

FUTURE CHALLENGES, OPPORTUNITIES AND APPLICATION OF INTERNET OF THINGS (IOT)

Rohit V. Mane*¹, S.S. Jadhav*²

*^{1,2}Department Of MCA, Yashoda Technical Campus, Satara, Dist- Satara, Maharashtra, India.

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ABSTRACT

The internet of things refers to a variety of networks that are connected by a set of specified protocols that allow different sensing sources to share and transfer data in order to create different types of networks. In order to benefit from different administration, placement, and recognitions.

A specialized platform known as the "internet of things" stands for the systems (hardware, software, and middleware) that facilitate the management of IoT networks, devices, applications, and services as well as permissions, databases, APIs, and other features.

A smart world is imagined as a time when objects can function automatically and intelligently, benefiting people in a meaningful way.

The internet of things, or IoT, is connected to radio frequency identification techniques and related identifying technologies.

The Internet of Things (IoT) is a network of electronically connected items that collaborate to accomplish tasks. An individual driving an automobile with integrated sensors—i.e., devices with an IP address and the ability to communicate data without human aid or intervention—could be considered an IoT entity.

Keywords: Internet Of Things Introduction, Potential Future Challenges, IOT Applications, And IOT Opportunities.

I. INTRODUCTION

For ordinary things, IOT makes perfect sense. Only the items that are now connected to electronics are taken into consideration, regardless of how things are handled in everyday life, how they are known, how information is shared (by RFID, wireless LAN, wide area network, or other means), or any combination of these. is going, but we don't have anything to do with anything anymore—food, clothes, animals, plants, water, etc.—anywhere, at any time. Attempting to establish connections with one another through the Internet has become essential.

II. LINKED WORK

2.1 IOT's Upcoming Challenges

A. IOT Security and Privacy

IoT has grown to be a significant component of the universe, and time-sensitive situations now need its employment. Reliability and appropriate security can be guaranteed using IoT.

These novel ideas include:

- Offering security and confidence in the interconnectivity of interconnects so that reuse is done correctly;
- Enabling safe data interchange between IOT devices and the users of their information; and
- Offering defense mechanisms for devices that are susceptible to harm.

B. Usability vs. Cost

IoT technology is used to link physical devices to the internet. Because of the growth of IoT, the cost of the components required for capabilities like sensing, tracking, and control systems should be rather low in the upcoming years.

C. Interoperability

The foundational principle of the Internet is interoperability. One of the initial prerequisites of Internet connectivity will be if a "connected" set of protocols and encodings can speak "the same language". Different standards are used by different industry leaders today to support applications. As more and more data and contentious tools use the interface, the standard across these different components becomes essential. IoT

requires the highest level of interoperability, just as it does in cross-organization of different sorts of supporting borders.

D. Data Management

An essential component of this IoT concept's information management. showing a significant lot of respect for some related aspects. This has a significant impact on how the information in the process and potential processes are estimated.

E. Device Level Energy Issues

Since communication uses the most energy on devices, one of the hurdles in IoT is figuring out how to "connect" items in a transactional way while taking energy issues into account.

F. Heterogeneous Things

Up to five distinct devices that are distinct from one another can be used with IoT's Strong Framework to facilitate communication, track information status, store information, and perform other functions. It is a difficult undertaking to develop communication protocols that are compatible with every device. In order to facilitate more productive machine-to-machine (M2M) communication, standard information configuration is necessary.

G. Intelligence

IOT places a high value on machine-to-machine (M2M) communication since machine automation needs to be improved to reduce latency, traffic, and time-sensitive actions. For automated systems to be possible, smart technologies must become more intelligent.

H. Communication Protocol

IOT-enabled services' diverse nature solves an inevitable communication protocol issue. Different protocols are used by different sorts of devices for data transfer. For Internet of Things services to be implemented successfully, a standard communication protocol must be created.

J. Real-Time Solution

Real-world implementation of the IoT concept is highly challenging. It is necessary to reduce the complexity of current real-time systems in nanoscale devices. For IOT devices to respond noticeably at any moment, real-time systems must be deployed at the lowest possible level.

K. Connectivity in IOT

The Internet of Things, or IOT for short, refers to the growing number of gadgets that are linked to the Internet. Therefore, in order for everything to function well, we must all do our part to increase stability's effectiveness. So, the primary problem that presents a barrier is connectivity. The main obstacle in the near future and as things stand right now is connection, which could threaten the way that current communication models and their technology are now structured. At the moment, the centralized server/client paradigm is what we rely on or use to connect, authenticate, and authorize various network nodes.

