A Survey on Internet of Things (IoT): Implementation, Security Challenges, Techniques and Development

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Abstract .

A large distributed network is what the internet of things is. IoT The Internet Of Things is the big thing in wireless revolution.IOT creates an intelligent, invisible, network fabric that can be sensed controlled and programmed. It has a great feature of communication like Human to Machine (H2M) and Machine to Machine (M2M). It is easy to communicate with a machine language. This technology supports the basic needs of medical and healthcare, industries, home, communication, agriculture, and many other ways. Everything is connected to the internet through the internet of things. Real world objects will be turned into virtual ones thanks to the internet of things. In order to be considered an internet of things, devices must be connected to the internet. It needs to be connected to the internet. Humans and machines interact. However, IoT undertaking a great future for internet by proposing a type of communication use to Machine 2 Machine. A lot of devices are attacking the same server. There are still many problems that need to be addressed even though the technology has improved. Many research challenges are bound to arise because of the I OT concept. The main objectives of the paper are to provide an overview of implementation of the internet of things, to face security and privacy issues, and to help solve challenges.

keywords
Security, privacy, Machine 2 Machine, Human2Machine,DDoS.

I. INTRODUCTION

The term Internet of Things was first proposed by Kevin Ashton in 1999[1],when he implemented radio frequency identification(RFID) for application in Chain management. The concept of IoT first became very popular through the Auto-ID Centre in 2003[5]. The internet was created for military purposes. IoT is the fastest rising areas within the history of computing, with a calculated 50 billion new devices by the end of 2020. In dealing with internet to connect, the current infrastructure is very good.

There is a sensor network on the internet of things.Sensor networks are used the most for monitoring. Any device connected to the internet can be connected to the market.

A collection of active physical things, sensors, actuators, cloud services, specificIoT protocols, communication layers, users, developers, and enterprise layer can be considered a system which can be physical, virtual, or hybrid of the two The internet of things can be defined.

“a dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual Things have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network”[16].The internet of things requires more security. Distribution dos attack detection techniques have advanced remarkably over the years. DDoS attack could be a cyber-attack in which the criminal looks for to make securities inaccessible to its expecting clients on the internet. Future is a remarkable type of robot network (botnets) that recently has caused large- scale DDoS attacks by abbusing IoT devices[4].

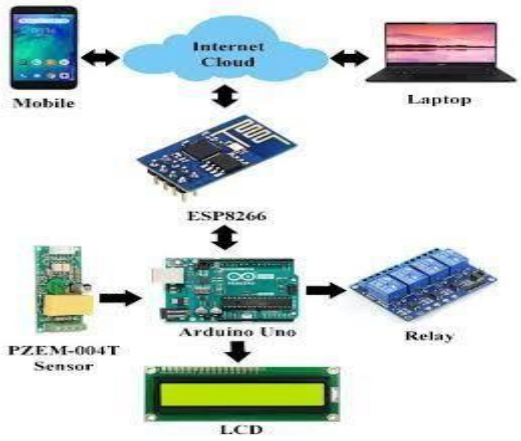

Fig 1.1 IoT Network

1.1.Mobile

Smartphones plays a main role in IoT.devices can be controlled through an app on a smartphones

1.2Internet Cloud

It supports a massive network that supports IoT Devices which includes servers,storage,processing and infrastructures.

1.3Relay

The internet of things power relay can be used to create an internet of things project with safe, reliable power control. The internet power relay can be used to control the power going to a device.

1.4Sensor(PZEM-004T)

It is used to build the next generation with IoT Technology to collect data from the surrounding environment.

1.5Arduino Uno

It is used to build connected objects in a quick,easy and secure way.it also conncets multiple devices.

1.6LCD

It is a full viewing angles to provide the readability of the content from any perspective.

1.7 ESP8266

It is a system on a chip used extensively across IoT and give any microcontroller access to WiFi network.

2.Literature Review

The next generation of communication is the Internet of Things. Physical objects can be created and received using the internet of things. The internet of things is trying to give objects the ability to act on their own. The internet of things is expected to increase the level of comfort, efficiency, and automation. It is necessary to have high security, privacy and recovery from attacks.

The internet of things can be connected using physical objects. A large number of machines connected to the internet will create and exchange enormous amounts of data that will make daily life more convenient, help to make a decision, and provide beneficial services. The evolution and how important the internet of things is in daily life, the generic architecture, its most widely used protocols, numerous possible applications, and concern over security and privacy issues in the internet of things are all described in this paper. One of the most popular networking ideas is the internet of things**.[15]**

The Internet of Things oriented architectures can improve the understanding of related tool, technology, and methodology. Directly or indirectly, the presented architectures propose to solve real-life problems by building and deployment of powerful Internet of Things notions. lacuna in the current trends of architectures has been investigated in order to motivate the academics and industries to find a way out of the internet of things. A main contribution of this survey paper is that it summarizes the current state-of-the-art of Internet of Things architectures in various domains systematically.[16]

Fig 2.1 Review Methodology

3.Implementation of IoT

Implementation of IOT includes medical and healthcare , manufacturing ,residence and city as well as agricultural sector.

