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A Study on Internet of Things Its Applications, Challenges and Related Future Technologies

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ABSTRACT: We are entering in a 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. Nowadays Internet of Things (IoT) gained a great attention from researchers, since it becomes an important technology that promises a smart human being life, by allowing a communications between objects, machines and every things together with peoples. IoT represents a system which consists a things in the real world, and sensors attached to or combined to these things, connected to the Internet via wired and wireless network structure. by the technology of the IoT, the world will becomes smart in every aspects, since the IoT will provides a means of smart cities, smart healthcare, smart homes and building, in addition to many important applications such as smart energy, grid, transportation, waste management and monitoring . In this paper we review a concept of many IoT applications and future possibilities for new related technologies in addition to the challenges that facing the implementation of the IoT.

KEYWORDS: Iot , IoT Applications, Smart Environment, Iot Challenges.

I. INTRODUCTION

Internet of Things (IoT) term represents a general concept for the ability of network devices to sense and collect data from around the world, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. 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 IoT is a technological revolution that represents the future of computing and communications, and its development depends on dynamic technical innovation in a number of important fields, from wireless sensors to nanotechnology. They are going tag the each object for identifying, automating, monitoring and controlling. The IoT sensors can use various types of connections such as RFID, Wi-Fi, Bluetooth, and ZigBee, in addition to allowing wide area connectivity using many technologies such as GSM, GPRS, 3G, and LTE. IoT-enabled things will share information about the condition of things and the surrounding environment with people, software systems and other machines. The aim of this paper is presents the internet of things Applications, Related Future Technologies, and challenges .

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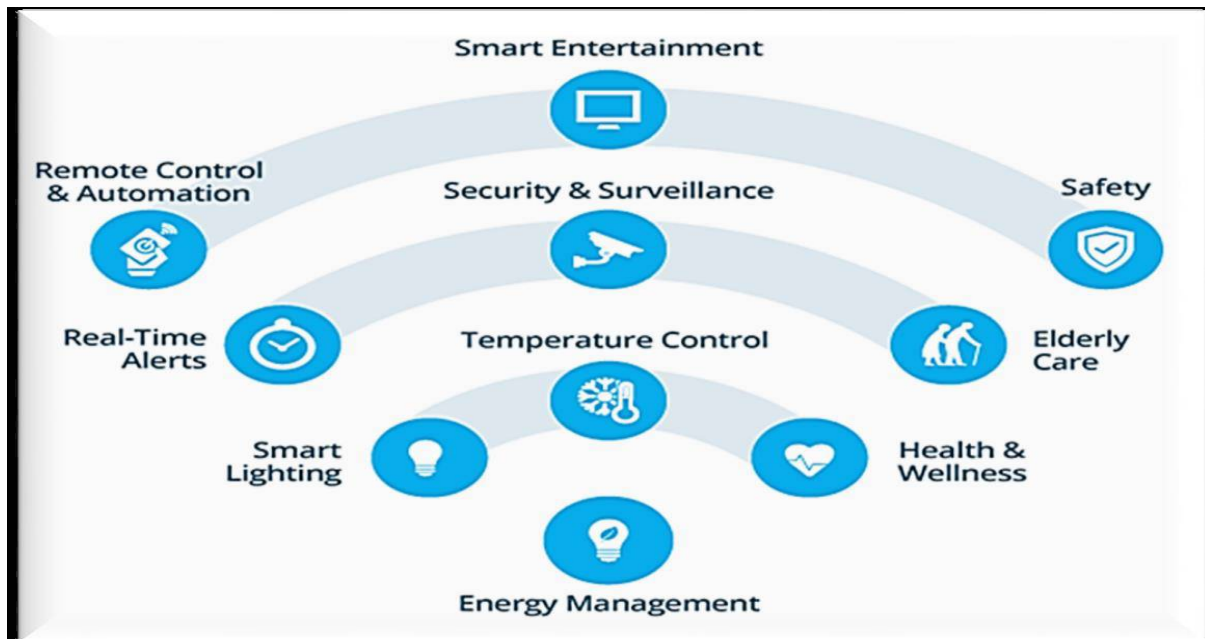
II. INTERNET OF THINGS APPLICATIONS

Smart Cities: To make the city as a smart city to engage with the data exhaust produced from your city and neighborhood.

1. Monitoring of parking areas availability in the city.
2. Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.
3. Detect Android devices, iPhone and in general any device which works with Bluetooth interfaces or WiFi .
4. Measurement of the energy radiated by cell stations and and Wi-Fi routers.
5. Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.
6. Detection of rubbish levels in containers to optimize the trash collection routes.
7. Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Home and Buildings: In home by using the iot system remotely monitor and manage our home appliances and cut down on your monthly bills and resource usage.

