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RASBERRY PI BASED VEHICLE STARTER ON ALCOHOL CONSUMPTION IN-LIMIT AND HELMET DETECTION WITH SMART INDICATORS

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ABSTRACT

According to the survey reports 75% accidents take place due to negligence of not wearing helmet . So our project makes the ignition enable only when the rider has helmet ON .Thereby ensuring safety. And Drink & drive is a leading cause of road accidents. Detecting drunk driving requires stopping vehicles and manually scanning drivers by using breath analyzers. Well here we propose a system that allows to detect drunk driving in the vehicle itself. Our system uses alcohol sensor with raspberry pi along with a GSM modem for sms notification. Now our system constantly checks for driver alcohol content.. And if the system detects driver is drunk above permissible limit, the sensor inputs trigger the processor about the issue by providing respective voltage.

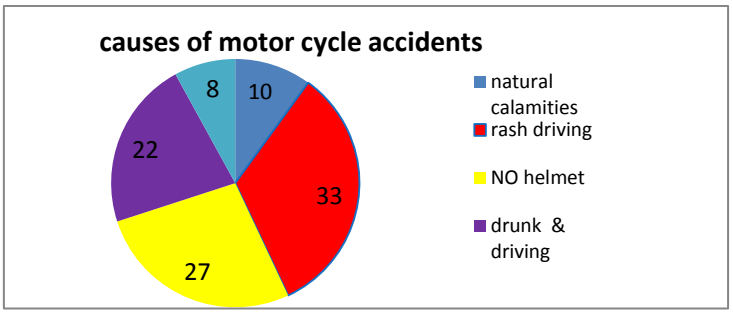
Now the system sends sms notifications to both the registered users/authorities to inform about the issue. Also the system stops the motor to demonstrate as engine locking of the vehicle. Thus the system detects and prevents drunk driving incidents automatically.

Therefore, this project is designed to introduce safety systems for the motorcyclist to wear the helmet properly and alcohol consumed is in limit . With the use of Image processing unit using Raspberry Pi and OpenCV , the motorcycle can move if there is helmet pound wearing, in accordance with the project title Smart Helmet - Intelligent Safety for Motorcyclist using Raspberry Pi and Open Cv. Around 8% Cases Reported due to Improper Turns and No proper Indications. Therefore, this project is designed to avoid this accidents. by making indicators ON whenever the handle is turned . This can be achieved with MEM Sensor.

I. INTRODUCTION

According to the National Highway Traffic Safety Administration (NHTSA). In 2019, motorcyclists were nearly 29 times more likely than passenger car occupants to die in a crash per vehicle miles travelled.

And when we look closer, it is observed that motor cycle accidents are caused due to the following



From the pie chart we can observe the percentage distribution of causes for accidents.

So this project is aimed to ensure safety and decrease in the global number of road related fatalities and injuries. This project aimed to reduce the accidents caused by 57 % from the data. As the remaining 43 % is due to natural calamities and rash driving. As per the ministry's data, 12,236 road accidents occurred in 2019 which were related to drunk driving. Not wearing helmets resulted in deaths of 44,666 (30,148 drivers and 14,518 pillions) or 29.82% of total road accident fatalities during 2019. And around 4000+ cases reported due to improper turns and no proper indications. So to avoid the following 3 causes of accidents which take 57% share .this project helps in preventing motor cycle accidents.

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II. METHODOLOGY

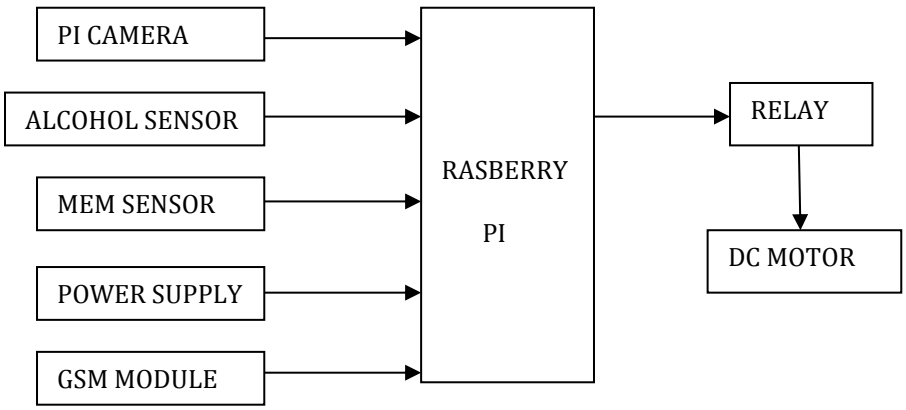
At present, previous studies of safety helmets detection can be divided into three parts, sensor-based detection, machine learning-based detection, and deep learning-based detection.

