ACCIDENT ALERT SYSTEM

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ABSTRACT

The IoT is a rapidly increasing and promising technology which is becoming more and more present in our everyday lives. The IoT offers us countless and endless possibilities of automation for both government, public and private industries or sectors. Image processing is a technique in which existing image is altered or processed in a desired manner. It involves the alteration and analysis of pictorial information. We lose a many lives in road accidents often. The most familiar reasons are usually driver's mistake and emergency services reach the accident spot late. It is utmost important and necessary to develop an efficient accident prevention and detection system on roads which will monitor the driver's behaviour and alert him when he is distracted. This effective system can send the information about the accident including the accident location to emergency services. This will in turn prevent the loss of life as the emergency personnel can reach the accident spot on time. This paper aims to use the techniques of IoT and image processing in the field of transportation and health care by not just preventing the accident but also detecting the accident and alerting the emergency services.

Key words: Image processing, IoT, Accident alert, Voila Jones Algorithm.

1. INTRODUCTION

Every day, hundreds of road traffic accidents occur across the country. In fact, statistics show that there are more than 10 motor vehicle-related deaths per day, many of which are preventable. Road accidents occur for a variety of reasons. Often, drivers are distracted while behind the wheel and not focusing on the road. In other cases, drivers can become tired after spending multiple hours at the wheel, resulting in preventable errors. Sometimes, accidents occur for a combination of reasons, from bad visibility to unsafe road design, or other drivers

lack caution. While causes of accidents can vary, the consequences are often the same, resulting in damage to serious injuries.

The reason for such accidents is distracted driving which results in more crashes every year than drunk drive, over speeding and various other major accident causes. Some of the leading causes of distracted driving accidents include using a mobile phone while driving, as well as eating or drinking while driving or the driver not being focused while driving.

According to recent survey conducted by the WHO approximately one million people die each year as a result of road accidents. Between twenty to fifty million people suffer from serious injuries, with many disabilities as a result. More than half of all road traffic deaths are among vulnerable road users like motorist, cyclist.

The important factor in driver monitoring system is the accuracy of the face detection. Different techniques have been used to identify the driver's behavior. This paper deals with the discussion of several methods which have been proposed for detecting driver behavior, preventing the accident and detecting the accident in case if it occurs and alerting the emergency services. It equips the vehicle with the recent technology which can detect accidents and alert the emergency services such as friends and hospitals. With IoT automatic response and push notifications can be sent.

2. LITERATURE SURVEY

In [1] the authors have proposed a system which used fog computing method to determine the mishap and send the alert message to the emergency personnel however there is much delay in sending the alert message and locating the exact location of the accident which increases the chances of losing lives. In a fog environment, we have to utilise a large sum total of fog nodes .The computation gets distributed and the entire system or environment becomes less energy efficient. We can place a set of fog servers in such a way that they give maximum service to all localised requirements however, this is a problem. This can result in breach in security as spiteful and malicious users can make use of a hoax IP address to retrieve information stored on a specific fog and this includes massive maintenance cost.

In [2] the authors proposed a system that uses IoT to detect the accident and send alert message to emergency services however this is not a quick method and causes delay in saving the life. This system uses only MEMS sensor to detect the accident and hence the accuracy of the information collected is reduced. This system makes use of cloud computing so in case of any network issues because of any mishap there might be a downtime or difficulty in connecting to the cloud. No precautionary measures have been included in this system to prevent the accident. Cloud computing does not work well if the network connection is slow or poor.

In [3] the authors have proposed a system called Traffic Accident Detection Using Random Forest Classifier technology. This is a detection method which helps detect an accident in real time. It uses a communication technique called vehicle to vehicle.It makes use of random forest classifier algorithm which is highly complex as it requires more computational resources and occupies a lot of memory. The algorithm is more time consuming when it must be trained. A lot of trees are first generated and then based on the maximum votes, a decision is made.The predictions are lower which may create challenges for various applications. It will only send the estimated location which is not exact or appropriate.

