



World Laying Steps towards Smart Ideas

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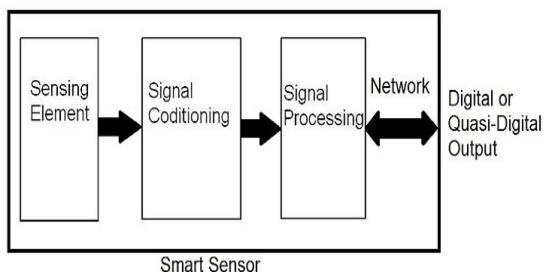
Abstract: Smart is the popular word which has become a general taught in every human brain. The Acronym of the word Smart refers to **S**pecific **M**easurement **A**chievable **R**elevant **T**ime-Oriented. The world is moving towards future technologies by laying different steps to be smarter in the future generations. A Smart World is a collection of different technologies which are getting improved better and better with the invention of Automation in every sector with wide range of application step by step. As the automation is improving day by day in each sector, with the advancement of technologies, resulting in advantages such as time reduction, efficiency, producing accurate results, scalability, and flexibility and so on. This paper shows how the world is moving into smarter technologies, with their roles in different sectors. Focusing on the types of sensors and the applications that the smarter is entering.

Keywords: IoT, Smart, Sensor, Actuator.

I. INTRODUCTION

A Smart world is the one where the automation is taking place in each and every sector with introducing the IoT in every application involved in the sectors. The world is moving towards future smart technologies with their increase in the thinking levels of each and every person, which is focusing on the generations with more interactive with things without the involvement of any human. IoT is the Internet of Things, where the interaction is going to take place with the communication among the devices (things). Here the Devices are going to communicate with each other without any role of the human being [1].

An IoT is a technology which has Sensors and Actuators. A sensor is a device which will grasp the input with using different methods depending on the type of sensors, the sensor will take the input and forward to the further processor which will process using the actuator. An actuator is the one which is going depending on the instructions given by the processor with the inputs taken with the help of sensor [2].



A smart sensor is a device that takes input from the physical environment and uses built-in compute resources to perform predefined functions upon detection of specific input and then process data before passing it on. Smart sensors enable more accurate and automated collection of environmental data with less erroneous noise amongst the accurately recorded information. These devices are used for monitoring and control mechanisms in a wide variety of environments including smart grids, battlefield

reconnaissance, exploration and a great number of science applications [2].

II. LITERATURE SURVEY (SENSORS)

The vision is to make machines smart enough to reduce human labor to almost nil. The idea of inter-connected devices where the devices are smart enough to share information with us, to cloud based applications and to each other (device to device). Smart devices or “Connected devices” as commonly called as, are designed in such a way that they capture and utilize every bit of data which you share or use in everyday life. And these devices will use this data to interact with you on daily basis and complete tasks [6]. This new wave of connectivity is going beyond laptops and smartphones, its 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.

There are different sensors:

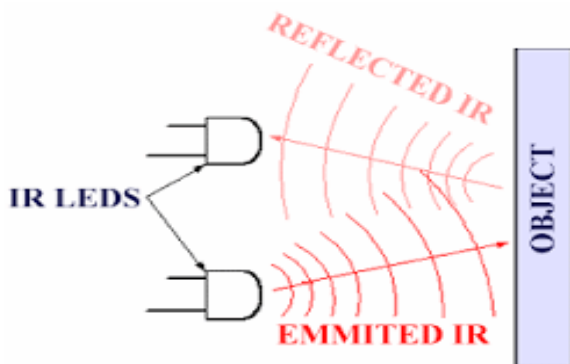




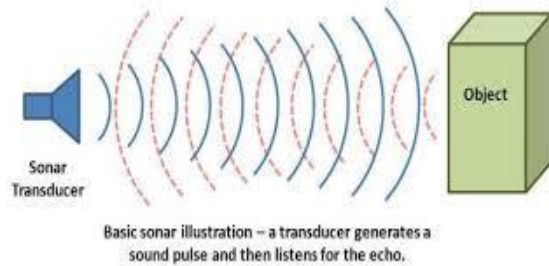
1. Temperature Sensor: Temperature is one of the most commonly measured environmental quantity for different reasons. There are different types of temperature sensors that can measure temperature, such as thermocouple, thermistors, semiconductor temperature sensors, resistance temperature detectors (RTDs), and so on. Based on the requirement, different types of sensors are used for measuring temperature in different applications [4].



