Safety Device for Drowsy Driving using IOT

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Abstract: This paper presents a safety device for drowsy driving using IOT. Drowsy driving is a major problem in every country. The risk, danger, and often tragic results of drowsy driving are alarming and shocking to everyone. Drowsy driving is the dangerous combination of driving and sleepiness or we can say fatigue. This usually happens when a driver has not slept enough, but it can also happen due to untreated sleep disorders, medications, drinking alcohol, shift work or long late night drives. In this project a self-powered IRIS scanner will be fitted into the dashboard in front of driver that will be scanning the driver eyes. So whenever a driver is drowsy or feeling siesta his/her eyes may go shut very frequently and for longer durations. So whenever the eyes are closed for more than two seconds or longer the sensor will trigger the action and activate the alarm so the alarm makes the driver conscious.

Keywords: Internet of Things, IOT, Drowsy Driving, IRIS Scanner, Alarm, Music system/Navigation System, Alert System.

I. INTRODUCTION

With huge development in Internet and Internet of Things, we all have become highly interconnected at an unequalled scale. IOT or the Internet of Things refers to the Interconnection of different devices or machines or things through any possible mode. Thus IOT is the inter-networking of physical sensors, devices, appliances, motor vehicles, buildings and other items embedded with software, electronics, instrument sensors, transducers, and Internet connectivity that enable these objects to collect, process and transmit data or work upon that data to produce desired results. The Internet of Things definition: "Sensors and actuators embedded in physical objects are linked through wired and wireless networks"

IOT gives us the capability to control digital devices or things through a user friendly GUI over the internet. Our efforts concentrates on researching innovative project on Safety enhancements in automobiles as new feature that could benefit the mankind. IOT is one of the main product of the smart cities in many countries and it helps to digitalize the whole world.

The Internet of Things, can be a person with an automobile that has built-in sensors to alert the driver when some problem like tire pressure is low or related to the safety devices in cars, heart monitor implant, or any other natural or man-made thing or device that can be assigned an IP address or any other unique address or functionality and provided with the ability to transfer data over a network. According to the Survey for IOT it is believed that it would be one of the most demanded and used tool or product in future. [1]

II. EARLY HISTORY

IOT was conceptualized as early as 1832 when an electromagnetic telegraph was made by Russian Scientist Baron Schilling. Similarly in 1833, Carl Friedrich Gauss and Wilhelm Weber developed a code to send communication signals over 1200 meter distance in Gottingen, Germany and this started a development towards the IOT.

SMART DEVICES: As early as 1982, a concept of smart devices was discussed at Carnegie University in Pittsburgh, USA where Coke machine was reformed to be first machine connected onto internet and thus created the smart device based first application of IOT.

As of 2016, the vision of the INTERNET OF THINGS or INTERNET OF EVERYTHING or INTERNET OF OBJECTS has advanced due to merger of technologies, including wireless communication, machine language learning, transducers or commodity sensors, real-time analytics of collected data and embedded systems. This means that the embedded computer systems, wireless sensor grids, control devices and systems, automated machines and its applications used in home and building automation or all such options enable IOT and work on the concept of IOT. [1][2]

III. APPLICATIONS

As everyone nowadays is aware that the hype around the Internet of Things (IOT) is huge. Every day a new company announces some IOT enabled product.

The applications of IOT are in abundance. And day by day the development in the field of IOT is increasing. So in the coming decades the applications of IOT are going to increase by many folds [3].

Some of the most well-known applications of an IOT are:
a. Smart Home
Smart Home, ranks as the highest Internet of Things application on all platforms. More than 70,000 people at present search for the term "Smart Home" each month.

In simple words a **smart home** is the one in which the devices are capable of interacting with each other as well as to their unidentifiable environment. A smart home application permits its users to develop/modify and control home environment for better security and cost-effective energy management.

b. Smart Cities

Smart city couples a wide variety of use cases, Right from Smart surveillance, safer and automated transportation, smarter energy management systems traffic management to water distribution, to waste management, urban security and environmental monitoring are all examples of the smart cities application of IOT. Popularity of IOT is ignited by the fact that many Smart City solutions promise to amend real pains of people living in cities in today's scenario.

c. Wearables

In the field of wearables the IOT contributes on a large scale through its Wearable IOT tech domain that consists of wide range of devices .The requirements covered by these wide range of devices includes fitness, health and entertainment requirements. The prerequisite from internet of things technology for wearable applications is to be highly energy efficient and must require ultra-low power and should be compact in size. Here are some top examples of wearable that uses the concept of IOT-
Fitbit,
Apple Watch,
Moto 360 by Motorola

d. Smart Retail

The capability of IOT in the retail sector is huge. Imagine the scenario when your home appliances will be able to inform you about insufficiency of supplies or even they can order them on their own. This IOT-based model of smart retailing has started to become a reality. So this model of Smart retail contributes immensely as one of the applications of IOT.

IV. NEED OF SAFETY SYSTEM FOR DROWSY DRIVING

According to the Centre for Disease Control and Prevention [4] [5] here is the list of drivers who's more likely to drive drowsy –

- Drivers who do not get enough sleep.
- Commercial drivers who operate vehicles such as trucks, tractor trailers, and buses and travel long distances late night.
- Shift workers (work the night shift or long shifts).
- Drivers with untreated sleep disorders such as one where breathing repeatedly stops and starts (sleep apnoea) or any other disorder.
- Drivers who use medications that make them sleepy.[4]

As time spent in a car is increasing, accidents caused by drowsy driving is also increasing year by year. [5]

It is a statement of experts that driver drowsiness is responsible for about 30% to 35% of severe traffic accidents and results in loss of many precious lives [6]. So, many car makers and IT companies are putting abundant amount of money into research and development (R&D) to detect drowsy driving and give a driver a visual or auditory warning, or an alarm through vehicle augmented reality. [5] This is analytical paper which consists of the driving information collected from an Eye Scanner that will scan the eyes of the Driver and checks whether the driver is attentive while driving or not.

