Review on IoT as a Development Tool in the Modern World

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ABSTRACT

Internet of Things (IoT) is the recent technology of connecting interrelated objects without human interference through the internet which is used in many fields and it plays a major role in the development of smart homes, health care, and self-driving. It makes the projects cost-effective with highly effective outcomes. The main utility achieved by IoT applications is observing and accordingly making decisions for online clients. This research work is presented in two main sections, one briefly gives the applications of IoT and the another describes the recent trends in IoT. IoT applications were discussed to strengthen research and development in various fields. The purpose of this research paper is to examine and give recent research in IoT applications and summarize recent technologies in them. In this paper, we will be discussing various applications and recent trends of the Internet of Things (IoT), however it also describes the study for highlighting the tips for various research in IoT applications for future

Introduction

In recent years, the field of sensors is the latest IoT technology that plays a spectacular role among techno experts and researchers. These sensors connected to the internet automatically collect useful information which allows us to make decisions in a smarter way [2]. Sensors are capable of sensing an object and help the devices connected to it to make decisions through an internet connection known as the Internet of Things (IoT). Detecting and sending information and making decisions from the collected information through the internet is the main purpose of IoT [1]. To achieve appropriate composite services, IoT uses cloud services computing for service-based applications [3]. The Internet of Things (IoT) has emerged strongly as a more prosperous area to precise this type of a replacement technology. It is not the primary technology in this field, but cloud computing technology has to represent the ever- present computing world. In the seventh within the series of ITU Internet Reports originally it had been launched in 1997 under the title "Challenges to the Network", and it had been first coined by Kevin Ashton within the RFID journal 1999, In 2005 this name was changed to "Internet of things ". It also has an advantage to choose the best solution for users regardless of whether they make decisions, manage or monitor cloud resources [4]. The main approach for IoT applications is focused on safe driving, health care, traffic monitoring and smart city [6]. The main purpose of this research is to explore various IoT applications to understand recent trends in various fields. Here the developing technology even can't stop the growing population from getting aged or eradicate acute and chronic diseases directly, it can at a minimum make healthcare easier on a pocket and in terms of accessibility [6]. The right diagnosis also will lessen the necessity of hospitalization [7]. TSCM enables the general public safety authority to gather sensing data during a particular region for crowd management. In recent technologies we will deeply discuss the trends of IoT such as Big Data, Cloud computing, Networking and Increased Security Concern which are becoming necessary technologies for the fast growing technical world. In Big data, a massive collection of various data which is difficult for processing is done. So that Big Data helps in getting a profitable outcome. Because of this factor Big Data becomes an unavoidable technology. Now on discussion about cloud computing in this paper we will see some benefits of cloud computing on how it is used [4]. In this paper we have also discussed Networking, where IoT is used as a main component for improvising the networking. Here we will also discuss MANET and some leading types of IoT wireless technology [5]. In addition to this, Increased Security concern is discussed which is a recent trend of IoT where Malware, Ransomware and many kinds of infections which break down the computer are prevented by the use of IoT.

I. STUDY ON RELATED WORKS

This section provides a short-lived description of relevant work studies for IoT applications.

Rosilah Haasan and Faizan Qamar are the authors describing the important applications of IoT. They also gave a comprehensive survey about IoT technology and their challenges in recent years.The networking standards in the IoT environment are being discussed by the author bello and zeadally and they showed the need for objects to enable a smarter IoT ecosystem. In addition ,an analysis is presented on the risks of cross-domain integration in various application and IoT environments to satisfy interoperability and QoS requirements like availability, reliability, scalability, security, etc. to provide IoT services. The strength of this research is that it presents a classification of the various standards at the network and application layers in various fields, including architecture,

transportation, smart cities, business, and grid systems.Burak Kantarci and Hussein T. Mouftah are the authors who gave an overall view about public safety in Cloud-Centric Internet of Things.Azana Hafizah Mohd Aman and Amjed Sid Ahmed are the authors defined about the recent technologies in IoT. The main drawback of this study is that it doesn't present statistical information on the discussed standards applied to different regulatory domains, also as statistical charts for risk analysis of the lack of interoperability between IoT objects and transport protocols Judgement is not to provide. N. Sathiyanathan, Selvakumar. S.P. Siva Prasanth is the author of a brief study on Iot applications.