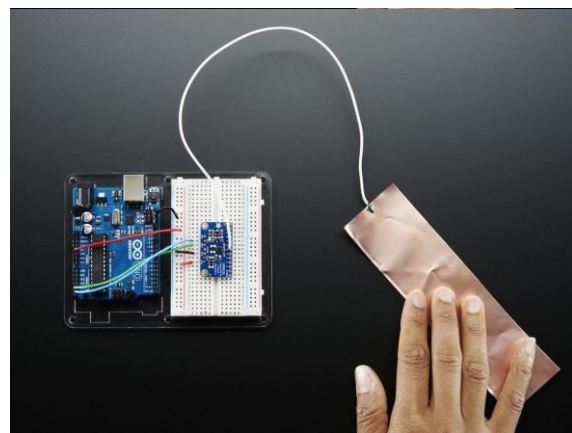
2. IR Sensor: The small photo chips having a photocell which are used to emit and detect the infrared light are called as IR sensors. IR sensors are generally used for designing remote control technology. IR sensors can be used for detecting obstacles of robotic vehicle and thus control the direction of the robotic vehicle. There are different types of sensors which can be used for detecting infrared lights.



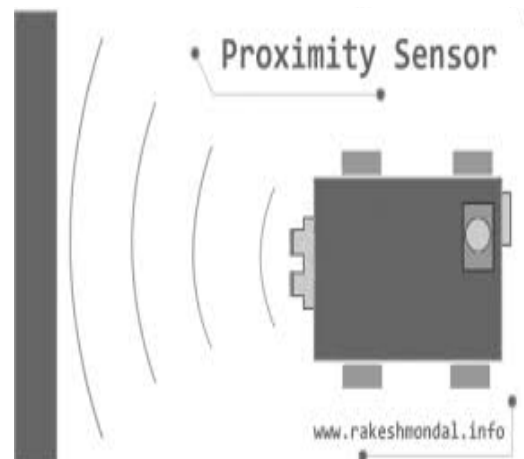
3. Ultrasonic Sensor: A transducer that works on the principle similar to the sonar or radar and estimate attributes of the target by interpreting is called as ultrasonic sensors or transceivers. There are different types of sensors that are classified as active and passive ultrasonic sensors that can be differentiated based on the working of sensors. The high frequency sound waves generated by active ultrasonic sensors are received back by the ultrasonic sensor for evaluating the echo. Thus, the time interval taken for transmitting and receiving the echo is used for determining the distance to an object. But, passive ultrasonic sensors are just used for detecting ultrasonic noise which is present under specific conditions.



4. Touch Sensor: Touch sensors can be defined as switches that are activated by the touch. There are different types of touch sensors that are classified based on type of touch such as capacitance touch switch, resistance touch switch, and piezo touch switch.



5. Proximity Sensors: A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

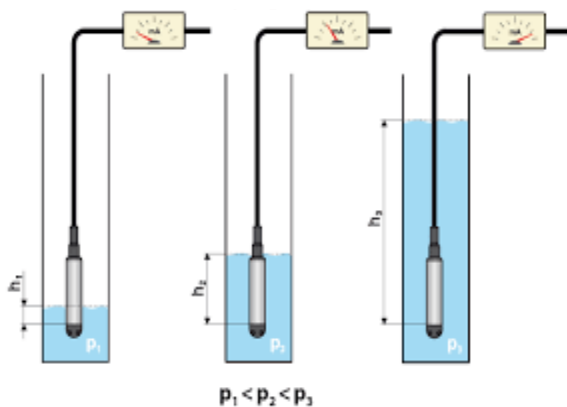




6. Pressure Sensor: Some pressure sensors, such as those found in some traffic enforcement cameras, function in a binary (off/on) manner, i.e., when pressure is applied to a pressure sensor, the sensor acts to complete or break an electrical circuit. These types of sensors are also known as a pressure switch. Pressure sensors can be classified in terms of pressure ranges they measure, temperature ranges of operation, and most importantly the type of pressure they measure [7].