In [4] they have proposed an accident detection and prevention System to minimise the hazards caused due to traffic using Infrared Sensors.These sensors require a line of sight which is practically not possible as there can be many obstructions in the line of sight of the driver. It readily gets cut off by familiar objects and has a definite limited range.

Environmental conditions such as rain, dust, fog etc. can affect these sensors. In this sensor, the data rate can be sluggish or slow.

In [5] they had proposed a system for accident detection which monitored traffic in real time. It was vision based. It made use of Gaussian mixture model. The chief limitation of GMM algorithm is that it failed to work for problems of his dimensionality. To avoid this, the user had to fix the sum total of models which the algorithm can fit in the training dataset. The user will have no clue about the number of models must be used. The user will also have to experiment with different models to find the exact number of models that will work for that classification problem.

In [6] the authors have proposed a system called intelligent traffic accident detection system. This system follows the principle of mobile edge computing to detect accidents using smart phones. The smartphone utilizes existing datasets and is prone to errors. This edge computing technology has limited redundancy or sometimes no redundancy. The outage time is much longer which in turn reduces the performance and efficiency of the system. This technology lacks tier III/IV security which increases risks of security threats. The data or information can be easily corrupted.

3. PROPOSED SYSTEM

This system is designed for both accident prevention and detection. This will keep track of the eye and head moments of driver using an eye blink sensor and camera and also this system will detect the driver's behavior. If the driver is distracted it will give an alert signal in the form of audio through speaker and display it on LCD so that driver doesn't distract and other part of this project is immediate response to accident by sending an alert message to emergency personnel.
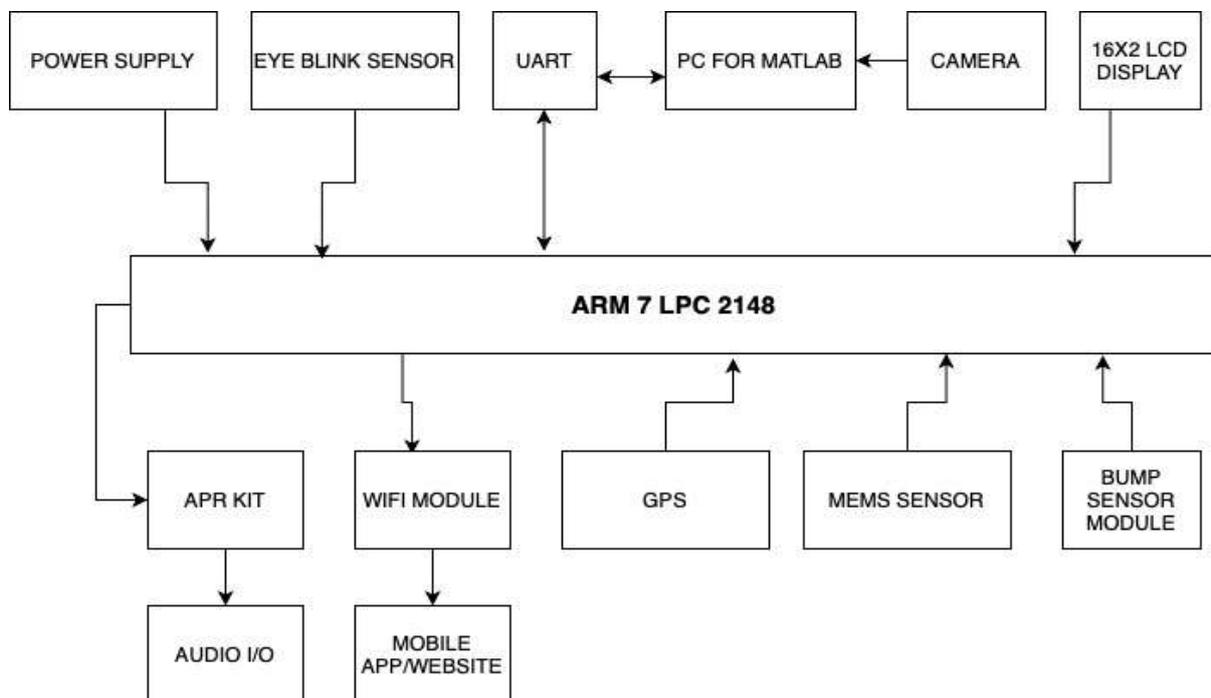