Sensor-based detection usually locates the safety helmets and workers .The methods usually use the RFID tags and readers to locate the helmets and workers and monitor how personal protective equipment is worn by workers in real time. Kelm et al. designed a mobile Radio Frequency Identification (RFID) portal for checking personal protective equipment (PPE) compliance of personnel. However, the working range of the RFID readers is limited and the RFID readers can only suggest that the safety helmets are close to the workers but unable to confirm that the safety helmets are being properly worn.

A convolutional neural network (CNN) is a multilayer neural network. It is a deep learning method designed for image recognition and classification tasks. It can solve the problems of too many parameters and difficult training of the deep neural networks and can get better classification effects. The structure of most CNNs consists of input layer-convolutional layer (Conv layer)-activation function-pooling layer-fully connected layer (FC layer). The main characteristics of CNNs are local connectivity and parameter sharing in order to reduce the number of parameters and increase the efficiency of detection.

The Conv layer and the pooling layer are the core parts, and they can extract the object features. Often, the convolutional layer and the pooling layer may occur alternately. The Conv layers can extract and reinforce the object features. The pooling layers can filter multiple features, remove the unimportant features, and compress the features. The activation layers use nonlinear activation functions to enhance the expression ability of the neural network models and can solve the nonlinear problems effectively. The FC layers combine the data features of objects and output the feature values. By this means the CNNs can transfer the original input images from the original pixel values to the final classification confidence layer by layer.

BLOCK DIAGRAM



MODULES OF THE PROJECT

RASBERRY PI

Raspberry Pi is a series of small single-board computers (SBCs) developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom. The Raspberry Pi project originally leaned towards the promotion of teaching basic computer science in schools and in developing countries. The original model became more popular than anticipated, selling outside its target market for uses such as robotics. It is widely

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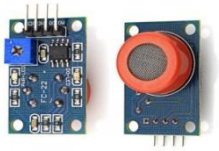
used in many areas, such as for weather monitoring, because of its low cost, modularity, and open design. It is typically used by computer and electronic hobbyists, due to its adoption of the HDMI and USB standards

PI CAMERA

This 5 megapixels sensor with OV5647 camera module is capable of 1080p video and still images that connect directly to your Raspberry Pi. This is the plug-and-play-compatible latest version of the Raspbian operating system, making it perfect for time-lapse photography, recording video, motion detection and security applications. Connect the included ribbon cable to the CSI (Camera Serial Interface) port on your Raspberry Pi, and you are good to go!

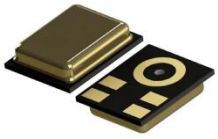
The board itself is tiny, at around 25mm x 23mm x 9mm and weighing in at just over 3g, making it perfect for mobile or other applications where size and weight are important. The sensor has a native resolution of 5 megapixel, and has a fixed focus lens on board. In terms of still images, the camera is capable of 2592 x 1944 pixel static images, and also supports 1080p30, 720p60 and 640x480p90 video.

ALCOHOL SENSOR



MQ3 is one of the most commonly used sensors in the MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type of sensor. Metal oxide sensors are also known as Chemiresistors, because sensing is based on the change of resistance of the sensing material when exposed to alcohol. So by placing it in a simple voltage divider network, alcohol concentrations can be detected. MQ3 alcohol sensor works on 5V DC and draws around 800mW. It can detect Alcohol concentrations anywhere from 25 to 500 ppm.

MEM SENSOR



MEMS, or Micro Electro-Mechanical System, is a chip-based technology where sensors are composed of a suspended mass between a pair of capacitive plates. When the sensor is tilted, a difference in electrical potential is created by this suspended mass. The created difference is then measured as a change in capacitance.

