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DRIVER MONITORING SYSTEM

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Abstract - *In this Era of modern, fast moving and insecure world, it is a basic necessity to be aware about safety measures while driving a vehicle. Moreover, the number of road accidents can be witnessed at an alarming growth rate. Many statistics say that most of the accidents are caused due to consumption of alcohol or due to the sleepiness of the driver. Knowing where the vehicles are, what the drivers are doing and monitoring every event in real time are the key parameters to be considered while developing the system. Basically, any driver monitoring system is developed with help of some sensors & camera to continuously monitor driver and give alert when found any suspicious activity like over speeding, alcoholic, fatigueless, etc. This is also essential way to track down the driving patterns of the driver which would be helpful for taking further decisions. This system is to be implemented by the truck and state transport bus driver's point of view. As we all know the MSRTC is facing a huge loss because of heavy maintenance charges for the buses because of careless driving. The implementation of this system using all modern sensors and tools of analysis is very necessary for maintaining the proper track of the driver's driving pattern.*

***Keywords*: Internet of Things, Global Positioning System, Automatic Gain Control, Automatic Exposure, Auto White Balance, Maharashtra State Road Transport Corporation.**

1. INTRODUCTION

In today's scenario, rash driving can be witnessed on almost every street or road.

Knowing where the vehicles are, what the drivers are doing and monitoring every event in real time are the key parameters to be considered. The feature of this project would be monitoring the speed of vehicles, pattern of driving, maintaining the statistical data of driving. Whenever the driver crosses the threshold range of speed, a warning would be sent to driver or owner of the vehicle.

This system is to be implemented by the truck and state transport bus driver's point of view. As we all know the MSRTC is facing a huge loss because of heavy maintenance charges for the buses because of careless driving. The implementation of this system using all modern sensors and tools of analysis is very necessary for maintaining the proper track of the driver's driving pattern.

MSRTC is facing a huge loss of 820 Cr. In 2018-19 year [1], which is because of the heavy maintenance of the buses, caused due to rash driving, hence solving this problem is our first and foremost motivation for developing this project.

So, to identify the rash drivers and then report them to organization/managing authorities we are trying to develop this system.

2. RESEARCH BACKGROUND

As core computing part of our system we are using ESP32 Development Board. It will be used for transmitting the data taken from the sensors to the remote location such as Firebase in our case.

The sensors continuously gather the data from their environment. Sensor used in this system are Ultrasonic Sensor (HC-SR04), Alcohol Sensor (MQ-3), Smoke Sensor (MQ-2).

The Database used for storing the sensor data is Firebase Realtime Database. We used this database because of its flexibility and robustness of handling the data at any point of instance.

3. LITERATURE SURVEY

3.1 Existing Systems

1. Driver and Passenger Safety Monitoring System [2]
   - This venture includes controlling mishap because of oblivious through Eye squint.
   - Here on eye squint sensor is settled in vehicle where on the off chance that anyone loses cognizant and demonstrate through bell.
   - The vibration sensors can be conveyed in the vehicles.

2. A Review: Driver Drowsiness Detection System [4]
   - Driver drowsiness detection is a car safety technology which prevents accidents when the driver is getting drowsy.
   - Based on Acquisition of video from the camera that is in front of driver perform real-time processing of an incoming video stream in order to infer the driver's level of fatigue if the drowsiness is Estimated then the output

is send to the alarm system and alarm is activated

3. Camera based Drowsiness Reference for Driver State Classification under Real Driving Conditions [5]
    - The performance of the latest eye tracking based in-vehicle fatigue prediction measures is evaluated.
    - These measures are assessed statistically and by a classification method based on a large dataset of 90 hours of real road drives.

4. Driver Inattention Monitoring System for Intelligent Vehicles: A Review [6]
    - Driver inattention monitoring, which can be classified into the following two main categories: 1) distraction and 2) fatigue.

These approaches by dividing them into the following five different types of measures: 1) subjective report measures; 2) driver biological measures; 3) driver physical measures; 4) driving performance measures; and 5) hybrid measures

3.2 Limitations

- Since, there is no such system in which all the sensors are integrated.
- There is no pattern generation of the driving patterns of drivers.
- There is no data storage of the patterns which are generated.

3.3 Advantages

- The system combines 2-D and 3-D techniques to provide head pose estimation.
- Event detection and behavior analysis is done.