1. Energy and Water Use: Energy and water supply consumption monitoring to obtain advice on how to save cost and resources.
2. Remote Control Appliances: Switching on and off remotely appliances to avoid accidents and save energy.
3. Intrusion Detection Systems: Detection of windows and doors openings and violations to prevent intruders.
4. Art and Goods Preservation: Monitoring of conditions inside museums and art warehouses.
5. Wi-Fi: Wi-Fi technologies in home automation has been used primarily due to the networked nature of deployed electronics where electronic devices such as TVs, mobile devices, etc are usually supported by Wi-Fi.



(a) Smart Home & building applications

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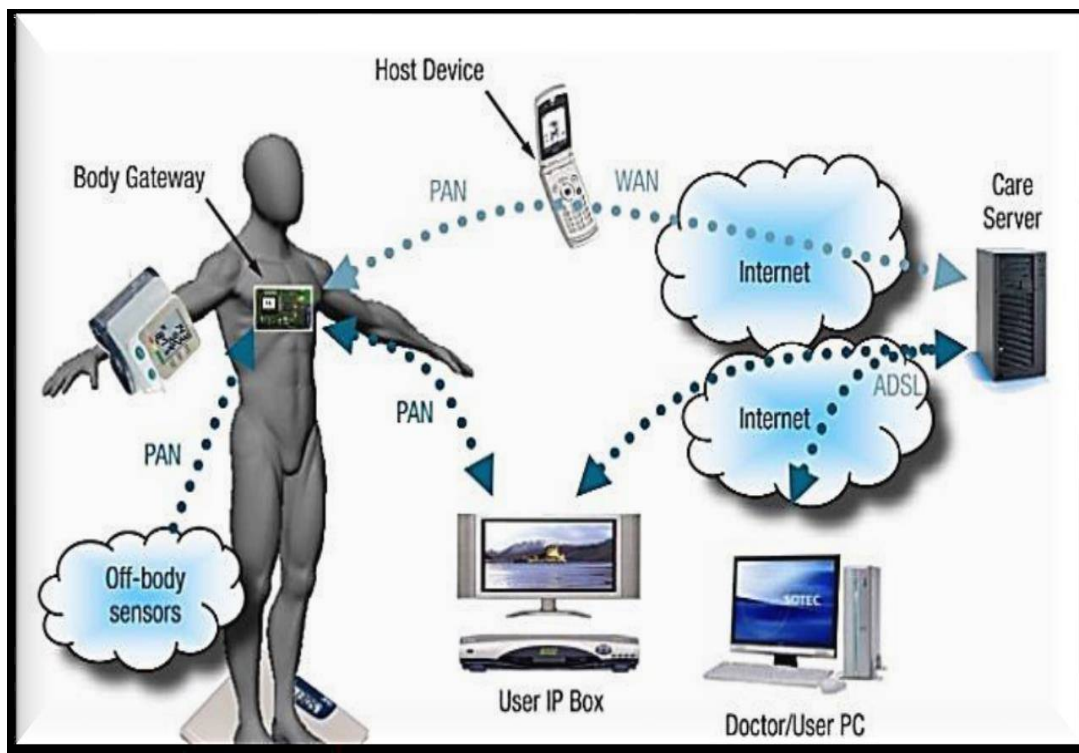
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Smart agriculture:

1. Wine Quality Enhancing: Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.
2. Green Houses: Control micro-climate conditions to maximize the production of fruits and vegetables and its quality.
3. Golf Courses: Selective irrigation in dry zones to reduce the water resources required in the green.
4. Meteorological Station Network: Study of weather conditions in fields to forecast ice formation, rain, drought, snow or wind changes.
5. Compost: Control of humidity and temperature levels in alfalfa, hay, straw, etc. to prevent fungus and other microbial contaminants.

Medical field:

1. All Detection: Assistance for elderly or disabled people living independent.
2. Medical Fridges: Monitoring and Control of conditions inside freezers storing medicines, vaccines, and organic elements.
3. Sportsmen Care: Vital signs monitoring in high performance centers and fields.
4. Patients Surveillance: Monitoring of conditions of patients inside hospitals and in old people's home.
5. Ultraviolet Radiation: Measurement of UV sun rays to warn people not to be exposed in certain hours.