Figure 1 Proposed System

Accident is detected by sensors and microprocessors the location will be sent to Wi-Fi module. The notification is sent to the hospital, police station and emergency contacts from the Wi-Fi module. This part involves the use of ARM LPC2148 micro controller and GPS which will provide the exact location of the accident. The collision is detected using bump

sensor module. Once the accident impact is recorded, the device then finds the GPS coordinates of the vehicle that has met with an accident. This data will be used to send an alert message to the emergency personnel of the vehicle's owner and emergency services like hospital. The Wi-Fi module comes with an inbuilt IP address which is used to connect to the application in which we will be getting the alert message. In case if the accident is minor and the passengers are safe then the driver can press the button, which will send another message to emergency personnel stating that they are safe and it was only a minor accident.
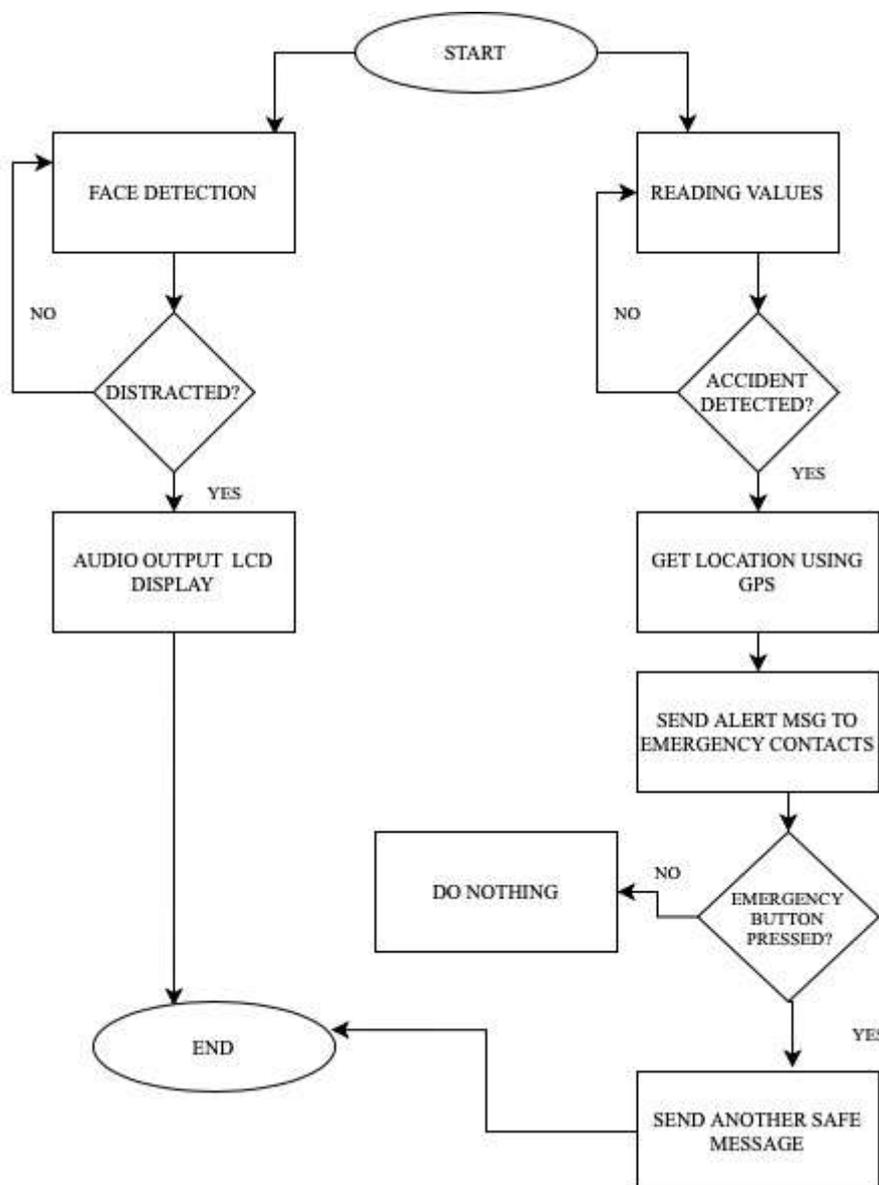