MATERIALS AND METHODS

The main goal of the paper is to explore and classify the procedures for research regarding various approaches and methods in IoT applications. It also investigates the widening trends and applications of IoT in various fields. The fields covered in this paper are traffic monitoring, safe driving, health care and smart city. In the following section,

various research has been done to give in detail about recent trends in IoT. Moreover all of these characteristic features are collectively discussed to ensure the importance of IoT in safe driving, smart city, traffic monitoring and health care. In addition to this IoT architecture layers are represented while describing the applications of IoT in various fields. In the next section various trends in IoT are extensively described including an overview of these technologies.

Figure 1. Topics Discussed

The robustness of this paper consists of having an overall view of the recent trends and their application in various fields in IoT. The above Figure.1 shows various topics discussed in this study.

3.1. Biggest Trends of IoT-

(i) SMART HOME

In a smart home setup, using an internet connection various devices and appliances in the home can be controlled easily from any place in the world. By interconnecting the devices through the internet, the user can access security to his home and he can also control various functions like lighting the home, measuring temperature, and can remotely control the home theater.

The devices in smart homes are accessed through a central point like a laptop or tablet or smartphone which are connected to each other. With a home automation system, one can control cameras, home theaters, CCTV cameras, TVs.

The self-learning skills of the appliances in smart homes make it very efficient as it can autonomously

make changesto the user's schedules as needed. It reduces cost by turning off the electrical appliances by enabling lighting controls. When the user is away from his home, if it detects any movement in the home then it warns the user automatically.

(ii) TRAFFIC MONITORING SYSTEMS

Using the Internet of Things in the traffic control system, the main role is played by the traffic lights which have sensors mounted to check weather changes in the particular place. It also helps in increasing or decreasing the intensity of light and it also detects gloomy weather conditions and adjusts the brightness depending on the changes. It also records the traffic congestion in a particular area.

In the traffic signals, CCTVs are mounted which records the traffic in a particular area and sends that data to the control room. Then they plan how to reduce the traffic congestion by diverting the vehicles in other routes. By analyzing the Big data, IoT is autonomously capable of giving possible routes to reduce traffic congestion.

This system is very useful for the user to know traffic count in an area and to calculate time arability in their area. It also provides useful information in planning road construction depending on the traffic in a particular area. It gives an effective solution for traffic congestion and thereby provides the best route to save their time.
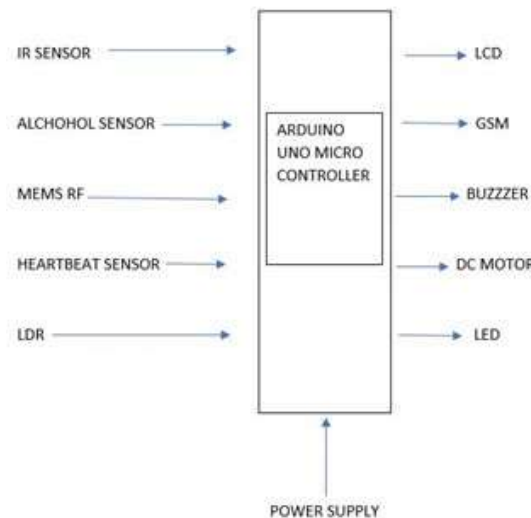

Figure 2. Systematic Flowchart

(iii) IOT IN SAFE DRIVING

The IoT project's main purpose is to design a system that detects the drowsiness and drunken state of the driver and provides safety by controlling the vehicle's speed. Here the GSM technology is used as a tool to alert the owner in case of drunken driving. IoT sensors are also used in monitoring the structural status of roads and bridges under

Figure 2. Shows Flowchart for Safe Driving in IoT. The IoT in vehicles is nowadays highly advanced which provides a safer and richer experience for drivers. This technology even allows the drivers to access information about traffic, road conditions, fuel usage, vehicle diagnostics, driving behavior, and more.

