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Smart system Applications using with Internet of Things

Ghanraj[1], Dr. Javalkar Dinesh Kumar[2]
School of Electrical and Electronics Engineering,
Lingaya'sVidyapeeth, Nacholi, Faridabad, Haryana.

ABSTRACT:

The aim of this paper is to bring out different applications of Internet of Things which play vital role in the daily life of human being. The new era of computing technology i.e. Internet of Things (IoT). IOT is a sort of "universal global neural network" in the cloud which connects various things. The IoT is a intelligently connected devices and systems which comprised of smart machines interacting and communicating with other machines, environments, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will rise to meet this new challenge. As a result, a enormous amount of data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things to make our lives much easier and safer—and to reduce our impact on the environment. Every organization such as companies and civil institutions needs up-to-date information about people. In this regard, most establishments either use websites, emails or notice boards. However, in most of countries internet access is available to people on systems and their mobile devices, so that the transferring of the information can be much easier and less costly through the internet

INTRODUCTION:

The new wave of connectivity is going beyond laptops and smartphones, it's going towards connected cars, smart homes, connected wearables, smart cities and connected healthcare. Basically, a connected life. According to Gartner report, by 2020 connected devices across all technologies will reach to 20.6 billion. It's a huge number. These devices will bridge the gap between physical and digital world to improve the quality and productivity of life, society and industries. With IoT catching up Smart homes is the most awaited feature, with brands already getting into the competition with smart appliances. Wearables are another feature trending second on the internet.

The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. Now a day"s every persons are connected with each other using lots of communication way. Where most popular communication way is internet so in another word we can say internet which connect peoples.

The essential idea of the Internet of Things (IoT) has been around for nearly two decades, and has attracted many researchers and industries because of its great estimated impact in improving our daily lives and society. When things like household appliances are connected to a network, they can work together in cooperation to provide the ideal service as a whole, not as a collection of independently working devices.This is useful for many of the real-world applications and services, and one would for example apply it to build a smart residence; windows can be closed automatically when the air conditioner is turned on, or can

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be opened for oxygen when the gas oven is turned on. The idea of IoT is especially valuable or persons with disabilities, as IoT technologies can support human activities at larger scale like building or society, as the devices can mutually cooperate to act as a total system.

Communication capability and remote manual control lead to the next step … how do I automate things and, based on my settings and with sophisticated cloud-based processing, make things happen without my intervention? That‟s the ultimate goal of some IoT applications. And, for those applications to connect with and leverage the Internet to achieve this goal, they must first become "smart" (incorporate an embedded system with an associated unique ID) then connected and, finally, controlled. Those capabilities can then enable a new class of services that makes life easier for their users IoT makes the concept of extensive computing and omnipresent computing a reality by allowing objects of our everyday life like cars, roadways, pacemakers, pill shaped cameras in our digestive tracks, billboards that adjust to passers-by, refrigerators and even cattle's equipped with sensors to communicate with humans and assisting them in every step . Wireless technologies such as the Wi-Fi, Bluetooth, ZigBee, RFID, 6LoWPAN (IPv6 Low Power Wireless Personal Area Network) allow the device to be connected to the Internet and to each other. The cloud services collect, store and analyse the data collected by the sensors and allow people to take decision accordingly. Sensors play a major role in defining boundaries of IOT by converting it from a passive to an active network. The collected data can be analysed, visualized, can calculate new data, or interact with web sites and social media with the help of software. The software helps to calculate new data, and visualize data in the form of plots, charts, and gauges using analytical tools online. The processed information is basically stored and viewed by the user. The user takes necessary actions by communicating with the devices. The devices which are used for communication are more powerful, cheaper and smaller over time, Internet of Things makes use of small devices to deliver its scalability, versatility, and accuracy. The application of IoT in various fields is discussed in the following section. This brings out the importance of IoT in our daily life.

APPLICATIONS OF IOT

IoT has many applications which are very useful for the people living in this world. Experts are increasingly taking advantage of the benefits these technologies to cater the need of the society. The various applications in IoT are creating more wonders in this real-time world. IoT application scenarios were identified and grouped into few domains, which includes Transportation, Smart Home, Smart City, Lifestyle, Retail, Agriculture, Smart Factory, Supply chain, Emergency, Health care, User interaction, Culture and tourism, Environment and Energy. Some of the IoT applications are briefly explained in the following paragraphs.