7. Level Sensors: Level sensors detect the level of liquids and other fluids and fluidized solids, including slurries, granular materials, and powders that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers (or other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally, the latter detect levels that are excessively high or low.



8. Smoke and Gas Sensors: A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself. Electrochemical gas sensors are gas detectors that measure the concentration of a target gas by

oxidizing or reducing the target gas at an electrode and measuring the resulting current.



III. APPLICATIONS

Now a day, in each and every sector the automation is replacing the manual system with invention of new technologies by updating their transnational methods with the usage of the smart devices such as sensors depending on their need [8].

1. Smart Home: With IoT creating the buzz, Smart Home is the most searched IoT associated feature on Google. But, what is a Smart Home? Wouldn't you love if you could switch on air conditioning before reaching home or switch off lights even after you have left home? Or unlock the doors to friends for temporary access even when you are not at home. Don't be surprised with IoT taking shape companies are building products to make your life simpler and convenient. Smart Home has become the revolutionary ladder of success in the residential spaces and it is predicted Smart homes will become as common as smartphones. The cost of owning a house is the biggest expense in a homeowner's life. Smart Home products are promised to save time, energy and money. With Smart home companies like Nest, Eco bee, Ring and August, to name a few, will become household brands and are planning to deliver a never seen before experience [4].

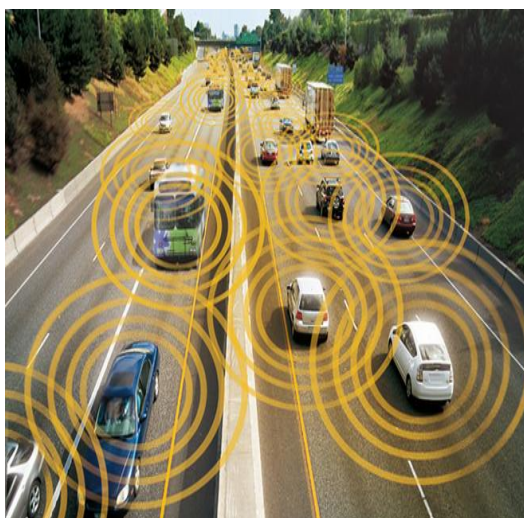




2. Wearables: Wearables have experienced an explosive demand in markets all over the world. Companies like Google, Samsung have invested heavily in building such devices. But, how do they work? Wearable devices are installed with sensors and software's which collect data and information about the users. This data is later pre-processed to extract essential insights about user. These devices broadly cover fitness, health and entertainment requirements. The pre-requisite from internet of things technology for wearable applications is to be highly energy efficient or ultra-low power and small sized.

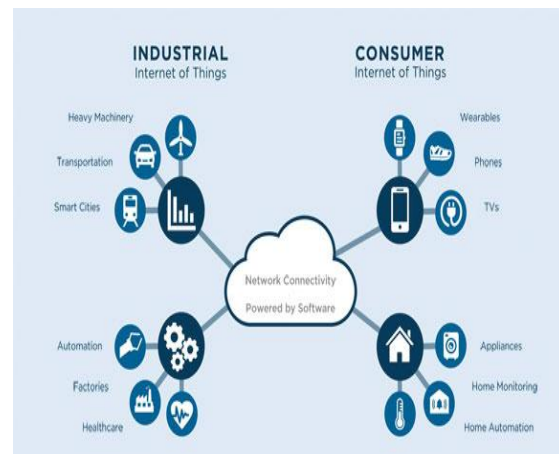


3. Connected Cars: The automotive digital technology has focused on optimizing vehicles internal functions. But now, this attention is growing towards enhancing the in-car experience. A connected car is a vehicle which is able to optimize its own operation, maintenance as well as comfort of passengers using onboard sensors and internet connectivity. Most large auto makers as well as some brave startups are working on connected car solutions. Major brands like Tesla, BMW, Apple, and Google are working on bringing the next revolution in automobiles.

