

INTERNET OF THINGS IN AUTOMATION

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Abstract— Internet of Things is the future technology that spread everywhere in engineering and non engineering fields. Now a day's people looking for smart appliances which make the life easier for accessing technology services. To realize this IoT is only way to make it possible. IoT mainly depends on sensors and actuators to get data, and it is available anywhere with connectivity to internet. This data can be used for analysis to take control decisions. Automation is nothing but controlling or operating the system with reduced human intervention. In this paper we want to give an overview of what is IoT , where it has it significant applications in automation and what are advantages with IoT.

Index Terms— IoT, Sensors, Actuator, Automation.

1. Introduction to IoT:

Internet of things is connecting the physical devices or things to internet and operate remotely. This is getting more popular in present technology because of it wide range of applications in every field of engineering and non engineering. Before going to the details of these applications lets briefly look into what is internet of things and how it works. Internet of things term is new to information technology but concept is used since from long back with internet as back bone. The following diagram will give you an idea about the IoT. Sensors play a key role in IoT. Sensors is a small electronic devices which measures or detects a physical property like temperature, light, pressure, speed ...etc., and responds or give data to network.

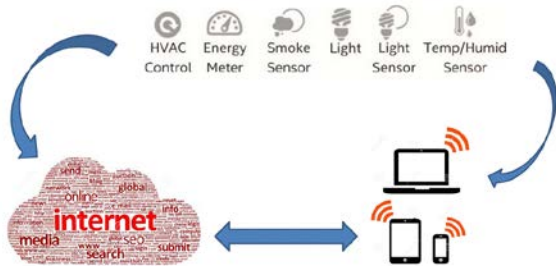


Fig: Internet of Things.

Initially the end devices in IoT are sensors which are connected directly to the internet and can be controlled by any computing device(like smart phone, tab, laptop, computer..etc.,) for controlling or these sensors can be connected to the computing devices directly. The data collected from the sensors can be used for analysis and prediction for taking necessary action.

2. IoT Applications areas for Automation

The following are the some of the major areas where it has shown its significant usage of IoT in automation.

- i. IoT in automation of industrial manufacturing.
- ii. IoT in smart grid.
- iii. IoT in vehicular technology.
- iv. IoT in Home automation.
- v. IoT in agriculture.
- vi. IoT in healthcare and medical.
- vii. IoT in smart cities.

2.1 IoT in automation of industrial manufacturing

IoT applied to automation uses this machinery to modernize, subside, and craft system architectures that are more reasonable, responsive, and efficient. The aim is frictionless connections and interaction from mechanized field input/output (I/O), including sensors, actuators, analyzers, drives, vision, video, and robotics, for increased manufacturing performance and elasticity. This revolution will make cleverness to the edge of the system with the final goal of all manufacturing devices at the bottom of IP, including field I/O. Wireless IP devices, as well as

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smartphones, tablets, and sensors, are already being used in manufacturing. The wireless sensor I/O open standards WirelessHART, ISA100, and WIA-PA are all IP devices sustaining the latest IPv6 principles, which leverage superior address spaces and enhanced cyber security standards.

The IP-enabled mechanized automation architecture will allocate more functions into new breeds of commanding industrial controllers and sensors/actuators with embedded processors, eliminating the need for middle-level software that is cumbersome, expensive, and difficult to maintain.

2.2 IoT in smart grid.

The smart grid is the combination of the twentieth century conventional electrical power grid with the most modern twenty-first century telecommunication and IT. Such combination enables capable resource consumption to minimize energy use, establish and supervise distributed energy sources, as well as to swap the generated power. The power flow and connections will be in 2 ways. Most utility companies around the world are on track to establish renewable energy sources such as solar and wind energy close by the utilization sites. Also, residential home owners started to establish smart home appliances and renewable energy resources in their building to produce and consume electrical power efficiently. As the smart grid concepts emerged as a fast rising research and development subject in the recent years.

Smart grid users communicate in 2 way directions by utilizing some wireless and wired communication protocols such as Zigbee, WiFi, Homeplug, power line carrier, GPRS, WiMax, LET, Lease line, and Fibers. Some software packages were updated and several are being developed to accommodate the new grid process, maintenance and supervision such as, distribution management system (DMS), geographic information systems (GIS), outage management systems (OMS), customer information systems (CIS), and supervisory control and data acquisition system (SCADA). As a consequence of the smart grid development, some recent enabling technologies have emerged to decrease the number of communication protocols and handle huge amounts of data. The Internet of Things (IoT) is one the most recent enabler for the smart grid.