L. Monitoring and Sensing

Even while monitoring and sensing technologies have advanced significantly, they are nonetheless always changing, with an emphasis on form and energy efficiency. In order to collect real-time data, sensors and tags are typically expected to be active all the time. This makes them crucial for energy efficiency, particularly when it comes to lifespan extension. New developments in biotechnology, nanotechnology, and miniaturization have made it possible to construct actuators and sensors at the nanoscale concurrently.

M. Complexity, confusion and integration issues

Integrating and testing IoT systems with a multitude of APIs and protocols across various platforms will be, to put it mildly, challenging.

2.2 Applications of IoT

A Smart Home

The number of people looking for well-equipped homes is increasing with every major convenience. and another thing is 256 companies and startups are include in the database of smart homes for IoT analytics. More companies are now actively involved in this field. Funding for these things is more than \$ 2.5 billion and

fast, and it is growing day by day. Alert Me and Nest were included in the list of startups. Similarly, Philips, Haier and Belkin have joined the list of startups.

B Intelligent City

Cities have benefited from numerous advances brought forth by IoT technology, including trash management, traffic control, and water delivery. IoT technology is growing in popularity as a means of resolving urban problems and preventing annoyances. The smart city area prevents various forms of pollution and improves city security Smart Retail

C Smart Retail

The Internet of Things (IoT) helps with inventory management, storing capacity operations, lowering theft, and improving the shopping experience for customers. Additionally, businesses can outpace the online system in terms of speed by utilizing IoT. They are able to draw customers to their products and reclaim their portion of the lost market. Through saves, you can buy more things with the money you save from this.

D. Astute Agriculture

A greater percentage of farming activities are mobile, as are the farm animals that farmers tend to. In IoT applications, the smart farming technique is frequently disregarded. The farm animals are monitored by the internet of things, and the farmers work day in and day out to maintain and improve that. Additionally, this concept works with widespread attention. IoT applications should always be respected and should not change. Smart farming has the potential to grow into a significant application area for nations that export agricultural products.

2.3 Opportunity of IoT

A. Farming

These days, IoT technology ignores agriculture. Remote farming is a common practice. Farmers rear animals for a living in large quantities. Farmers can employ this technology, and it can be used to monitor the operations being performed in agriculture. But putting this idea into practice will need a lot of work. However, this idea shouldn't be abandoned. The application of IoT technologies in high-yielding nations is demonstrated via smart farming.

B. Energy Usage

Energy usage is one of the concerns we have all the time. Due to our laziness and the growing population, we have lost sight of our energy usage and are less worried about the environment. Technology, fortunately, provides a unique answer in this kind of situation. Reducing fuel and electricity use is made simpler by IoT. It is your intention to build smart lights and smart houses with automatic shutdown and energy usage in mind, even when you are not there or in a closed area. These things tell you how much fuel your energy needs and how much energy you use.

C. Medical

The importance of aromatherapy services and the production of fake medications outweighs all other necessary needs. The worst thing is that people just take these medications because they are ignorant of them and have no awareness about them. The possibility that IoT will do this is a major worry. If more individuals become aware that some pharmaceutical businesses are billing this drug as a comfort element in their life through the use of IoT infrastructure and QR codes, counterfeit drugs may be permanently halted.

D. Mobility

Connected vehicles are becoming more and more common in the market. Top-end smartphones are linked to the internet for a variety of app offers. the more inventive and efficient owners in terms of fuel consumption and emissions per journey.

III. CONCLUSION

This paper concludes by outlining the potential of an IOT. Our research led us to the following conclusions: privacy and security, cost versus usability, interoperability, data management, energy issues at the device level, heterogeneous things, intelligence, communication protocol, real-time solutions, connectivity in IoT, monitoring and sensing, evolving architecture, protocol wars and competing standards, complexity, confusion,

and integration issues are the challenges that the Internet of Things will face in the future. Smart homes, wearables, smart cities, smart grids, industrial internet, linked cars, smart supply chains, smart farming, and smart retail are some of the uses for the Internet of Things. We also discovered that energy consumption, transportation, healthcare, and agriculture are areas where IoT offers opportunity.

Despite the many problems that still need to be resolved, the Internet of Things seems to have a lot of potential. Through various breakthroughs and applications, IOT has been steadily bringing about a progression of mechanical modifications in our daily lives, making them less challenging and more appealing.

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