V. RELATED WORK

1. VOLVO "Vision 2020" Safety tools for Cars:

Development took place in the field of Safety tools which was designed for cars and was initiated by Volvo back in 2008 when it announced its "Vision 2020" safety endeavor, which offered that Volvo would be able to put safety enhancements on cars on the road by 2020 in which none of the individual would be killed or would get seriously injured in any circumstances, which would provide much more safety than airbags, crumple zones, collision warnings, and automatic braking systems. [7]

2. Internet of Things Alarm Clock

This is another project based on the concept of IOT. [8] Frederick Vander bosh build this project commissioned by element14 which is just way more than the simple alarm clock. This clock can tell the train timing and may not wake you up if the train is delayed or a lecture is cancelled in the college. Like these Volvo Safety Tool or IOT Alarm Clock, we thought about the need of an Alarming Watchful device working with support of IOT based software concept that can react on the signals given by the sensor by monitoring driver's alertness or drowsiness and along with raising alerting sound it shall also direct the driver to nearest refreshment spot or location with distance and approximate time to reach. F. Fabian and B. Yang under their IEEE paper titled as "Drowsiness monitoring by steering and lane data based features under real driving conditions", Signal Processing, pp. 209-213, 2010 stated that drowsy driving is increasing year by year and because of that accidents are also increasing so there is a need of a safety tool to stop the road accidents happened due to drowsy driving. So in this paper we propose a safety enhancement that will use the sensors and alert system based on the concept of IOT and on the above related work this safety enhancement will help stop the drivers from getting drowsy while driving and stop the accidents on road.

VI. PROPOSED METHODOLOGY

As we know that whenever a driver is travelling on late night long trips it is a tendency of every driver/human to feel sleepy at nights that will results into drowsy driving. So, to ensure the safety of the driver and reduce the possibilities of car accidents/crashes we proposed a

concept of safety enhancement for drowsy driving based on Internet of Things (IOT). This concept involves scanning of driver's eyes continuously using the Eye Scanner, so that whenever the car driver closes his eyes for a longer period (2 seconds or more), the scanner generates or activates the alarm and the alarm starts ringing loudly. This will wake up the driver and make him conscious for driving ahead The alarm system will be included as an application in the car music system and the driver will be given the choice of switching on/off the functionality.

If the driver switches off the safety feature the IRIS/Eye Scanner will stop working. But if the safety feature is switched on by the Driver the IRIS Scanner will continuously scan the driver eyes while the driver is driving the car and check whether the driver is attentive or not. In addition to analysing the situation of threat due to Drowsy driving, this alert system post alarming the driver will fetch the nearest refreshment halt direct him to destination with exact distance and expected time to reach and will also announce to driver through the medium of navigation system/music system speakers of the car.

This way we can create complete solution for safety device to alert drowsy drivers, hence saving many precious human lives.

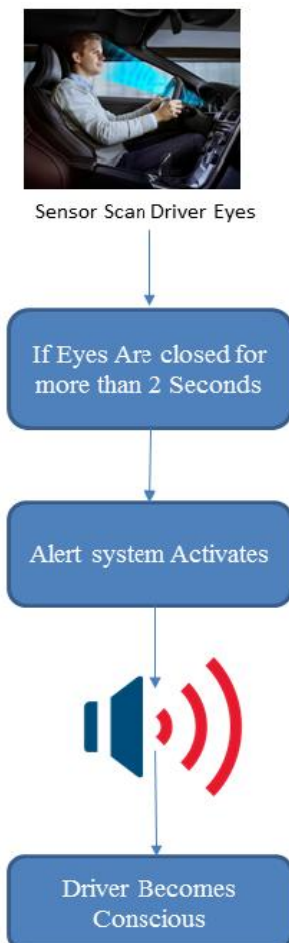## VII. GENERAL MODEL FOR PROPOSED SYSTEM

Fig.1 Flowchart for the Working of the Proposed Model

The general structure of our safety device is a block of different processes clubbed into one so as to make it successful operation in the work of computation and in turn make it useful for the human – computer interaction as this is the main aim of our safety enhancement.

Steps:-
1. The first step is that the IRIS/Eye scanner scans the driver Eyes.
2. 2nd step is analysis of the driver eyes. If the driver Eyes are closed for 2 seconds or more then the sensor generates the signal and activates the alarm.
3. As soon as the alarm receives the signal from sensor it starts ringing with the help of the application in the music entertainment system/navigation system of the car.
4. As the alarm rings, it makes the driver conscious.

VIII. CONCLUSION

This paper discusses about what is Internet of Things and the importance of IOT in our life. This paper also discusses about unique and attractive features of the above proposed system based on IOT and interconnectivity of sensors and sound system of the car that will lead to a safer life for drivers. As humanity and human life is the most important thing in this world we would like to propose this safety system that should come in all the cars and enhance the safety for the car drivers. In this concept the car is able to detect if a driver is not paying attention or drowsy and frequently closing eyes while driving, this new safety system comes in action to avoid any crises, hence saving precious human lives. We have tried our level best to take this topic to a higher level and thought through the practical implementation of this model.

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