3.1Medical and Healthcare

The procedure for patient monitoring is done manually by the nursing staff and involves monitoring the condition of patient medicines. Patients data can be stored and processed. [2][5].

3.2Manufacturing(Smart Industry)

Industries are well developed and equipped with mechines.IoT helps in detection of gas leakage , chemical,underground mills,water and oxygen level monitoring.The implementation of IoT in this industry improves the service quality[2][8][5].

3.3Smart Home and Smart City

It reduces the cost, makes us more comfortable, and improves safety and security when we implement the internet of things.
It is used to monitor the garbage level in containers. [2][8][5] .

4.IoT Security Solution Approaches

For secure End-to-End communication in the IoT, a number of techniques are being used, including the key research directions listed below[4][8]:

Centralized approaches are used.
Extensions and Optimizations are based on protocols

Alternative Delegation Architecures.
Solutions that require special purpose Hardware Modules.

5.Advantages and Disadvantages of IoT

5.1Advantages of IoT

- You can monitor your home using your mobile phones for security purpose of your family members .
- It can provide personal safety.
- It can be used in the hospitals for monitoring the patients health .

- If your home appliances are communicating with you about the work done under the control of sensors , their maintenance and repair will be easy.
- EXAMPLE: ALEXA INTRODUCED BY GOOGLE.

- A large number of business operations like shipping and location, security, assettracking and inventory control, individual order tracking, customer management, personalized marketing & sales operations etc. can be done efficiently with a proper tracking system using IoT[5].

5.2Disadvantages of IoT

- Your network architecture could be easily compromised by hackers who then gather personal data.

- People are growing less and less motivated to engage in physical activity or apply science in their daily lives as they grow acclimated to click-based labour.

- Lower-level personnel and unskilled workers may face a serious risk of losing their jobs.

- The next generation's life are ruined by some malicious or undesirable websites[5].

6.Techinques And Developments

To realise the concept of the internet of things, it is necessary to use technologies like ubiquitous computing, context awareness, RFID, WSN, embedded devices, CPS, communication technologies, and internet protocols. The internet of today and the internet of the future are not the same.
Using some of the following techniques, such projects can achieve realistic and effective long-term scalability[10][3][9]:

- Robotic Bootstrapping
- IoT Data Pipeline Better Control.
- Three-Axis Scaling Approach.
- The Realiable Microservices Architecture.
- There are various data storage technologies.

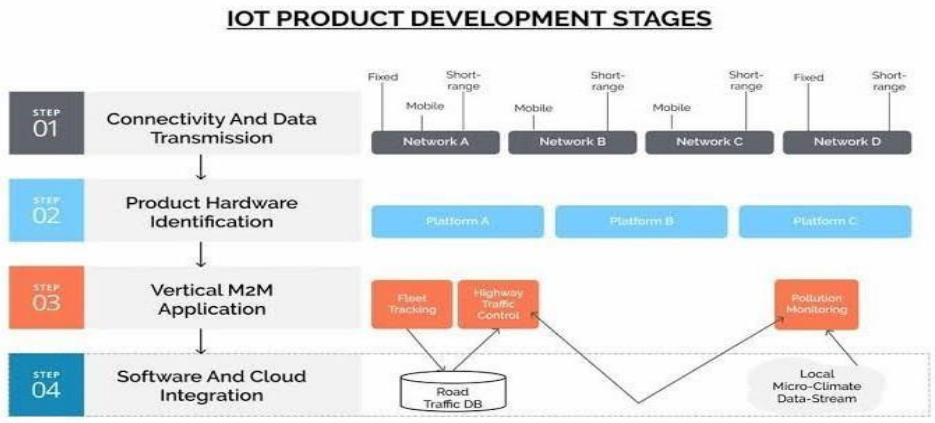

Fig 6.1 IoT Product Development Stages

6.1Connectivity And Data Transmission

It is used to connect IoT devices and transferred to a gateway server and send it to cloud platform for further data processing.

6.2Product Hardware Identification

These IoT Device manages key tasks and function such as system activation,security,action specificationand communication.

6.3Vertical M2M Application

It is a platform enables solution providers,system investigator,industrial players or device makers to build and deploy with ease end-to-end IoT solution.

6.4Software And Cloud Integration

It is a service that provides the tools required for analytics and IoT application development.

6.5Local Micro-Climate and Data- Stream

Data -stream is used to collect,process and analyseorders of more data even before.

In Local Micro –Climate IoT plays a vital role in the field of forecasting climate for agriculture purpose.

6.6Road Traffic DB

It is used for sensors instaalled in key locations may collect data on high- traffic crossings and areas where cars are diverted.

6.7Pollution Monitoring

It is used to monitor the Air Quality over a web sever using internet.

7.Conclusion and Future Work

The review of the Internet of Things, including its challenges, solutions, and advancement, is highlighted in this paper's conclusion.The Internet of Things (IoT) is the most extensively used technology in our daily lives, simplifying and facilitating everything.There are numerous applications in the areas of business, smart homes and cities, agriculture, and medicine and healthcare.The next generation will profit from IoT breakthroughs before their time as IoT is on track to connect the world and human life to smart technology.

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