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Review on Vehicle Accident Prevention System by Using Raspberry Pi

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ABSTRACT: Accidents are one of the leading causes of death in the United States. The amount of time between the accident and the arrival of an emergency medical facility at the scene is a critical element in the accident's survival rates. The amount of time between an accident and medical assistance arrives reduces fatality rates, allowing more lives to be saved. Accident Detection is one method for avoiding such delays. In the case of an accident, it immediately sends out an alarm and notifies emergency responders using a Raspberry Pi. The proposed system covers the design and development of a RASPBERRY PI-based vehicle monitoring, tracking, and accident detection system. Here the vehicular module is used to track, monitor, and surveillance, as well as locate and inform the monitoring station about the accident. About a real-time basis, the suggested design gives information on the vehicle's identity and location. The RASPBERRY PI uses many sensors to obtain this data. We utilized Arduino to link sensors such as an alcohol sensor and a temperature sensor.

KEYWORDS - Vehicle accident prevention, Raspberry Pi

I. INTRODUCTION

Vehicle usage is increasing as a percentage of the population. Accidents are on the rise these days as a result of traffic congestion. The loss of human life occurs as a result of a delay in the arrival of an ambulance to the accident scene or from the accident scene to the hospital. As a result, the accident victim must be taken to the hospital as soon as possible. Whenever an accident occurs, it must be reported to the accident investigation unit. As a result, it is critical that the notification be sent to the inquiry unit as soon as possible so that the investigation time can be reduced. Demand primary road accidents occur due to drivers' carelessness in cities, but also outside of cities, where accidents are mostly caused by intoxicated driving. Not only does driving while inebriated result in fatalities, but so does driving while not wearing a seat belt. As a result, the public's life is in grave danger. The reason for this is that our country lacks the best emergency facilities. The proposed method can detect accidents in a fraction of the time. Using the Raspberry Pi camera Rev. 1.3, the accident can be precisely recognized. This programmer is a wonderful answer to the substandard emergency services that are supplied to road accidents in the most efficient manner feasible.

II. LITERATURE SURVEY

For post-accident detection system Hari Sankar S et al [1] given an solution for street auto collision location and emergency vehicle administration. It utilizes GPS, Accelerometer sensors and mishap identification calculation to distinguish the mischance and a rescue vehicle administration framework which gets the area of the mischance spot and sends the data to the closest emergency vehicle and then the emergency vehicle is dispatched to the mishap spot promptly.

For pre detection of the accident Vaishali et al[2] has described different laser sensors like LIDAR ,RADAR which uses laser light beams to find the distance between vehicle and the object coming forward to it. But these systems were not that efficient when the distance between vehicle and object is more than 1 m. By the time the new technologies evolved like vehicle to vehicle communication network or VANET where every vehicle can communicate to every other vehicle and the street side unit which ended up being more effective with a specific end goal to limit the street mishaps. Also for post detection of accident earlier systems used speed of the vehicles as parameter to determine

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whether the accident occurred or not. But nowadays different IOT sensor gadgets are utilized as a part of vehicles to decide the mischance event based on few parameters.
Laura Carolina Dasuha at el [3] uses a method called CoMoSeF (Co-operative Mobility Services of the Future) [4] that use a sensor controller area network (CAN) BUS installed in all the vehicles where the sensor is functioning as communication between vehicles. The CoMoSeF has been designed using cheap sensors that can be installed on every vehicle through which vehicles can communicate with each other.
Another exploration zone called Internet of Vehicle (IOV) has advanced which incorporates essentially five kinds of vehicular interchanges; specifically, Vehicle-to-Vehicle, Vehicle to-Roadside, Vehicle-to-Infrastructure of cell systems, Vehicle-to-Personal gadgets and Vehicle-to-Sensors. Particularly it following the foundation on development of VANETs[5].

Communication between vehicles is done in vehicular ad hoc network (VANET) where the information is shared among vehicles. VANET is utilized for making a system with vehicles that can associate with different vehicles and roadside units [6].

For building up correspondence in the vehicular system, IEEE 802.11p (WAVE) convention is being utilized [7].
An entire vehicle to vehicle correspondence framework is actualized by N.G Ghatwai et al [8] in addition; it detects blind spot to reduce the collision on road. In this, GPS is used which gives the information about the dimensions of the vehicle steering and its angle coordinates to the On Board Unit (OBU) of every vehicle and then after processing , safety messages are shared among vehicles through RF transceivers.