Figure 3. Below shows the IoT model for Safe Driving which has four layers namely Business layer,

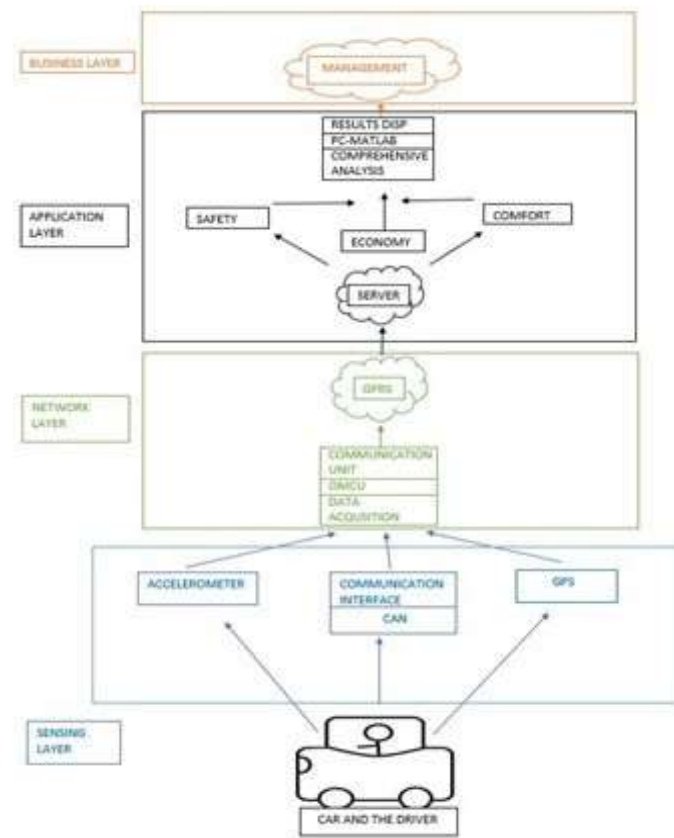Application layer, Network layer and Sensing layer describing the main purpose of Safe Driving IoT models.

Figure 3. Layers in Safe Driving

(iv) IOT IN HEALTHCARE

IoT helps healthcare professionals to be more vigilant and be connected with the patients regularly. The Data collected from the IoT devices may help doctors in the identification of the best treatment process for the patients to get expected outcomes [7]. Fitness bands that use IoT will be the future in tracking the patient's health, IoT and wearable devices together used in tracking and providing services to the patient. So, this helps very much in the maintenance of patient's health, thus IoT services are quick and reliable which helps to save millions of lives. IoT in healthcare helps doctors to spend less amount of time on transportation, diagnosing illness, and communicating with patients. Now we can say that IoT is undoubtedly transforming the healthcare industry by changing the space of devices and interaction between the people regarding the delivery of healthcare solutions. The applications of IoT in healthcare helps and provides benefits to patients, families, doctors, hospitals, and insurance companies.

3.2, LATEST TECHNOLOGIES OF IoT:

(i) BIG DATA

Big data means a massive collection of structured and unstructured data which will be difficult to be processed by using traditional methods but somehow the data must be processed for organizing useful data so here big data as a technology is used as a tool

Let us see how big data works:

Big companies will have sensor-fitted devices in order to collect and transmit the data. By then the big data will be collected with a lot of structured and unstructured data mainly consisting of charts and other types of data insights. Big data storage is the container as well as the source of data. The addition of more and more IoT devices will make AI models to be complex and collectively heavier volumes of big data. In this way, big data becomes the latest technology of IoT. Some of the big data tools are Flink, Apache Storm, MongoDB, Apache Cassandra, Kafke, Tableau, Apache Spark, RapidMiner, R Programming.

