Bus Speed Tracking System

Rakshali Jain
Department of Computer Science and Engineering
Faculty of Engineering and Technology, Jain University
Bengaluru, India

Shreyansh Rakhecha
Department of Computer Science and Engineering
Faculty of Engineering and Technology, Jain University
Bengaluru, India

Panchami V Urs
Department of Computer Science and Engineering
Faculty of Engineering and Technology, Jain University
Bengaluru, India

Pratyush Kumar Pathak
Department of Computer Science and Engineering
Faculty of Engineering and Technology, Jain University
Bengaluru, India

Abstract— **Among many emerging technologies one of the most emerging technologies is Internet of Things (IoT). IoT proves the fact that devices having different properties like cars and machinery used in industries etc. can connect easily with other devices and can share information digitally and globally too. IoT and Cloud Computing provide new ways and techniques of sharing data and services using internet. These technologies introduce world to a global network system which is not only dynamic but also have self-configuring capabilities which are based on interoperable communication protocols and also assure reliability and high scalability of the services which are available.**
In the current world situation where everyone is in a hurry to get where they need to reach lead to accidents and injury due to such activities can be fatal. Therefore, using the above technologies, a system that detects over speeding and generates an alarm in such buses can be built to reduce over speeding.

Keywords— Accelerometer, Google Cloud Platform, Arduino, Google Maps API, Live Location Tracking, Speed Tracking, Google Sheets API.

I. INTRODUCTION

In a recent study which was conducted to maintain the records of road accidents in 2019, it was concluded that over speeding affected human lives by causing most of the accidents. Accidents also happened on internal roads due to the over speeding. After research we discovered that one-third of the bus drivers are always a part of over speeding, where all the bus drivers are aware of it that they are breaking the traffic rules and risking the lives of their passengers and the nearby vehicles. Bus drivers are not aware with the effects of over speeding as they have a justification that the lower permissible speed at the locations and conditions within the areas and roads are the reasons behind the over speeding of the buses. So, there is a need to develop such a system that helps the authorities to monitor the over speeding of buses so that the bus drivers should be punished accordingly which might reduce the number of accidents and provides safety to the regular passengers travelling in buses.
The main motive is to build a system that uses the Google Maps API and provide the maximum permissible speed for a particular location. Accelerometer and GPRS system that tracks live location should be set up in the buses. Maximum permissible speed will be processed by microcontroller and should be compared with the speed of the bus. When buses travel at a speed past the speed limit, the bus registration number, location and speed at the location will be uploaded on cloud. A datasheet will be generated categorized by the current day and date which will be uploaded on Google Cloud Platform.

II. RELATED WORK

There has been a lot of effort put towards the challenge of detecting the over speed of the vehicles.

Punith B Kotagi, Punith Kumar N, Parishwanath Madakari, Omkar VH and Vishwanath created a system which is based on automatic speed monitoring. It provided an easier way to monitor speed of all the vehicles from centralized control room. This system uses sensors to detect continuous speed of the vehicle and the vehicles which are over speeding are detected with the help of image processing. This model consists of real-world traffic data and the comparison of the speeds can be done manually. But the drawback of this system is that it is not cost efficient and installing cameras on road can have lot of technical issues.

Lujaina Al-Shabibi, Nadarajan Jayaraman and Jayavrinda Vrindavanam have created a system consisting of a GPS, RFID and PIC which identify violations of speed and help drivers to maintain speed within permissible speed. The system alerts the Police and vehicle's owner through an SMS. It also captures an image through camera and send it to the vehicle's owner and the police and a fine is charged when the speed of the vehicle is beyond the permissible speed.

Arpita Kulkarni, Amulya KJ, Radhika AD developed a system consisting of two sensors where the first sensor is inserted at the starting point and the second sensor is inserted at the point which is tracked. When sensor detects vehicle in motion, then it captures image and time is recorded by time recorder when the sensor captures the image. Then the two frames captured are compared with each other and if they match, then the time is estimated. If the time-limit fixed in the starting is beyond the estimated time, then the vehicle will be tracked as it is considered to have higher speed than the limit.
Tarun Kumar and Dharmendar Singh Kushwaha presented a system to detect vehicles in motion and find their speed using

camera in daylight or environment which is comparatively brighter. The vehicles passing through the surveillance area are tracked and the position of vehicles is recorded. It can be used in Automatic Number Plate Recognition System in which those vehicles are selected where the speed limit is beyond the speed which is allowed.

