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SURVEY OF ACCIDENT AVOIDANCE PREVENTION AND DETECTION SCHEME USING INTERNET OF THINGS

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Abstract

Internet of Things (IoT) plays a vital role in connecting the surrounding environmental things to the network and made easy to access those un-internet things from any remote location. It's inevitable for the people to update with the growing technology.Generally people are facing problems on smart driving accident avoidance system. In this research paper we analyze and compare some of the existing works on smart vehicle communication and accident avoidance system in IoT. We categorize the works as accident prediction scheme, accident avoidance scheme, accident prevention scheme, powered IoT and Quality of Service.Here we also present the advantages and disadvantages of these techniques and suggest a best approach based on the observation.

Key words: Internet of Things(IOT), Navigation system, Smart Vehicle Tracking, Quality of Service

1 . INTRODCUTION

The IoT is an important topic in technology industry, policy, and engineering circles and has become headline news in both the specialty press and the popular media. This technology is embodied in a wide spectrum of networked products, systems, and sensors, which take advantage of advancements in computing power, electronics miniaturization, and network interconnections to offer new capabilities not previously possible. An abundance of conferences, reports, and news articles discuss and debate the prospective impact of the IoT revolution-from new market opportunities and business models to concerns about security, privacy, and technical interoperability[1]. The large-scale implementation of IoT devices promises to transform many aspects of the way we live. For consumers, new IoT products like Internet-enabled appliances, home automation components, and energy management devices are moving us toward a vision of the Smart home, offering more security and energy efficiency. Other personal IoT devices like wearable fitness and health monitoring devices and network enabled medical devices are transforming the way healthcare services are delivered. This technology promises to be beneficial for people with disabilities and the elderly, enabling improved levels of independence and quality of life at a reasonable cost. IoT systems like networked vehicles, intelligent traffic systems, and sensors embedded in roads and bridges move us closer to the idea of Smart cities, which help minimize congestion and energy consumption. IoT technology offers the possibility to transform agriculture, industry, energy production and distribution by increasing the availability of information along the value chain of production using networked sensors. However, IoT raises many issues and challenges that need to be considered and addressed in order for potential benefits to be realized.

The IoT is an emerging topic of technical, social, and economic significance. Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, and other everyday objects are being combined with internet connectivity and powerful data analytic capabilities that promise to transform the way we work, live, and play. Projections for the impact of IoT on the internet and economy are impressive, with some anticipating as many as 100 billion connected IoT devices and a global economic impact of more than $11 trillion by 2025[1].

IoT issue areas are examined to explore some of the most pressing challenges and questions related to the technology. These include ,

Legal, Regulatory and Rights: The use of IoT devices raises many new regulatory and legal questions as well as amplifies existing legal issues around the internet. The questions are wide in scope, and the rapid rate of change in IoT technology frequently outpaces the ability of the associated policy, legal, and regulatory structures to adapt. One set of issues surrounds cross border data flows, which occur when IoT devices collect data about people in one jurisdiction and transmit it to another jurisdiction with different data protection laws for processing. Further, data collected by IoT devices is sometimes susceptible to misuse, potentially causing discriminatory outcomes for some users. Other legal issues with IoT devices include the conflict between law enforcement surveillance and civil rights; data retention and destruction policies; and legal liability for unintended uses, security breaches or privacy lapses. While the legal and regulatory challenges are broad and complex in scope, adopting the guiding Internet Society principles of promoting a user's ability to connect, speak, innovate, share, choose, and trust are core

considerations for evolving IoT laws and regulations that enable user rights[2].

Emerging Economy and Development Issues: The IoT holds significant promise for delivering social and economic benefits to emerging and developing economies. This includes areas such as sustainable agriculture, water quality and use, healthcare, industrialization, and environmental management, among others. As such, IoT holds promise as a tool in achieving the United Nations Sustainable Development Goals. The broad scope of IoT challenges will not be unique to industrialized countries. Developing regions also need to respond to realize the potential benefits of IoT. In addition, the unique needs and challenges of implementation in less-developed regions need to be addressed, including infrastructure readiness, market and investment incentives, technical skill requirements, and policy resources.

In the device-to-gateway model, or more typically, the device-to-application-layer gateway (ALG) model, the IoT device connects through an ALG service as a conduit to reach a cloud service. In simpler terms, this means that there is application software operating on a local gateway device, which acts as an intermediary between the device and the cloud service and provides security and other functionality such as data or protocol translation.

