provides real time signalacquistion and data logging acquistion and data logging hence it is one step beyond Scada. The function of control and supervision is done by integrating the distinct devices, sensors, machine and other electrical equipments.

D.   Smart Grid Systems

The digital technology that allow the two way communication between the customers and the utility, and the sensing along the transmission line is what makes the grid smarter. Smart grid consists of new technologies, automation, system contro and equipments working together with the electrical grid to respond digitally to our rapid changing in the electrical power demand.

The smart grid illustrate an unrivalled opportunity to advance the power industry into an epoch of dependibility, acessibility and well organised, that will contribute to our economy and environmental health. Depending upon the load demand the Smart grid to filter the use of available energy supply and use the power appropriately by optimizing electrical generation and distribution. In this each substation is connected with ethernet based communication with intelligent equipment devices which enables automation of substation which can be coordinate effectively for more advence and appropriate power distribution especially during the peak hours. Benefits of smart grid over normal grid are as follows:

- Better integration of customer-owner power generation systems, including renewable energy systems.

- More efficient transmission of electricity

- Reducing the peak poer demand which will result in lower electricity rates

- Improved security

- Restoration of electricity will me more quick after power disturbances

- Reduction in operation and management costs for utlities will result in lower power costs for consumers

- Increased integration of large scale renewable energy systems

These days, an electricity distruption such as blackout can be to to much disasterous as it will cause a series of failures affecting traffic, security, communication and banking. A smarter grid will inform the system before as well as add pliablility to the electric power system and make it concieve to address many different emergencies such as earthquake, large solar flares or some kind of attaks. The smart grid will allow automatic rerouting when equipments fails or outages occur, thus minimizing the outages as well as the effect when they do happen.

At the end the smart grid is a process for addressing a mature energy infrastructure that has a necessity to be reformed or altered. This is a techniqueto address energy effeciency, to expand awareness to consumers about the connection between the power and all the environment.

IV.   CONCLUSION

IOT has begun to scale up whether we talk about IT industries, control and automation or our very own personal life. The IOT at present has been used in all the domains including education, manufacturing, medical, transportation, industrial, and implementation level. IOT guarantees to deliver a change in step for individual "Quality of life and enterprises" productivity. Through a smart networking of intelligent local devices which is distributed widely all over the world, the IOT has the prospective to empower extension and enhance the foundational services. IOT functioning also has many facts which make the mind of many convectional grid system to switch in IOT based smart grid system, thus results a great contribution towards the field of electricity production.

Conflict of interest: The corresponding author declares that there is no conflict of interest.

Ethical statement: It is also declared that ethical responsibilities are completely followed.

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This volume is dedicated to Late Sh. Ram Singh Phanden, father of Dr. Rakesh Kumar Phanden.