Smart User

This type of application is mainly for the specific type of people who are actually in need of smart system. Smart user application involves smart home security, wearable technology, asset tracking, workplace etc. Smart Home allows controlling our home appliances from a remote distance as per our needs. Proper monitoring of utility meters, energy and water supply will help saving resources and detecting unexpected overloading, water leaks etc. The system can also have a proper encroachment detection system which will prevent burglaries. Gardening sensors will be able to measure the light, humidity, temperature, moisture and other gardening vitals, as well as it will water the plants according to their needs. The IoT structures of a farm can also be taken into consideration for home

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landscaping. Smart systems carry out key maintenance and repairs and additionally request them. IoT watches over any suspicious activities even miles away.

Wearable technology is attached to the body of the user and it is installed with sensors and software which collect data and information about the users. This data is later pre-processed to extract essential insights about user. These devices broadly cover the details like fitness, health and entertainment requirements. This technology for wearable applications is to be highly energy efficient or ultra-low power and small sized. Asset tracking helps to track things like smart mobile tracking, GPS pet monitoring and any asset we want to. Nowadays, Puppy monitoring is becoming increasingly more popular to offer pet proprietors complete peace of thoughts. They could screen the movement in their pets. Additionally, it operates over longer distances in which IoT coverage is present for low energy wide area networks.

At workplace, IoT learns about the user and their task, and the way to work to supply optimized surroundings. This outcome in a realistic resort like adjusting the room temperature, but also extra advanced benefits like modifying the user schedule and the new technique to increase the output and decrease work time. IoT system inside a workplace acts as a consultant and a manager.

Smart Education System with IoT

Figure 1 shows that development of IoT has great application in the field of education. IoT helps in fulfilling the gaps and loopholes in the education industry. It improves the quality of education being offered to students by optimizing the cost. It also improves the administration and the management by taking into consideration student's response and performance.

Figure 1. Smart School

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School with IoT IoT enabled board's permits us to create digital posters without problems combining with the photos, audio, video, text, and hyperlinks. This allows us to percentage them electronically with others and reveals the activity of the scholar without problems. These virtual posters can then be shared with classmates and instructors through e-mail, surely accessed through the poster's URL deal with and posted on elegance blogs.

Interactive learning gives a broader outlook to the students to analyse new things with a better understanding and interplay with instructors and their friends. The instructional professionals are bringing the actual world troubles inside the study room and permits college students to find their very own answers. IoT allows students and teachers to communicate via extraordinary method, checking messages and upcoming events at the same time when away from the classroom or even replying to posts. It is by far a very effective app that provides safe network and complete privacy. The IoT enabled communications system also be utilized for special cases like emergency tones, live bulletins, a couple of bell schedules and pre-recorded instructional messages in order to direct the group of workers and students at some point of emergency. Attendance monitoring could help in maintaining attendance records automatically. It also reduces the time for publishing the attendance facts and allows school officers to send a piece of email or messages to the ward's family.

Smart Government System with IoT

The idea of Smart city is to make a better use of the public resources, increasing the quality of the services offered to the citizens, while reducing the operational costs of the public administrations. This objective can be pursued by the deployment of an urban IoT. A smart city has many important features incorporated with it. They are monitoring of parking areas availability in the city, monitoring of vibrations and material conditions in buildings, bridges and historical monuments, detection of Android devices, iPhone and in general any device which works with Bluetooth interfaces or WiFi, measurement of the energy radiated by cell stations and Wi-Fi routers, monitoring of vehicles and pedestrian levels to optimize driving and walking routes, detection of rubbish levels in containers to optimize the trash collection routes, Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart system in defence improves and supports militia systems and services, and gives the technology vital to control the panorama of national defence. It helps the higher safety of borders through cheaper, better performance gadgets that are manageable and remarkable. IoT automates the safety responsibilities that generally unfold throughout numerous departments and multiple individuals.

Smart Industry System with IoT

Smart industry is empowering industrial engineering with sensors, software and big data analytics to create brilliant machines. Digitized machinery that is embedded with an IoT system can transfer information related to operations to the workers about the original equipment manufacturers and report to field engineers. This way process automation and optimization is made advantageous by enabling operation managers and factory heads to remotely manage the factory units. It helps to identify potential problems for managers.