2.3 IoT in vehicular technology

The automobile industry is growing to reach the maximum satisfaction and safety of customers. As these vehicles turn into more and more associated, they turn into self-aware, appropriate, and eventually, autonomous. Those of you reading this will maybe know-how self-driving cars in your life span. We still require addressing a many of technology, engineering, legislative, and advertising issues to develop successful offerings here. But this automotive era builds on current and related industry trends such as the convergence of digital lifestyles, the emergence of new mobility solutions, demographic shifts, and the increase of smart phones and the mobile internet. Consumers at the present expect to access relevant information anywhere they are ... including in the vehicle. At the same time, these technologies are building new mobility solutions, such as peer-to-peer car sharing is more extensive and attractive. This is particularly significant since vehicle possession in urban areas is expensive and customers, especially younger ones, don't show the same desire for vehicle ownership as older generations do. To be successful, connected vehicles will draw on the leading technologies in sensors, displays, on-board and off-board computing, in-vehicle operating systems, wireless and in-vehicle data communication, machine learning, analytics, speech recognition, and content management. (That's just to name a few.) All of this leads to considerable benefits and opportunities: reduced accident rates, increased productivity, enhanced traffic flow, lowered emissions, extended utility for EVs, new entertainment options, and new promotion and commerce experiences. Besides providing automobiles and drivers with new function, connected vehicles will also expand automotive business models to include a much broader set of industries — IT, retail, financial services, media, consumer electronics. This is considerable, because it could challenge the traditional automotive business model: Rather than focusing only on the sale and maintenance of a vehicle, companies will focus on the *sum of business opportunities* the vehicle represents.

2.4 IoT in Home automation.

Homes of the Twenty First century will turn out to be more and more self controlled and programmed due to the comfort it provides, particularly when working in a personal home. A home automation structure is a way that allow user to manage electric appliances of varying type. Several existing, well recognized home automation systems are based on wired communication. This does not create a problem until the system is designed well in advance and installed during the physical construction of the structure. But for already existing buildings the execution cost goes very high. In difference, Wireless systems can be of big help for automation systems. With the improvement of wireless technologies such as Wi Fi, cloud networks in the current past, wireless systems are used all day and all over the place.

Home automation is the process of controlling home appliances automatically using various control system techniques. The electrical and electronic appliances in the home such as fan, lights, outdoor lights, fire alarm, kitchen timer, etc., can be controlled using various control techniques. The necessary machinery and equipment for home automation using IOT project can be listed as a Wi-Fi module, Opto-coupler, TRIAC, resistors, capacitors, diode, regulator, loads (home appliances).

2.5 IoT in agriculture

Smart farming is a idea quickly catching on in the agricultural industry. Contributing high-precision crop organize, useful data gathering, and automated farming techniques, there are clearly many advantages a networked farm has to offer.

A recent Beecham's account entitled *Towards Smart Farming: Agriculture Embracing the IoT Vision* predicts that food production must increase by 70 percent in the year 2050 in order to meet our probable world population of 9.6 billion people. It also describes rising concerns about farming in the future: climate change, limited arable land, and expenses/accessibility of fossil fuels. So, what's the solution? Smart farming.

Of the several advantages IoT brings to the bench, its capability to innovate the site of present farming methods is completely revolutionary. IoT sensors capable of provided that farmers with data about crop yields, rainfall, pest infestation, and soil nourishment are helpful to production and recommend accurate data which can be used to

improve farming techniques over time. New hardware, like the corn-tending Rowbot, is building strides by coupling data-collecting software with robotics to fertilize the corn, relate seed cover-crops, and gather data in order to both make the most of yields and reduce misuse.

One more way in which smart farming is headed involve intensively restricted indoor growing methods. The OpenAG Initiative at MIT Media Lab uses "personal food computers" and an open source platform to collect and share information. The collected information is termed a "climate recipe" which can be downloaded to other personal food computers and used to replicate climate variables such as carbon dioxide, air temperature, humidity, dissolved oxygen, potential hydrogen, electrical conductivity, and root-zone temperature. This allows users very precise control to document, share, or recreate a specific environment for growing and removes the element of poor weather conditions and human error. It could also potentially allow farmers to induce drought or other abnormal conditions producing desirable traits in specific crops that wouldn't typically occur in nature.