Rahul Nagar developed a system using several technologies like GPS, OBD, GSM, GPRS module, RFID. The main aim of this system is to monitor the vehicle and track its location from a centralized place. It also stores data of testing parameters of those vehicles on server for further records and analysis. It can also monitor some other parameters like – fuel consumption of the vehicle, location of the vehicle, engine compartment, temperature of the vehicle and many other parameters as well.

III. PROPOSED IDEA

The idea is to develop a system which can constantly detect the speed of a bus in motion and can compare it with the maximum permissible speed of a that particular location and if the current speed is found to be more than the permissible speed then the alarm should ring inside the bus to warn the bus driver and the required information should be uploaded automatically to the cloud which is accessible by the authorities for further action.
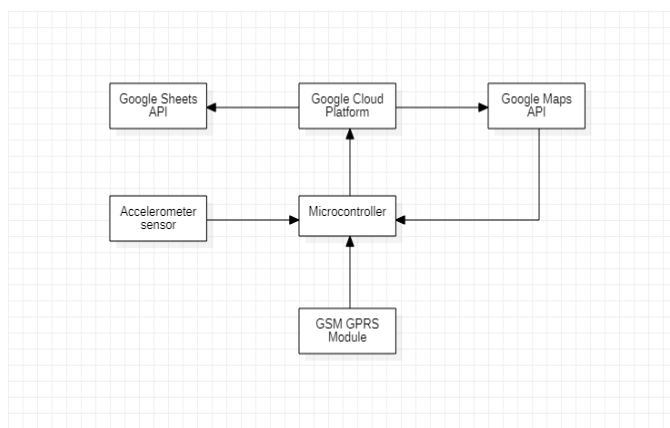

Fig 1

- In this project, an inductive approach is used to develop the solution i.e., to build a microcontroller-based location and speed tracking device for buses. The project uses Internet of Things, Data migration, Cloud development, Cloud Computing, Cloud API services and Embedded Systems.

- To determine the speed of the bus a microcontroller will be placed inside the bus along with an accelerometer. The speed of the bus would be constantly monitored by the module along with some location parameters i.e., longitude and latitude of the location where the bus is currently present. The Microcontroller will get the maximum permissible speed from Google Maps API.

- For this project GCP i.e., Google Cloud Platform will be used because of the unmatched features of

the Google Maps API provided by google. After the cloud has received the data, it will call the Google Maps API and by providing the locational data in the form of latitude and longitude, after which the permissible speed at that location will be provided. This will be of significant use as it will help to determine whether the vehicle is being over accelerated at that instance or not.

- Once the Microcontroller knows the permissible speed at that particular location, it will compare the permissible speed with the vehicle's speed at the location respectively. After comparing, if the speed is found to be more than the permissible speed an alarm will ring inside the bus itself and the data will be sent to GCP and then it will be sent to Google Sheets API which will be accessible by higher authorities.

IV. HARDWARE AND SOFTWARE REQUIREMENTS

1. Arduino Nano
2. Sim800L GSM/GPRS Module
3. LM2596 DC-DC Buck converter
4. MPU6050 Triple axis accelerometer
5. Google cloud platform
6. Arduino IDE
7. Google maps API

V. CONCLUSIONS

Over speeding of the vehicles have become a major challenge and a threat to the society which is raising day by day. Our major goal is to develop a system which tracks the speed of the buses along with the current location so that the authorities can have a check on the buses which may lead to the decreasing number of road accidents caused by buses. Accidents due to over speeding may harm the people, can damage the public property, and risk the life of passengers and nearby vehicles. Our project will ensure that bus drivers are not over speeding the buses and prevent minor and major accidents from happening.

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