(ii) CLOUD COMPUTING

The IoT and cloud computing are companions for one another, they are being branded together while discussing the technical services, and both working together to provide an overall best IoT service. in fact, they have many differences between them which distinguish them as the best effective technical solution the main part of cloud computing in IoT is to store the IoT data as the cloud is a central server that contains common data which can be accessed when required cloud computing is used to store large data like big data which is also an application of IoT in cloud computing, large data packages are generated in IoT through internet cloud computing helps in cuttingdown the cost that helps in Realtime control and monitoring of data.

SOME BENEFITS OF USING CLOUD COMPUTING

1.Scalability for device data

2.scalable   infrastructure

capacity   3.increase   in

efficiency 4.distribution of

data   worldwide

5.advancement in analysis

(iii)NETWORKING

Networking is the recent technology of IoT as it has got great relevance on the internet because it contains factors that manage the network. to the network coming the behavior of the network

depends hardly upon the protocols andthe data traffic. Coming to the simple definition of Ad hoc networks are mostly wireless local area networks. The MANET here consists of a number of self-organized mobile nodes or objects and it is considered as a way to maintain a connection, Multi home ad-hoc is an extension to the prevailing structures in IoT. So in this way, networking becomes the latest technology in the Internet of Things (IoT).

There is some leading type IoT wireless tech uses networking they are:
1. LPWAN (low power wide area networks)

2. Cellular (used in mobile markets widely)

3. Zigbee and other mesh protocols (it is a short-range, low-power, wireless standard (IEEE 802.15.4))

4.RFID (Radio frequency identification)

Table 1

KEY TO IOT VERTICALS	LPWAN	CELLULAR	ZIGBEE	BLE	WIFI	RFID
CONNECTED CAR					1	
SMART BUILDING	*		1	1		
SMART CITY	*					
SMART METER	*					
SMART HOME			*	*	*	
WEARABLES	1			*		

INDUSTRIAL IoT	*	1	1			
SMART RETAIL		1		*	1	*
CONNECTED HEALTH		*		*		

*- HIGHLY APPLICABLE, 1- MODERATELY APPLICABLE

Table 1. Shows technologies and their implementations

in IoT(iv)INCREASED SECURITY CONCERN

In the past, malware infections could only compromise data or cause loss. However, with the advent of the Internet of Things (IoT), viruses and ransomware have become commonplace, wreaking havoc on essential services and functions. For example, in March 2018, ransomware crippled Atlanta's water service and ticket payment systems. To avoid data loss, a major problem, and to remain vigilant about threat protection and network health, organisations are turning to IoT, which helps them stay informed. However, with the rise of security concerns, IoT has become a new technology.

II. DISCUSSION

Health care, safe driving, smart homes, and traffic monitoring systems are just a few of the areas that this paper has covered. One example is the use of the Internet of Things (IoT) in smart bands, which can track a person's vitals and keep them informed about their health. One usage of IoT sensors is to monitor drivers' levels of sleepiness, which may help reduce the number of accidents caused by drunk driving. Finally, we have the tendencies In today's dynamic and rapidly evolving world, big data, cloud computing, and networking are quickly becoming indispensable. Consequently, these apps aid in raising the user's level of living in a very effective way. The field will undergo even more refinement, leading to a dramatic increase in utilisation.

CONCLUSION

The purpose of this study is to provide a high-level overview of IoT applications so that academics and technologists may better grasp the facilities and how to improve IoT performance. To be realised, the Internet of Things need specialised tools and technology. Nowadays, identification and sensing—the two building blocks of the Internet of Things—are employed together in every industry for the

greatest results and advancement. Due to its significant expansion over the last five years and its status as the future of modern technology, the Internet of Things (IoT) is now being used in healthcare and medical sectors for a variety of finest results. Therefore, the Internet of Things (IoT) allows for improved internet-based detection and decision-making.

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