With a future of capable, data-driven, highly-precise farming methods, it is definitely safe to call this type of farming smart. We can expect IoT will forever alter the way we grow food.

2.6 IoT in healthcare and medical

We all want individual, quality care when it comes to our physical condition. We want it to be cost-effective and, for the majority part, we would like to sense empowered all the way through all parts of the process. The possibilities connected with health care and the IoT check all these boxes and more. Let's take a look.

Reduced cost. The cost of health care is not a topic discussed lightly. IoT provide remote investigation and triage to decide whether patient's readings lay them at risk of health crises, and in need of intervention; reduces costs through decreased emergency care visits

Enhanced care. That health tracking information Goldman Sachs referenced as a cost reducer can also help doctors provide better care. IoT-enabled devices can provide remote data from apparatus like fetal monitors and electrocardiographs, among others. When data like temperatures, heart rates and glucose levels are automatically transmitted in real-time via wearable devices, hospitals operate more

professionally and patients obtain enhanced care. All that spare data can help providers observe patients' sleep and keep fit patterns and even determines their threat for heart attack or stroke.

Empowered patients. The upcoming of IoT-powered health care may permit patients to get specialist checkup recommendation without going to the doctor. Tele health applications can permit actual doctor admission without the waiting rooms. This connectedness could also be helpful when it comes to behavior alteration, as providers would have new apparatus to use when encouraging better lifestyles for their patients.

2.7 IoT in smart cities

Over the few years, the meaning of "Smart Cities" has evolved to stand for various things to various people. Yet, one object remains unvarying: part of being "smart" is utilizing information and communications technology (ICT) and the Internet to deal with urban problems. The amount of urban residents is increasing by almost 60 million every year. In addition, more than 60% of the world's population will be living in urban area by 2050. As a consequence, people occupying just 2% of the world's land will take about three-quarters of its resources. Additionally, more than 100 cities of 1 million people will be built in the next decade. Today's urban area face a diversity of challenges, including job creation, financial growth, ecological sustainability, and social resilience. Given these trends, accepting where we are in the development of the Internet is significant to upcoming city-planning processes. In terms of phases or eras, Cisco believes that several organizations are presently experiencing the Internet of Things (IoT), the networked association of physical objects. As things add capabilities like context knowledge, improved processing power, and energy autonomy, and as more people and new types of information are coupled, IoT becomes an Internet of Everything — a network of networks where billions or even trillions of connections create exceptional opportunities as well as new risks. In fact, we are seeing the emergence of a new essential from public leaders and industries. "Digital urbanism" is quickly becoming a central support for urban planners, architects, developers, and transportation providers, as well as in public service provision. From a public sector leadership perspective, cities can be viewed as microcosms of the interconnected networks that make

up IoT. In fact, cities serve as "productive ground" for realizing IoT value.

3. Advantages with IoT

Overall by connecting IoT with every field it leads to many fruitful advantages. Some of the advantages are coined below.

Automation of daily tasks leads to better monitoring of devices: The IoT allows us to computerize and manage the tasks that are done on a daily basis, avoid human interference. Machine-to-machine communication helps to uphold transparency in the processes. It also leads to consistency in the everyday jobs. It can as well preserve the quality of service. We can also take needed action in case of emergencies.

Efficient and Saves Time:

The machine-to-machine communication provides improved efficiency, therefore; perfect results can be obtained fast. This consequences in saving precious time. Instead of repeating the same tasks every day, it enables people to do other innovative jobs.

Saves Money:

Optimum utilization of power and capital can be achieved by adopting this technology and keeping the devices under observation. We can be alerted in case of probable bottlenecks, breakdowns, and damage to the system. Hence, we can save money by using IoT technology.

Enhances Quality of Life:

Every application of this machinery culminate in improved comfort, convenience, and better organization, thus improving the Quality of life.

4. Conclusion

With the above description it is clear that how the IoT is going change the life with peace of mind. Automation is possible and complete with the IoT technology. Even though there exists few complexities in deployment it can be solved with new architectures coming in near future.

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