In facility management, the IoT sensors placed inside manufacturing equipment triggers alerts based on condition-based maintenance. Most of the machine tools are critical and are

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designed to function between a specific temperature and vibration ranges. Whenever an equipment deviates from its prescribed parameters, IoT sensors can actively monitor machines and send an alert. Manufacturers in this way can conserve energy, reduce costs, eliminate machine downtime and increase operational efficiency, by ensuring the prescribed working environment for machinery. In Production Flow Monitoring, IoT is capable of monitoring an entire production line be it from the refining process completely down to the packaging of final products. Because this complete monitoring of the process takes place in real-time. It provides us the scope to recommend any adjustments in operations for better management of the industry's operational cost. Since the monitoring is done quite closely, it lags in the actual production thereby eliminating wastes and unnecessary work. Through Inventory Management, the IoT systems monitors the events across a supply chain. These systems allow one to track the inventory and trace it globally on a line-item level. It helps managers in getting realistic estimates of the available material, the work in progress and the estimated arrival time of new materials. Ultimately this makes supply more optimal and reduces additional and shared costs that arise in the value chain. For the Plant Safety and Security, the IoT system monitors some important Performance Indicators of health and safety, such as the number of injuries, frequent rates of illness, vehicle incidents, and property damage or any kind of loss incurred during daily operations. This method provides an effective monitoring system ensures better and effective safety. In Quality Control, it contains information on the composition of raw materials used in the making of a product, the temperature & working environment, different wastes, the importance of transportation etc. Quality control in different sources can help to identify and correct potential quality issues.
Through packaging optimization, the products are modified and their packaging for delivering better performance in both costs of packaging and customer experience. Factors such as weather impact, a condition of roads and other environment variables on the product affects the product quality. Through effective reporting manufacturers are able to collect and feed the delivery information. As a result, this data will help manufacturers to reduce inventory, predict potential issues and also reduces capital requirements.

Smart Healthcare System with IoT

The IoT is used in healthcare domain to improve the quality of human life by assisting basic tasks that humans must perform through application. Sensors can be placed on health monitoring equipment used by patients. The information collected by these sensors is made available on the Internet to doctors, family members and other interested parties in order to improve treatment and responsiveness.

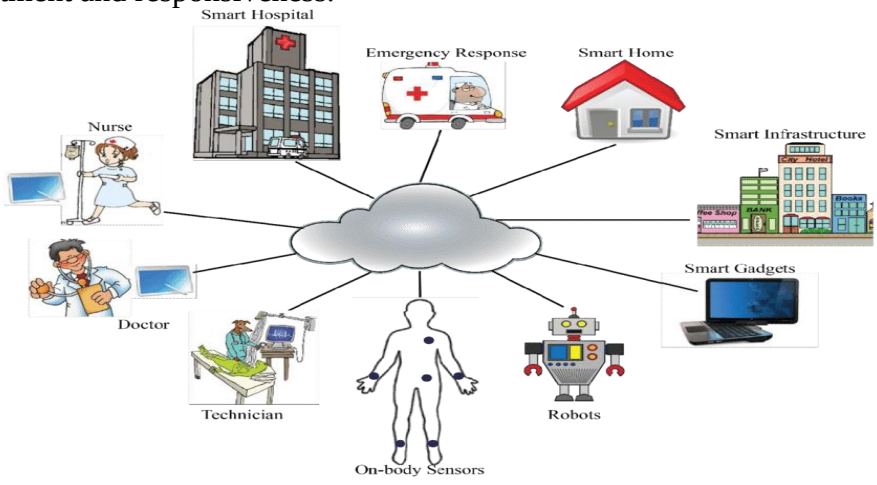

Figure 2. Smart Healthcare

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IoT opens ways to a sea of valuable data and information through analysis, real-time field data, and testing. IoT can deliver data that is far superior to standard analytics through making use of instruments that are capable of performing potential research. As a result, IoT helps in healthcare by providing more practical and reliable data, which yields better solutions and discovery of issues that were previously unknown. IoT devices can be used to monitor a patient's current medicines and evaluate the risk of new medications in terms of allergic reactions and adverse interactions. With the use of sensors and the technology stated above we can track the person's body temperature, heart beat rate, blood pressure, etc. In case of emergency, the individual and their personal doctor will be notified with all the data collected by the sensors. This system will be very useful to senior citizens and disabled people who live independently. Smart Hospitals will be equipped with smart flexible wearable embedded with RFID tags which will be given to the patients on arrivals. There are many medical emergencies such as cardiac arrest but ambulances take some time to reach patient, Drone Ambulances are already in the market which can fly to the scene with the emergency kit so due to proper monitoring, doctors will be able to track the patients and can send in the drone to provide quick medical care until the ambulance arrive. Monitoring of the important symptoms of sportsmen all through training the use of personal wearables facilitates is likewise turning into very common inside the field of sports. Other areas of use inside the healthcare enterprise encompass patient's surveillance, care of the elderly and the disabled, fall detection and so on.

