Study of IoT and proposed accident detection system using IoT

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Abstract: *The Internet of things, also known as IoT, is a connected system consisting of interrelated devices used for computing purposes, mechanical machines, digital machines, various objects, components, animals or human beings, where all of them are provided with a certain unique identifying identity called UID. This provides the users with the ability to transfer data over a large and connected network without the requirement of human-to-human kind of communication or human-to-computer interaction.Internet of Things is a virtual ecosystem consisting of physical objects connected over internet and is accessible through an internet connection. The embedded technology used in the IoT connected objects helps the objects to interact with their internal states or with the external environment, which in turn is used to come up to a decision. IoT is a transformational technology that helps many companies to improve their performances through IoT analytic techniques. Moreover, IoT security also helps in delivering better results to the companies. abstract should summarize the contents of the paper and should contain at least 70 and at most 150 words. It should be set in 9-point font size and should be inset 1.0 cm from the right and left margins. There should be two blank (10-point) lines before and after the abstract. This document is in the required format.*
Keywords*: Internet of Things, accident detection, sensor nodes*

I. Introduction

IoT is an abbreviation of Internet of Things, which is a highly emerging technology these days. What it basically does is connecting any device, even the devices we use in our everyday life, such as mobile phones, vehicles, office appliances, home appliances and various other wearable, and all of these devices are embedded with sensors and actuators, and with Internet, which enables these objects to exchange data or any information with each other on a connected network. Most of the people think that IoT an internet are the same things, but in reality there is a difference between both the technologies and must not be confused as the same, and the difference is the absence of the role of human beings[1]. The IoT connected devices are able to create information about an individual's behaviors, make some analysis on it, and then take action accordingly whatever suits best. A technology consulting firm named Gartner says that about 6.4 billion IoT connected things will be in use in the world this year, and up to 30% more from the last year. Gartner also forecasts that the numbers or figures will be increased by atleast three times and it seems to reach nearly 21 billion by 2020.

The Internet of Things and smart system technologies are driven with the help of Sensors & Actuators, Connectivity, People & Process

1.1 Working of IoT

Internet of Things or IoT is the inter-networking technology of physical usable devices, vehicles, internet oriented smart-devices, buildings, and various other items that are embedded with electronics and electrical, software, sensors and actuators, and network connectivity via an internet connection which helps to enable these objects to collect, share and exchange data [2]. Internet of things may be considered as an uncommon concept to most of the people but it doesn't mean that it's not a rising technology prevailing in our society today. With the increasing demands of IoT, virtual internet connectivity has gained its importance in transforming a number of industries, which in turn is resulting in changing the traditional landscape of tehchnologies prevailing in our world. IoT helps us to establish a connection with many physical objects or electronic devices and sensors, providing us with the facilities where the information or the data can be shared widely without any need of direct or indirect human interaction[3].

"IoT is a system comprising of several interrelated computing devices, mechanical components, digital machines, connecting objects, animals or even human beings, where each component is provided with unique identifiers, generally known as UIDs , which helps in providing with the ability to transfer data over a connected network without requiring any kind of interaction that requires humans".

Since the IoT technology is a quite new technology and in recent years it has been very actively developed by the developers, we have to understand what services IoT can offer to humans [4]. For example, imagine you have an alarm clock which is supposed to wake you up at 7 AM. So when it is triggered, it will

send notifications via Internet to various machines at your house which my help to fasten up your work, like, Coffee machine to start brewing coffee, smart home system to open the curtains in your bedroom, smart TV to turn on your favorite music on TV.

This was just a simple example with your home and your alarm clock, now suppose a person had heart implantation, that tracks the data of your heart and then sends this data to your doctor so that he can analyze this data and predict the possibility of diseases or any other deviations from the normal form.

It is no more a secret that the IoT market is now actively evolving day by dayand growing with great speed, also, many new startups are appearing every day.

According to a research done by large multinational companies and publishing houses, it is found that,

B2B spending the revenues on IoT technologies and apps will reach to €250B by 2020, Expenditure on IoT applications is predicted to produce about €60B by 2020, IoT Analytics technology is expecting to generate €20B by 2020

II. Applications of IoT

IoT finds its application in various domains e.g. smart cities, smart transport, Traffic monitoring etc. Few of them are discussed in the following sections [5-12].

2.1 Smart Cities

It is estimated that about 70% of the population will be living in cities by the year 2050. This rapid growth of urban population is producing a lot of strain on the present infrastructure in order to accommodate more people moving to urban areas.

To meet this demand of accommodation in cities, governments around the world are seeking towards Internet of Things and its innovation technology to enhance the services provided to people, reduction of costs, and improved communication in the community. Mentioning some of the applications for smart cities provided by IoT:

I.   Efficient supply of water

IoT has transformed the ways of water supply in the cities. Use of smart meters improved detection of leakage in the water tank, making the system more efficient and boosted the productivity by minimizing the time spent in analyzing the water in tank.

II.   Traffic congestion solution

Internet of Things is proved successful in making improvements in the area of traffic congestion to benefit the residents. For example, traffic signals integrated with IoT can adjust the timing of signals by sensing the amount of traffic and keep cars moving. The aggregate data about the traffic can be collected from the traffic cameras, mobiles, vehicles, and various sensors at the roads to sense and monitor traffic in real-time.

III.   Reliable public transport

Public transport is often disrupted when there are close roads, weather issues, or any other factor. IoT gives real-time warnings needed to implement plans without interrupts, provision of safe and efficient public transport system. This can be done with the help of cameras or connected to the bus stops or other public areas.

IV.   Energy-efficient buildings

This technology is allowing buildings to save resources of energy and improve sustainability. Various energy management systems in smart buildings make use of IoT devices to connect lighting, fire-safety and various other systems to a central, common management system. It also highlights the areas of high use and the change in energy so that staff can rectify it.