(b) Smart healthcare concept

Smart Environment: The environment needs a smart ways and new technologies for monitoring and management. Monitoring the environment is important in order to assess the current condition of the environment to take correct life decision according to collected data from monitoring systems, and management is needed to have an efficient resources consuming and use in addition to decrease the factories and vehicles wastes. Both monitoring and waste management

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provide a large amount of data to force the health standard by governments or healthy environment organizations to protect people and environment, and to mitigate or to avoid natural disaster that might occur. Other environment aspect is a weather forecast and monitoring. IoT can provide a high resolution, and accuracy for weather monitoring by data exchange and information sharing. It's enabling weather systems to collect data from various vehicles on the road, and wirelessly communicate to the weather stations to support data that is inclusive of air temperature, barometric pressure, visibility or light, motion and other data needed. Sensors equipped in many buildings, vehicles integration with IoT help in collecting weather data which is further stored in clouds for analysis.



(c) Smart environment

III. INTERNET OF THINGS CHALLENGES

1. **Automatic Discovery:** In dynamic environments, suitable services for things must be automatically identified, which requires appropriate semantic means of describing their functionality.
2. **Software complexity:** A more extensive software infrastructure will be needed on the network and on background servers in order to manage the smart objects and provide services to support them. that because the software systems in smart objects will have to function with minimal resources, as in conventional embedded systems.
3. **Security and privacy:** In addition to the security and protection aspects of the Internet such in communications confidentiality, the authenticity and trustworthiness of communication partners, and message integrity, other requirements would also be important in an Internet of Things. There is a need to access certain services or prevent from communicating with other things in IoT and also business transactions involving smart objects would need to be protected from competitors' prying eyes.

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4. **Fault tolerance:** Objects in internet of things is much more dynamic and mobile than the internet computers, and they are in changing rapidly in unexpected ways. Structuring an Internet of Things in a robust and trustworthy manner would require redundancy on several levels and an ability to automatically adapt to changed conditions.
5. **Power supply:** Things typically move around and are not connected to a power supply, so their smartness needs to be powered from a self-sufficient energy source. Although passive RFID transponders do not need their own energy source, their functionality and communications range are very limited. Hopes are pinned on future low power processors and communications units for embedded systems that can function with significantly less energy. Energy saving is a factor not only in hardware and system architecture, but also in software, for example the implementation of protocol stacks, where every single transmission byte will have to justify its existence.
6. **Wireless communications:** From an energy point of view, established wireless technologies such as GSM, UMTS, Wi-Fi and Bluetooth are far less suitable; more recent WPAN standards such as ZigBee and others still under development may have a narrower bandwidth, but they do use significantly less power.
7. **Data interpretation:** To support the users of smart things, there is a need to interpret the local context determined by sensors as accurately as possible. For service providers to profit from the disparate data that will be generated, needs to be able to draw some generalizable conclusions from the interpreted sensor data.
8. **Interoperability:** Each type of smart objects in Internet of Things have different information, processing and communication capabilities. Different smart objects would also be subjected to different conditions such as the energy availability and the communications bandwidth requirements. To facilitate communication and cooperation of these objects, common standards are required.
9. **Scalability:** Internet of Things has a big concept than the conventional Internet of computers, because of things are cooperated within an open environment. Basic functionality such as communication and service discovery therefore need to function equally efficiently in both small scale and large scale environments. The IoT requires a new functions and methods in order to gain an efficient operation for scalability.
10. **Self-Organizing:** Smart things should not be managed as computers that require their users to configure and adapt them to particular situations. Mobile things, which are often only sporadically used, need to establish connections spontaneously, and able to be organize and configure themselves to suit their particular environment.
11. **Data volumes:** Some application scenarios of the internet of things will involve to infrequent communication, and gathering information's form sensor networks, or form logistics and large scale networks, will collect a huge volumes of data on central network nodes or servers. The term represent this phenomena is big data which is requires many operational mechanism in addition to new technologies for storing, processing and management.

IV. CONCLUSION

The IoT promises to deliver a step change in individuals' quality of life and enterprises' productivity. Through a widely distributed, locally intelligent network of smart devices, the IoT has the potential to enable extensions and enhancements to fundamental services in transportation, logistics, security, utilities, education, healthcare and other areas, while providing a new ecosystem for application development. A concerted effort is required to move the industry beyond the early stages of market development towards maturity, driven by common understanding of the distinct nature of the opportunity. This market has distinct characteristics in the areas of service distribution, business and charging models, capabilities required to deliver IoT services, and the differing demands these services will place on mobile networks. The internet of things promises future new technologies when related to cloud, fog and distributed computing, big data, and security issues. By integrating all these issues with the internet of things, smarter applications will be developed as soon. This paper surveyed some of the most important applications of IoT with particular focus on what is being actually done in addition to the challenges that facing the implementation the internet of things concept, and the other future technologies make the concept of IoT feasible.

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