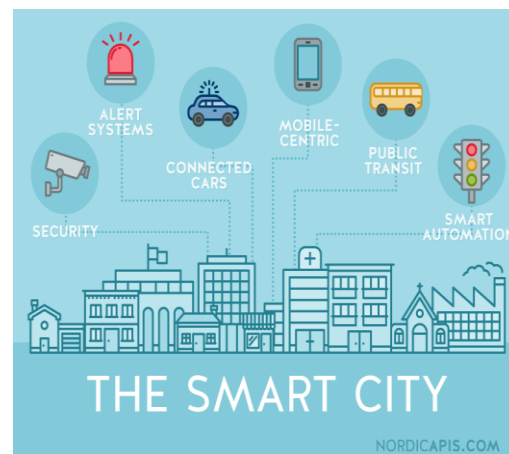


4. Industrial Internet: Industrial Internet is the new buzz in the industrial sector, also termed as Industrial Internet

of Things (Eliot). It is empowering industrial engineering with sensors, software and big data analytics to create brilliant machines. According to Jeff Imelda, CEO, GE Electric, Eliot is a beautiful, desirable and investable asset. The driving philosophy behind Eliot is that, smart machines are more accurate and consistent than humans in communicating through data. And, this data can help companies pick inefficiencies and problems sooner. Eliot holds great potential for quality control and sustainability. Applications for tracking goods, real time information exchange about inventory among suppliers and retailers and automated delivery will increase the supply chain efficiency. According to GE the improvement industry productivity will generate \$10 trillion to \$15 trillion in GDP worldwide over next 15 years.



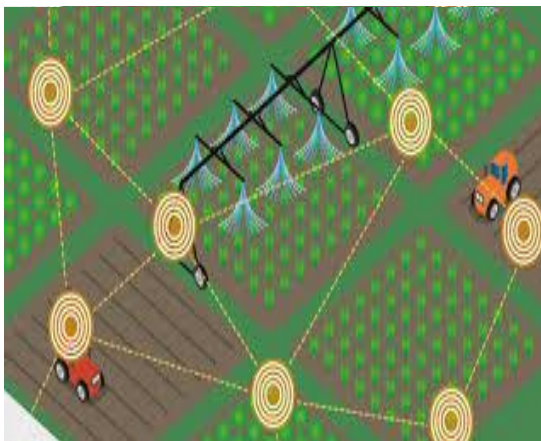
5. Smart Cities: Smart city is another powerful application of IoT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environmental monitoring all are examples of internet of things applications for smart cities. IoT will solve major problems faced by the people living in cities like pollution, traffic congestion and shortage of energy supplies etc. Products like cellular communication enabled Smart Belly trash will send alerts to municipal services when a bin needs to be emptied.



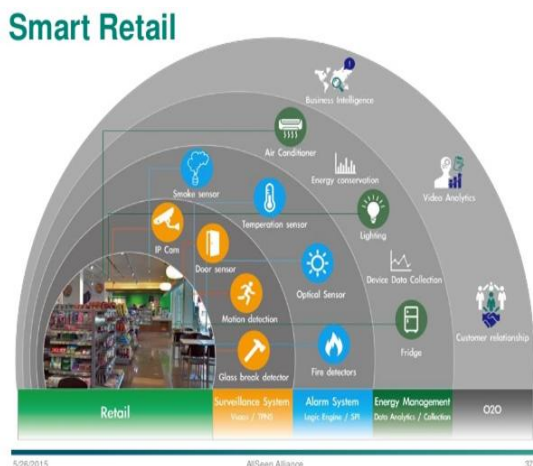


By installing sensors and using web applications, citizens can find free available parking slots across the city. Also, the sensors can detect meter tampering issues, general malfunctions and any installation issues in the electricity system.

6. IoT in agriculture: With the continuous increase in world's population, demand for food supply is extremely raised. Governments are helping farmers to use advanced techniques and research to increase food production. Smart farming is one of the fastest growing field in IoT. Farmers are using meaningful insights from the data to yield better return on investment. Sensing for soil moisture and nutrients, controlling water usage for plant growth and determining custom fertilizer are some simple uses of IoT [5].