V.   Public safety improvement

Smart cities have hundreds of cameras that are used for controlling the traffic, accidents and street areas for safety reasons. A video analyzing software processes the video footage of the cameras, spotting to only important events. The security systems make use of IoT technology to turn every attached camera into sensor, along with end-to-end computing and analyzing from the source. Also, Machine Learning, a sub branch of Artificial Intelligence helps to complete the process of analysis.

2.2 Smart Transport

From the perspective of connected vehicles, some of the major applicable ideas powered by IoT technology which may soon be implemented are-

1. Response to Crash: Connected cars are capable of automatically sending real-time information about a car crash along with the location of the vehicle to emergency centers.

2. Diagnosis of Car Problems: Connected cars are able to generate data that can predict an upcoming failure before a part of the car fails, which would eventually prevent the inconvenience caused due to a breakdown and will help users to manage the care of the vehicle. It will help to reduce the cost of repairs.

3. Convenience of Services: IoT provides with the ability to access a car remotely, making it possible to access the services like remote door unlocking, find my vehicle, recovery of stolen and many more.

4. Integrated Navigation: IoT enabled connected cars can integrate GPS system along with online services which responds to the driver's preferences, routing, availability of fuel alerts about traffic, etc.

5. Traffic Management: The connected cars provide the transportation agencies with real-time traffic update and parking data information which make it easier for agencies to manage transportation.

6.Infotainment: IoT car provides with in-vehicle entertainment facilities such as streaming music and knowledge. However, AAA has set a limit for some features while driving so as to prevent distractions.

It is obvious that it's impossible to foresee which application will prove to be game-changing in the upcoming generation. One of the features the scientists are heavily involved in nowadays is converting the real time data collected routinely into a usable tool for determining repair issues, warranty and maintenance of a vehicle before a problem occurs.

III. Proposed accident alerting system

In this system, every moving vehicle is equipped with a mobile device which is constantly connected with internet. The vehicle has a sensor attached to it in front panel. The sensor is capable of sensing the accident of the road ahead and broadcasts the information. The vehicle moving in the vicinity of this vehicle can relay this information to the nearest toll booth and send an alert to the nearby police station. The block diagram shown in Fig. 1 below shows the proposed system.
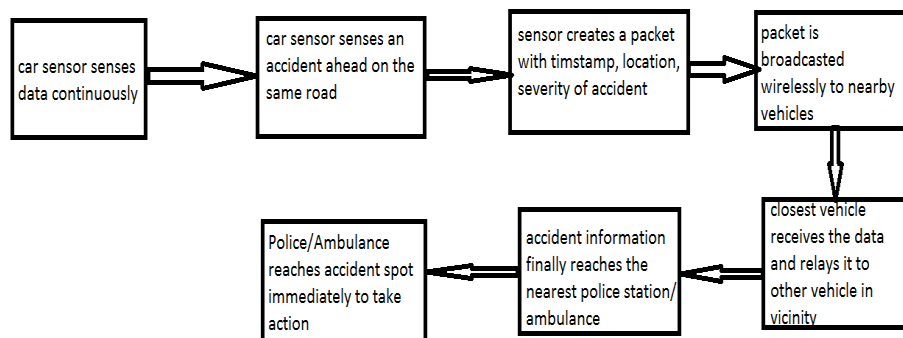

Fig.1 proposed accident alerting system using Iot

IV. Conclusion and Future scope

The technology Internet of Things is all about connecting real world objects to the internet for the ease of humans. First the object is given with an identity tag, then provided with the senses of touch, vision, listening, smell and taste through various sensors so that the object is capable of recognizing, monitoring and recordinf its surroundings. After that, the object is connected to the internet and is then ready to act as a virtual human.

It is estimated that there are 10 billion iot enabled devices, more than human population. It is predicted that by 2020, around 50 billion iot devices will be present and connected to the internet. Nest labs is a company which makes thermostats and smart smoke detectors was sold by google for 3.2 billion dollars. Moreover, GE and IBM, other big companies are also working on IoT.

References
[1].   Zanella, A., Angelo, C.: Internet of things for smart cities. Int. J. Internet of Things. 1 (2014) 22–32
[2].   Chen, S, Xui, H.: A vision of Iot. Int. J. Internet of Things. 1 (2014) 349–359
[3].   Stankovic, J. A.:Research directions for the Internet of Things. IEEE Internet Things J., 1(2014),pp. 3-9
[4].   Liu, T. :The application and development of IoT. Proc. Int. Symp. Inf. Technol. Med. Educ. (ITME), 2(2012),991-994
[5].   Zanella, A.:Internet of Things for smart cities. *IEEE Internet Things J.*,1(2014),22-32
[6].   Yang, J.:Broadcasting with prediction and selective forwarding in vehicular networks. *Int. J. Distrib. Sensor Netw.*,2013(2013),1-9
[7].   Dachyar, M.: Knowledge growth and development:Iot research.ScienceDirect Heliyon, 5(2019), 1-14
[8].   Widyantara, M.O.:Iot for Intelligent traffic monitoring system.Int. J. Computer trends and technology, 30(2015), 169-173

[9]. Hammi, B.: Iot Technologies for smart cities. IET Journals, (2017), 1-14
[10]. Margeret, V.: A Survey on Transport System Using Internet of Things. IOSR Journal of Computer Engineering. 20 (2018),1-3
[11]. Kadam S.G.: Internet of Things (IOT). IOSR Journal of Computer Engineering, 69-74
[12]. Bajaj, R.K.: Internet Of Things (IoT) In The Smart Automotive Sector: A Review. IOSR Journal of Computer Engineering,(2018), 36-44