2. RELATED WORK

The contributions of various scholars are studied for survey and analyzing the merits and demerits in order to enhance the consequences for making the system work better.

Prabha[3] et al discovered automatic vehicle accident detection and messaging system using GSM and GPS Modem which helps when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over, and Micro Electro Mechanical System sensor will detects the signal and sends it to ARM controller. Microcontroller sends the alert message through the GSM MODEM including the locationto police control room or a rescue team. So the police can immediately trace the location through the GPS MODEM, after receiving the information. Then after conforming the location necessary action will be taken. If the person meets with a small accident or if there is no serious threat to anyone`s life, then the alert message can be terminated by the driver by a switch provided in order to avoid wasting the valuable time of the medical rescue team. The team is focused in detecting the accident precisely by means of both vibration sensor and Micro Electro Mechanical System (MEMS) or accelerometer.The proposed vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. The resultshown that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mobile numbers permanently.

Aishwarya S.R[4] et al presented Eye Blink Monitoring System (EBM) that alerts the subject during state of drowsiness. An embedded system based on psychological state of Subject by monitoring eye movements and head movements are useful in warning drivers duringinitial sleep cycle phase of drowsiness. The physiological sleep state analysis of subject can be determined by monitoring subjects eye-blink rate using an IR sensor and head movement using an accelerometer. A normal eye blinkrate has no effect on the output of the system. However, if subject is in extreme state of sleep-cycle, then IR sensor receives abnormal eye blinking rate & an alarm is initiated to wake the subject. An IoT enabled sensors are used to transmit the entire data collected by sensors over a smart grid network for quick response team to take actions under emergency conditions.The development of smart grids fascinates the overall process of communication between human and machine rather than machine to machine communication. Hence, IoT can revolutionize the way embedded systems interact and respond for variety of applications especially in case of vulnerable night drivers by monitoring the state of their drowsiness for a quick, safe and effective response for a safer road travel.

Vishwajeet H. Bhide[5] proposed a survey on the smart homes using IoT which explains How to provide fully smart environment condition monitoring by various sensors like Temperature, Humidity, Light and Level for providing necessary data to automatically adjust the comfort level in homes by optimizing the use of energy. They also use prediction here for automatically detection and resolution of any problem in the devices. For that they are using Naïve Bayes Classifier algorithm for data mining. It will send email or SMS to required technician for service and it will also notify the owner. It gives a huge advantage on the smart home systems using IoT.The work is to planning to eliminate most of the human interaction by providing intelligent system. Development of such smart home achieve by using IoT technologies. By using these system it can actually manage to make low cost, flexible smart homes to adjust its environmental conditions and resolve its errors with energy saving.

Spurti Shinde[6] et al did a literature review on an Accident Detection and Alert Systems for Immediate Emergency Services which explains accidents are responsible for a large number of casualties each year. In some cases deaths are caused due to unavailability of immediate medical aid to the victim which can be avoided with the help of an automated system that will reduce the time consumed in activities such as taking the victim to the nearest hospital, completing formalities such as filling forms and also involving police in case of major crashes. This review compared various algorithms and technologies that have been developed for detecting different types of accidents. The purpose is to analyze various algorithms studied in this survey in terms of efficiency, advantages and disadvantages and enhance the best suited algorithm for developing an efficient system that synchronizes emergency services for accident detection.

Tasneem Sanjana[7] et al presented a paper on an Automated Anti-Collision System for Automobiles which prevents collision among cars and objects automatically. The work was about implementation of the prototype of designed microcontroller based automated car anti-collision system. Thus system specializes in detecting obstacles by sharp distance sensor and alerts within close distance of collision and hereafter brakes automatically by actuator in critical distance without the help of driving person. If somehow driver fails avoiding the collision, the system will automatically stop the vehicle as it monitors the condition of the vehicle continuously. Automated anti-collision systems are being used in expensive vehicles but our anti-collision system will open a new horizon as it can be used any vehicles at a very low cost.