Nicky Kattukkaran et al [9] involves a heartbeat sensor and an android application in order to detect the heartbeat of the driver/victim and sends the information to medical authorities using android application.
Chatrapathi.C et al[7] proposed a system for automatic accident detection and management where an accident occurred is detected and using VANET the shortest path is found and provided to the ambulance. Ambulance receives the route information from the server and follows the route with the help of GPS.

Norsuzila Ya'acob et al [10] uses PIC 16F microcontroller, piezoelectric sensors, GPS and Global System for Mobile (GSM) modules to detect traffic accidents. Piezoelectric sensor detects and measures the severity of the force impacted on the vehicle and sends out a help message to central emergency server which gets the location coordinates and dispatches the ambulance to the accident location using the respective coordinates. The intelligent irrigation system for agriculture filed advances a impending solution to provide specific irrigation management based on the requirement of each crop i.e., crop specific that lets the producers to capitalize on their yield while saving the water.
SoSMart application [11] detects accidents automatically using the internal sensors and accelerometer of the smartphone. After accident detection it sends an alert notification with location to pre-selected contact, so the contacted one can send rescue services as soon as possible. This application uses professional and sophisticated algorithms that are developed and tested on real car crash data from the National Highway Traffic Safety Administration [11]. Using these algorithms, it is easy to differentiate the sensitivity of accidents whether it is hard, normal, or just minor to avoid false alarms.

As in [12], the system is intended to trace the vehicle when it is lost using the Global positioning system (GPS) and Global System for Mobile Communication (GSM) technology. GPS receiver and GSM module use Arduino UNO controller to forward the commands. This system is fixed inside a vehicle. The GPS module will transfer the placement values to the controller. The controller will receive it and send that information to the auto user using the GSM modem.

III. OBJECTIVE

One of the leading causes of death is traffic accidents. The time between the occurrence of the accident and the arrival of an emergency medical institution at the accident site is a critical component in the accident's survival rates. The time between the accident and the arrival of a medical facility reduces fatality rates, allowing more lives to be saved.

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IV. PROPOSED SYSTEM

The Raspberry Pi and camera are used in this system to detect accidents. The Raspberry Pi is connected to the camera. When the camera connected to the Raspberry Pi detects any things. As a result, the Raspberry Pi will be able to autonomously stop the vehicle.

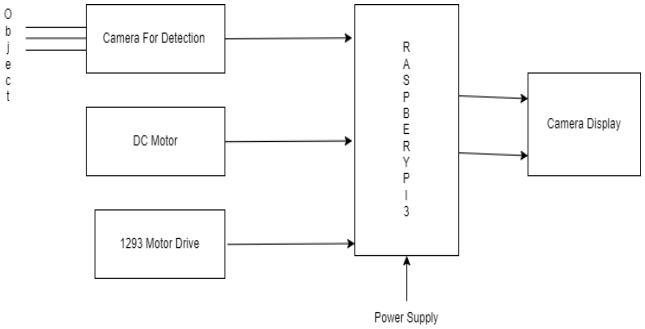

Fig. 1. Proposed System Block Diagram

1. Raspberry pi:

A raspberry pi computer is a small computer. the raspberry pi zero is significantly less expensive and smaller than the raspberry pi 3. a camera port has been added to the raspberry pi zero. it's now feasible to attach a raspberry pi camera to your zero using the new raspberry pi zero camera adapter.

Fig. 2. Raspberry pi 4 model B

We are using the Raspberry pi 4 model B fig.2 since it is the most efficient small single-board computer that supports machine learning as well as networking capabilities.

2. Camera:In photography, a camera is a light-tight box having an aperture to allow light focussed onto a sensitised film or plate for recording an image of an object on a light-sensitive surface.

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Fig. 3. Raspberry pi Camera Module

IV. CONCLUSION

The system's goal is to provide a comprehensive overview of vehicle monitoring and damage detection. Experiments have been meticulously carried out. The outcome demonstrates increased sensitivity and accuracy. This technique has been proven to be extremely advantageous to the automotive sector. In addition, a camera module will be added to the system to collect photographs of accidents and unauthorized transactions and send them to an authorized person.

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