Figure 2 Flow chart for working of the Proposed System

3.1. Voila Jones Algorithm

This algorithm involves two stages that is training and detection . detection involves detecting the haar like feature and creating the integral image . training involves both classifiers and adaboost. Adaboost stands for adaptive boosting in which the algorithm learns from the images we provide as input and it will determine the false positives and true negatives of the data hence this provides a highly accurate model. The main motive of this is that the detection is fast despite training being slow but, by first creating the integral image the efficiency can be

increased. The detection window is where the detection takes place. A maximum and minimum window size is chosen.
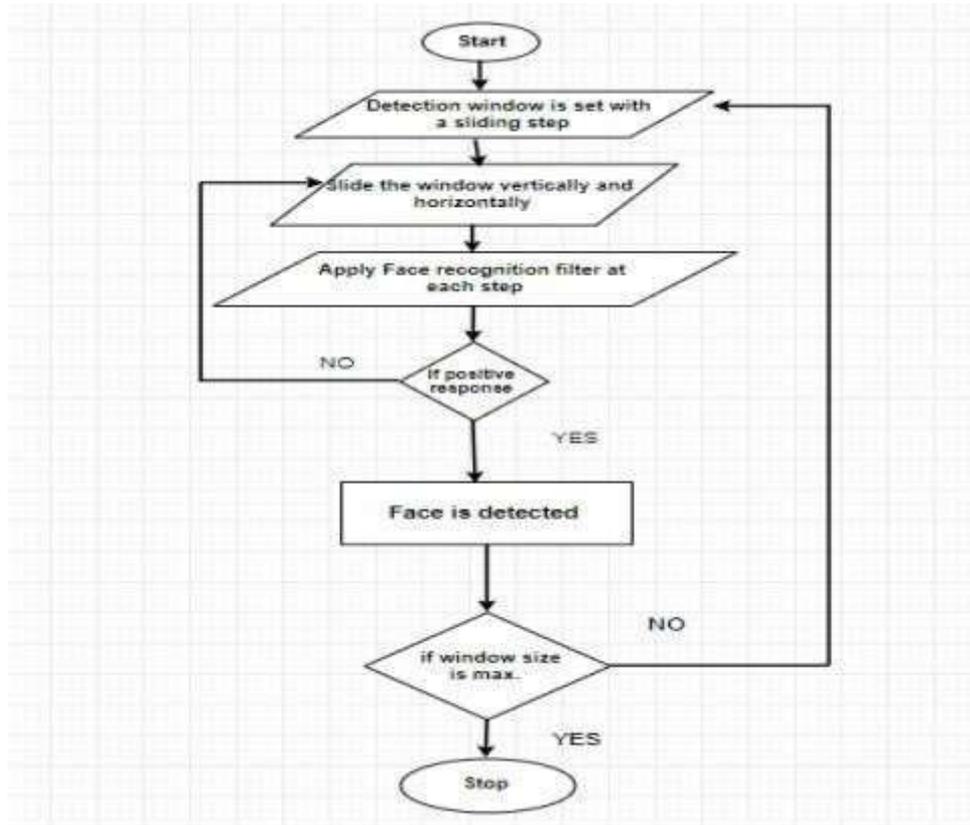

Figure 3 Voila Jones Algorithm

4. RESULTS

From the above research which has been keenly performed based on survey of various papers and the detailed analysis of various algorithms for image classification, we could come out with a software for monitoring the eye and head moments of the driver as well as alert him when he is distracted .The resultant outcome will prevent the driver from getting distracted which in turn will reduce the number of accidents. The software is being developed keeping driver, vehicle and road safety in mind. The system also detects the accidents and sends a quick alert or warning message to the emergency services with the exact location of the accident which decreases the chances of losing life.