Binu P K[8] et al developed an Android Based Application for efficient Carpooling with User Tracking Facility. Carpooling is much efficient in current society as it can reduce traffic, environmental problems, etc. Applications related to carpooling provides basic carpooling functionalities. Some of the applications provides location tracking where the passengers can only track the current location of the car.Whereas, the author have provided an efficient application where the users including both driver and passengers can track each other.In most of the navigation applications, time wastage is a major problem as they get delayed by obstacles like road accidents,traffic, etc. it has provided an efficient anomaly detection method integrated to this carpooling application to find fool proof anomalies from all the reported anomalies.

Md. Syedul Amin[9] et al proposed Accident Detection and Reporting System using GPS,GPRS and GSM Technology which utilizes the capability of a GPS receiver to monitor speed of a vehicle and detect accident basing on monitored speed and send accident location to an Alert Service Center. The GPS will monitor speed of a vehicle and compare with the previous speed in every second through a Microcontroller Unit. Whenever the speed is below the specified threshold, it will assume that an accident has occurred. The system will then send the accident location acquired from the GPS along with the time and the speed by utilizing the GSM network. This will help to reach the rescue service in time and save the valuable human life.

Gobhinath.S[10] **et al** an automatic driver drowsiness alert system by using GSM.The author has suggests a System that can be incorporated in every car and if it detects the sleepy driver it must stop the vehicle immediately. It was used to avoid various road accidents caused by drowsy driving and also this system is used for security purpose of a driver to caution the driver if any fire accident or any gas leakage. It involved avoiding accident to unconsciousness through Eye blink. Here one eye blink sensor is fixed in vehicle where if driver lose his consciousness, then it alerts the driver through buzzer to prevent vehicle from accident. The alcohol and temperature sensor are used for further safety system in the vehicle. Development of a hybrid microcontroller for a vehicle which also consists of an alcohol and temperature detector which will sense if the driver is drunk and would not start the vehicle. A complete study on road safety is going to be the next boom for the automobile industry for it to flourish and survive every human from the risk. The main advantage of work is the accuracy of using physiological parameters to detect drowsiness is really high. It helps in preventing most of the road accidents that occur due to fatigue.

Yong-Kul Ki[11] et al suggested a traffic accident detection model and installed a system for automatically detecting, recording, and reporting traffic accidents at intersections. A system with these properties would be beneficial in determining the cause of accidents and the features of the intersection that impact safety. Additionally, They have suggested and designed the metadata registry for the system to improve the interoperability.The far of the proposed model is 0.34×10-6 %, and the proposed algorithm is superior to the California #7a algorithm and SBIDA. It has significantly improves the accident detection efficiency at intersections. This accident detection and video verification mechanism will be able to provide real-time crash warnings to the operators and drivers. The video clips are invaluable for intersection safety analysis.

Asad Ali[12] proposed an idea is that as soon as an accident is detected by the system, the authorities should immediately benotified to prevent further car congestion as well as allow the passengers to be escorted to the hospital in a timely fashion. The system involves the use of fuzzy logic as a decision support built into the smartphone application that analyzes the incoming data from the sensors and makes a decision based on a set of rules. ASAD system – an automated notification service that allows authorities to be immediately aware of any accidents that occur in their respective cities to allow them to take immediate action and prevent as much damage as possible, both human and economic. The system has demonstrated its efficiency through a 98.67% accuracy while the 1.33% can be corrected by adjusting the system's threshold. Further more, user surveys have indicated a keen interest in ASAD while a few raised concerns about privacy.

Fahim Bin Basheer[13] et al proposed a Design of Accident Detection and Alert System for Motor Cycles which is an attempt to detect accident through three parameters-acceleration/deceleration, tilt of the vehicle and the pressure change on the body of the vehicle. Using these minute data values and an apt algorithm, the accident can be detected with a reasonable success rate. And the coordinates of the vehicle found using GPS technology is send to the emergency services for help. A real coordination between this central node and other services like ambulance, police force, hospitals and other medical facilities, social forms etc. is also necessary. This system

has a lot of potential to improve the accident rescue operations and with better resources and innovations it can reach there.