Smart Agriculture System with IoT

It will monitor Soil nutrition, Light, Humidity etc and improve the green housing experience by automatic adjustment of temperature to maximize the production. Accurate watering and fertilization will help improving the water quality and saving the fertilizers respectively. Smart surveillance can bring out the images of distant areas where cultivation is possible. A Smart agricultural farming is represented in Fig.3.

Figure 3. Smart Agriculture

In this modern era, the two types of drones, ground based and aerial-based drones are being incorporated in agriculture in many ways such as, for crop health assessment, irrigation,

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planting, and soil & field analysis. Usage of such drones brings to the table include, ease of use, time-saving, crop health imaging, integrated GIS mapping, and the ability to increase yields. The drone technology will give a high-tech makeover to the agriculture industry by making use of strategy and planning based on real-time data collection and processing. The various factors such as plant counting and yield prediction, plant health indices, plant height measurement, canopy cover mapping, nitrogen content in wheat, drainage mapping, and so on are also taken for consideration. Livestock monitoring system helps them in identifying the condition of their livestock. They involve in finding animals that are sick so that they can separate from the entire herd, preventing the spread of the disease to the entire cattle. The feasibility of ranchers to locate their cattle with the help of IoT based sensors helps in bringing down labour costs by a substantial amount

Smart Energy System with IoT

Smart energy system has become the need of the hour. The energy rates have become paramount. All Individuals and organizations, both are searching ways to reduce and control the consumption of energy. IoT provides a better way to monitor energy usages not only at the appliance-level but also at the grid level, house-level or even at the distribution level. Smart energy systems such as Meters & Smart Grids are installed at various organizations and houses to monitor energy consumption. This system is protected against losses such as damaged equipment, downtime, and injuries by detecting threats to system performance and stability of the equipment. All sensors in the configuration area can provide coverage and connectivity but consume their energy efficiently. So, the energy requirement for tracking energy equipment are made smart.

Smart Environment System with IoT

Prediction of natural disasters such as flood, fire, earthquakes etc will be possible due to innovative technologies of IoT. It provides weather forecasts even in extreme climatic conditions with greater accuracy and flexibility. There will be a proper monitoring of air pollution in the environment. The problem of waste management is very crucial issue in big cities, due to two reasons; first the cost of service and second the problem of storage of accumulating garbage. A trash bin embedded with sensors which are capable to analyse and alert the authorities when it is full and need to be emptied.

Smart Transportation System with IoT

Traffic is an important part of a society therefore all the related problems must be properly addressed. There is a need for a system that can improve the traffic situation based on the traffic information obtained from objects using IoT technologies. For such an intelligent traffic monitoring system, realization of a proper system for automatic identification of vehicles and other traffic factors is very important for which we need IoT technologies instead of using common image processing methods. The intelligent traffic monitoring system will provide a good transportation experience by easing the congestion. It will provide features like theft-detection, reporting of traffic accidents, less environmental pollution. Smart transportation system of this smart city will give diversions with climatic changes or unexpected traffic jams due to which driving and walking routes will be optimized the traffic lighting system will be weather adaptive to save energy. Availability of parking spaces throughout the city will be accessible by everyone. Smart Railway systems will do great help for Railway officers as it involves in automatic re-routing of trains based on the availability

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of platform without any manual intervention. It also closes the railway gates automatically if there is a possibility of train to cross over the road routes.

Smart Governance

By the use of IoT, the traffic indicators inform the authorities about the traffic congestion at a specific place. This helps the authorities to detect the location of accident and guide them to move swiftly to that particular location. Unarmed high surveillance vehicles can be used to identify the residence of the criminals without any manual deployment. This avoids serious risks involved in tracking those criminals. Drones can float above a specific locality that requires higher surveillance and behave as an additional pair of eyes when equipped with distinctive styles of cameras.

CONCLUSION

IoT is a promising platform where the existing technology transforms into new level. The various applications of IoT clearly defines the significant importance of the technology in our conventional life. This developing prototype of networking will influence every part of our lives ranging from the automated houses to smart health and environment monitored by embedding intelligence into the electronic objects that surrounds us. In this paper, the different applications of IoT were discussed. The application never gets limited as the technology grows exponentially. Researchers strive hard to keep the collected information with full privacy and security.

The future of IoT is more fascinating than this where billions of things will be talking to each other and human intervention will become least. IoT will bring macro shift in the way we live and work.

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