4. PROPOSED SYSTEM

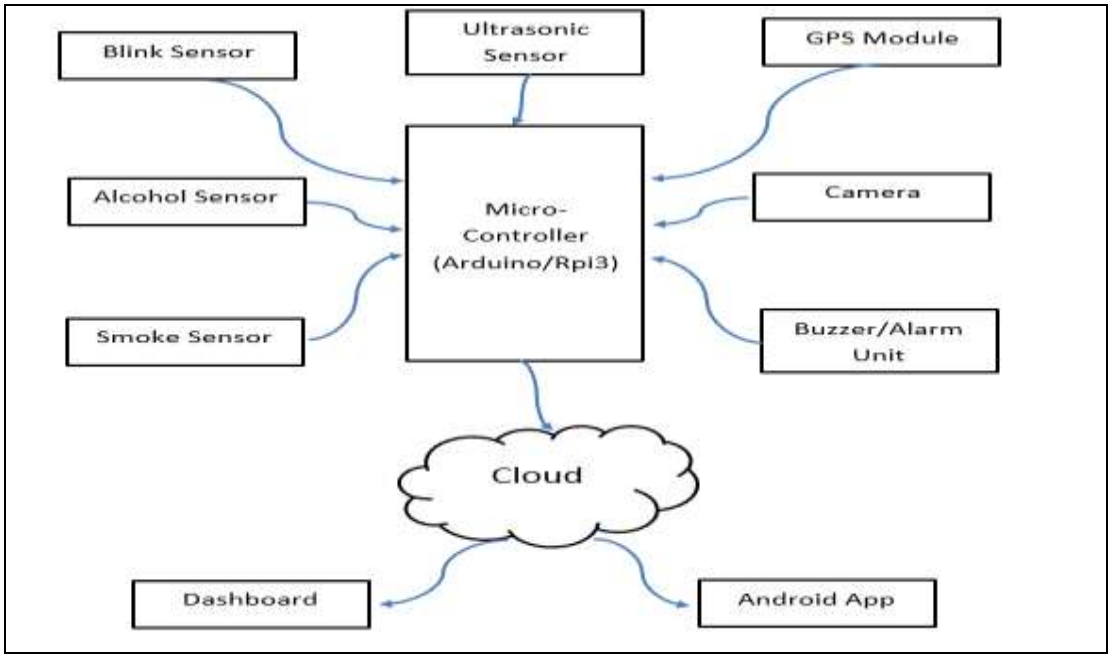

Fig- 1: System Architecture

System Architecture gives us the overall description about the how system is working System that contains both input and output and also short description about the operation I gives basic idea about what type of functionality is performed. In this system we two scenarios:

Driver's Scenario:

- Login to the android application.
- Fill out all details required.
- Get feedback from authority regarding his Driving patterns.

Authority's Scenario:

- Login to the Android dashboard.
- Analyze the patterns of driving patterns.
- Generate the reports.
- It does the analysis of the data from the cloud.
- It does the predictions base on the analysis reports.
- Sends the reports to driver.

4.1 MATHEMATICAL MODEL

System S as a whole can be defined with the following main components.

Let S be the System
S = {I, O, P}
Where,
I = *Input*
O= *Output*
P = *Processing*

I = {Ie, Iu, Ia, Is, Ic, Igsm, Igps}
Where,
Ie = *Eye-Blink Sensor*
Iu = *Ultrasonic Sensor*
Ia = *Alcohol Sensor (MQ3)*
Is = *Smoke Sensor*
Ic = *Rpi Camera*
Igsm = *GSM module*
Igps = *GPS Module*

O = {Obuzz, Osync}
Where,
Obuzz = *Buzzer Alert*
Osync = *DataBase Synchronization*

P = {Cdist, Cspd, Cavg}
Where,

Cdist = $\pi distance\sigma<5(vehicle)$
Cspd = $\pi speed\sigma<60(vehicle)$
Cavg = $\Sigma speed(vehicle)$

4.2 FEASIBILITY STUDY

A crucial and key aspect for the initial investigation that reviews anticipated costs and benefits and recommends a course of action supported operational, technical, economic, and time factors. The aim of the study is to figure out if the system is feasible enough to sustain the market and being used at an enormous rate.