Mahesh M. Bundele[14] et al presented the work which have been to design a simple wearable computing system for the prevention of fatal injuries and loss of lives due to fatigued state of a vehicular driver. So far, we have been able to design a reliable fatigue / drowsiness / stress detection system using neural network approach. It had been aimed to consider Skin Conductance, Oximetry Pulse, SPO2,Respiration and Respiration Rate for detecting the fatigue state of a driver. It focused on correlating the fatigue with Skin Conductance and Oximetry Pulse by having recorded the signals for pre driving and post driving states. From the comparative analysis of nine neural network based classifiers, it could be observed that if it is planned to use all the physiological parameters separately by classifying the fatigue state of a driver, the SC as an input parameter, SVM NN performs very well giving average PCLA of 92.95 %but with the existing feature matrix, for OP as an input parameter, SVM does support due its PCLA of 75.6 % only. Two-hidden layer based MLP NN performs better than SVM NN giving PCLA as84.36 %, which may be further improved else SVM may support better by attempting some other input features. If two feature matrices corresponding to SC and OP are combined and fed to the neural classifiers, the average classification accuracy gets improved to 93.17 % as compared to the classifiers using either SC or OP as inputs.

Yu Chen[15] et al proposed a reliable vision-based system for traffic accident detection. First, detection accuracy is improvedby detecting the last seconds before vehicle collision. Then it has been devised an advanced local descriptor that can capture rich and explicit motion information in temporal domain while using no spatial constraints. In order to construct a more compact representation for video scenes, they have build the bag of feature model with spatial information. Extreme learning machine with Gaussian kernel is employed as the base classifier. Such additional strategies as normalization of flow magnitude and filtering of sliding windows are used to reduce the classifiers workload in computation and detection. Experiments using real-world data have shown that the proposed method has high recognition accuracy.

Adnan Bin Faiz[16] et al proposed Smart Vehicle Accident Detection and Alarming System Using a Smartphone which have shown that road accident can be detected efficiently by using some particular parameters. Our proposed approach capable of deciding whether a situation is an accident or not and if so, then immediately traces nearest police station as well as hospital and send emergency alert message for help. Besides, they have demonstrated the reduction of false alarm in a greater extent compared to other previous works. Though the system requires a continuous Internet connection, but this it is very much cost effective and can be applied significantly in the practical world.

Jie Hu[17] et al proposed to detect abnormal driving by analyzing normalized driving behavior. Serving as the virtual driver, a personalized driver model is established for the speed control purpose by using the locally designed neural network and the real-world vehicle test data. The driving behavior is normalized by employing the virtual driver to conduct the speed following task as defined by the standard driving cycle test, e.g., the FTP-72. Three typical abnormal driving behaviors are characterized and simulated, namely, the fatigue/drunk, the reckless and the phone use while driving. An abnormality index is proposed based on the analysis of normalized driving behaviors and is applied to quantitatively evaluate the abnormity. Numerical experiments are conducted to verify the effectiveness of the proposed scheme.

Xuefeng Liu[18] et al proposed InfraSee: An Unobtrusive Alertness System for PedestrianMobile Phone Users and InfraSee augments smartphones with a small infrared sensor which measures the distance of the ground surface from the sensor. The temporal variation of distance can provide information about the change of ground surface ahead. InfraSee also leverages the information of smartphone sensors to improve detection accuracy, to reduce energy consumption, and to avoid unnecessary alarms. It have been carried out extensive experiments in different scenarios and by different users. The results show that InfraSee is able to reliably detect about 80%change of ground surfaces. In addition, InfraSee can reliably identify theawareness of smartphone users and reduce unnecessary alarms.

Elie Nasr[19] et al proposed and implemented an IoT systemwhich may help the community decreasing the death rates resulting from vehicles accidents. The solution provided many advantages namely, minimizing injured passengers interaction,providing basic medical information to rescue teams, recognizing exact and accurate accidents locations, and facilitating the routing process. Reliability test showed that the system is robust, that is, available and serviceable specially when the IoT device keeps sending continuous notification of crash occurrence until it makes sure its reception by the headquarter.The data collected from this system can be fed to data mining engine and hence, can serve the PSO in generating statistical reports related to the number of accidents, number of injured, bank of blood donors, and road conditions.

3.CONCLUSION

Based on the comparison of various accident detection techniques for IOT and the discussion of enabling technologies based approach in the previous section, We can conclude that the current accident avoidance approach is the mostly used technique for smart vehicles communication and the common parameters for Internet of things estimation include, Speed, accuracy of estimation, and Quality of service. In some cases, stability and connectivity are also taken into account. So we need an innovative technique representational state transfer web services is one way of providing interoperability between

computer systems on the Internet scheme thereby minimizing the complexity and maximizing the network efficiency.

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