7. Smart Retail: The potential of IoT in the retail sector is enormous. IoT provides an opportunity to retailers to connect with the customers to enhance the in-store experience. Smartphones will be the way for retailers to remain connected with their consumers even out of store. Interacting through Smartphones and using Beacon technology can help retailers serve their consumers better. They can also track consumer's path through a store and improve store layout and place premium products in high traffic areas.



8. Energy Engagement: Power grids of the future will not only be smart enough but also highly reliable. Smart grid concept is becoming very popular all over world. The basic idea behind the smart grids is to collect data in an automated fashion and analyze the behavior or electricity consumers and suppliers for improving efficiency as well as economics of electricity use. Smart Grids will also be able to detect sources of power outages more quickly and at individual household levels like nearby solar panel, making possible distributed energy system [3].

Digital Grid Communications Overview

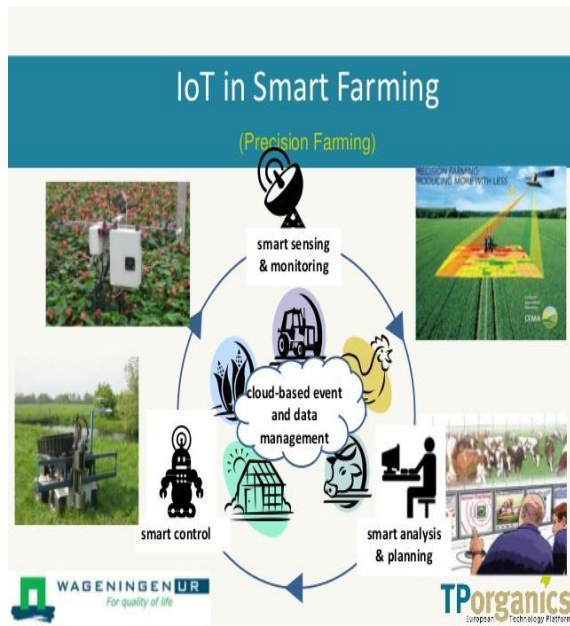


9. IOT in Healthcare: Connected healthcare yet remains the sleeping giant of the Internet of Things applications. The concept of connected healthcare system and smart medical devices bears enormous potential not just for companies, but also for the well-being of people in general. Research shows IoT in healthcare will be massive in coming years. IoT in healthcare is aimed at empowering people to live healthier life by wearing connected devices. The collected data will help in personalized analysis of an individual's health and provide tailor made strategies to combat illness [8].

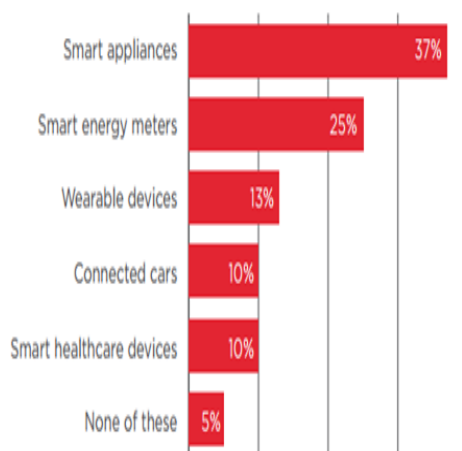




10. IoT in Poultry and Farming: Livestock monitoring is about animal husbandry and cost saving. Using IoT applications to gather data about the health and wellbeing of the cattle, ranchers knowing early about the sick animal can pull out and help prevent large number of sick cattle. With the help of the collected data and ranchers can increase the pouty production [5].



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. There are many more areas where IoT is making an impact. Networked Toys is one application of IoT which will change the playing experience of your kids. IoT can also be used in the detection of environmental issues [5].



The graph shows the percentage how the improvement of the smart technologies is coming into existence with the invention of new technologies in advance to the requirements.

IV. CONCLUSION

This paper shows a brief introduction of IoT with describing the technology hidden in the IoT with Sensors and Actuators. Introducing different types of sensors with their need and also focusing on different sectors where the Smart technologies are replacing the traditional systems, giving more interactive nature towards the advancement. Final concluding the title for World laying steps towards Smart with smarter thinking.

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