Aim is to prevent and detect the accident in more efficient, cost effective and accurate method. The project also replaces the traditional method which involved a need of an operator. This project is unique and different because the sensors prevent and find any road accident. The location of the accident is sent quickly to the emergency services. This eliminates the requirement for any intermediary step.
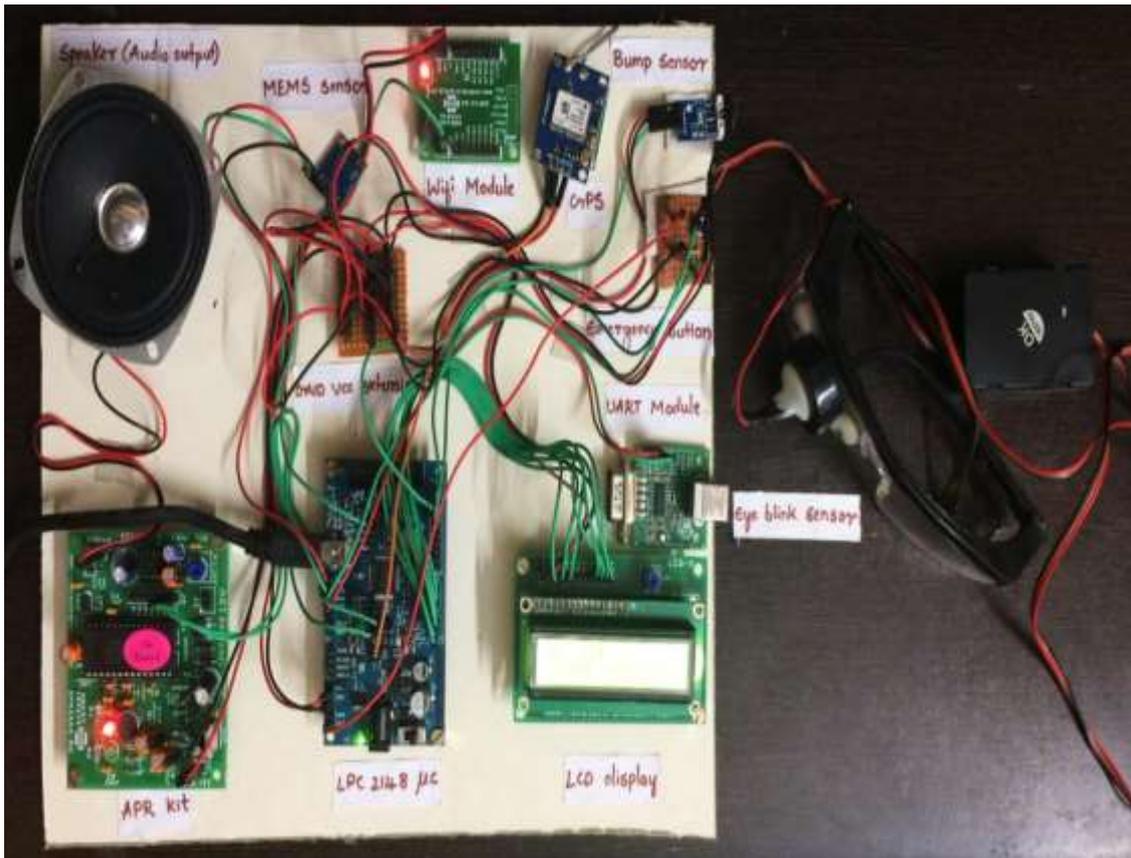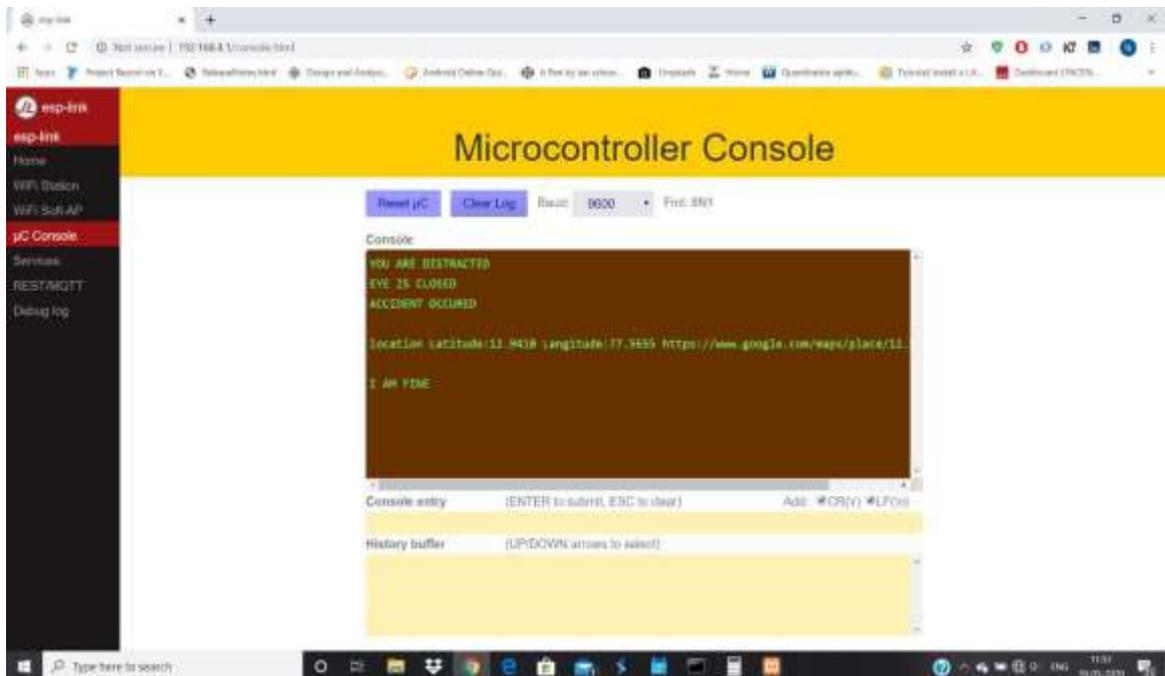
Figure 4 Developed Model

Figure 5 Displaying on Hospital's Website

Figure 6 Displaying on App

5. FUTURE ENHANCEMENTS

This system can be improved by including supplementary features like alerting the driver if the nearby vehicle's distance is less than the threshold value. It can also be made available to all users by making it multilingual which eliminates the limitations on users. The alert messages can be sent to the registered sim and also the alert message can be sent to the nearby police station. The future work can involve, using of more advanced algorithms which can help in getting the vehicle's information in severe weather conditions as well as road accidents.

6. CONCLUSION

By improving the emergency medical services, the number of accident deaths can be controlled. These services depend on speed of the data transfer regarding the accident. The accident alert system is a system which will send an alert message to the emergency services about the accident with the location and thus save valuable life. Main motive of this system is to reduce the possibilities of emergency services arriving late to the location in such accident. Whenever accident takes place an alert message is sent to emergency services like hospital, police station so that they can reach the location to reduce the possibility of losing a life.

The system can detect the accident and confirms the seriousness of the accident as well as it alerts the closest medical assist center to supply emergency treatment to accident victim. Bump sensor is used to determine whether an accident has occurred. This system aims at developing low cost solution for the benefit of the society.

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