Technical Feasibility

In this study, the aim is to verify the feasibility whether the proposed system is possible to be developed by using existing technologies or not. It is found that the specified hardware and software are available for development of the proposed system. Hence, the solution is technically feasible. The project is technically feasible because the technologies used to implement are ESP32 Development Board, Various Low-Price Sensors as Hardware and Embedded C, Java, ArdunioIDE & Android Studio which are easy to understand and are open source.

Economic Feasibility

In this study, the aim is to verify the costs and benefits directly/indirectly associated with the proposed system and thus the project is economically feasible as long as it is tangible or intangible benefits out weight cost. The system development costs are reasonably significant. Thus, we can say that the proposed system is within the budget and this was achieved because most of the technologies used are open source.

Behavioral Feasibility

In this study, the aim is to verify the usability of the proposed system. The proposed system is deployed with dashboard app and the kit which is to be embed in the vehicle. Both of the deliverables are easy and user friendly to install as well as makes use of intuitive user interface for user friendly experience.

4.3 APPLICATIONS

- MSRTC local buses
- Fleet vehicles
- Private vehicles

4.4 DATA FLOW

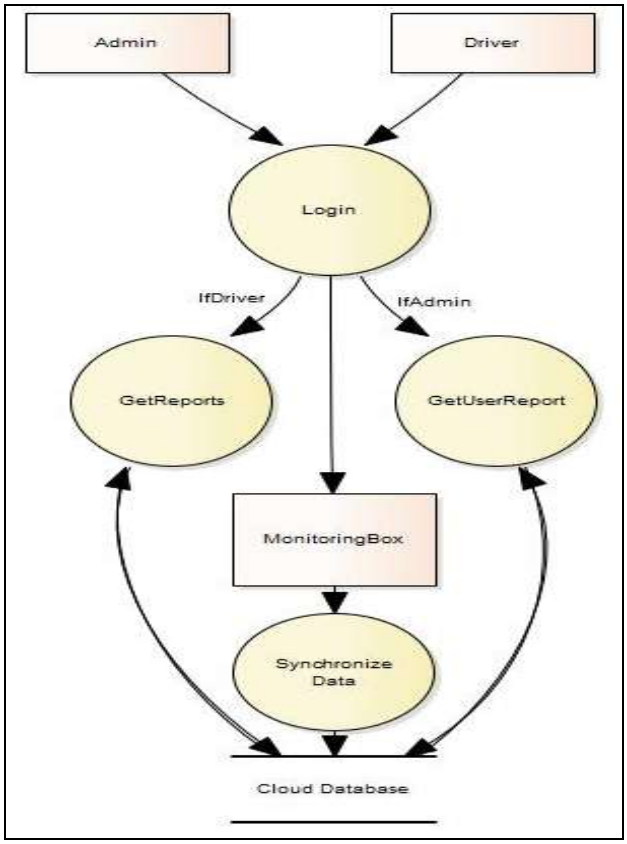

Fig-2: Data Flow Diagram

4.5 ADVANTAGES

- This system is developed to be helpful to the authorities and hence provide them with the information about their vehicles and drivers, their location at any given point of time, and their behavior on the road.
- By monitoring the driver's behavior on the road, the authority can get an exact idea of driver's driving quality, and can be able to compare between the drivers and if necessary, then take disciplinary actions to ensure the drivers drive with enough safety, attentiveness and efficiency.
- Yet another pros for having installed this system is, that the fleet organization manager can be notified in real time if the vehicle is being driven after work hours or on weekends, when it isn't expected to be operating, and reduce the unnecessary use of the company's resources.

4.6 LIMITATIONS

- Since, the sensors used are not of industrial standards, we cannot predict the actual accuracy of the sensors when being prone to unexpected environmental conditions.
- There are some areas where GPS signal may be weak or unreachable, then there might be mis-calculations of speed/distance.
- It may also sometimes happen that poor mobile network can also affect the efficiency of data from sensors.

5. CONCLUSION

This project is aimed to be helpful to fleet organizations for monitoring the driver's driving patterns and maintain that data for further generation of graphical visualizations. Nearly 40% of road accidents happen because of distraction of driver. There are various methods by which we can monitor driver. In order to reduce road accidents there is also a need to detect the causes such as drowsiness, fatigue & at some extent this system is capable of doing so.

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