GSM MODULE

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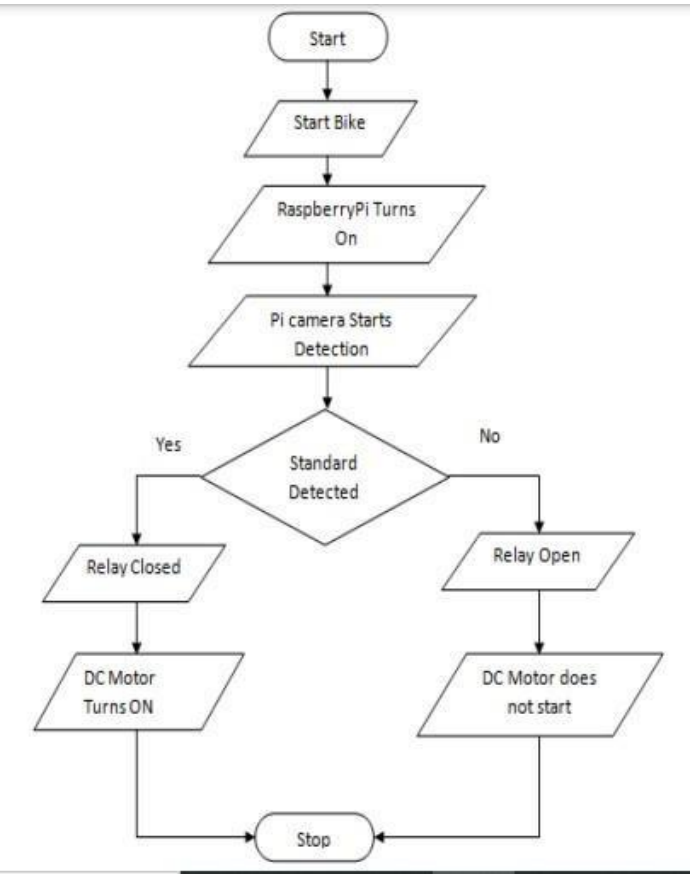
A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks. They use SIMs to identify their device to the network.

DC MOTOR

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

FLOW CHART



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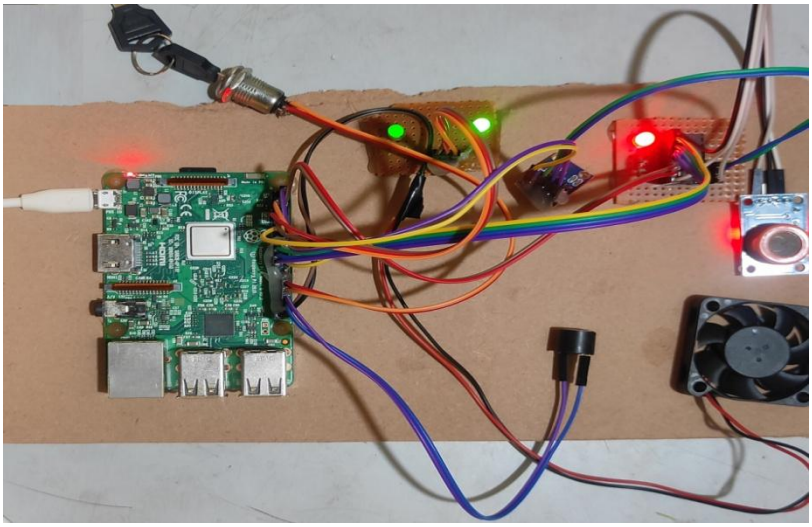
III. RESULT



Result of the module when it is powered

Photo captured when rider has Helmet ON

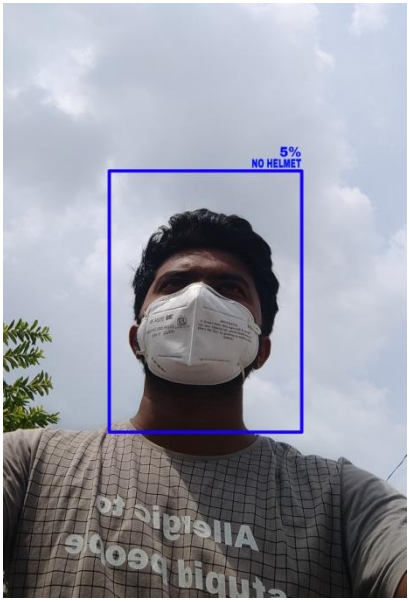


photo monitoring while rider has No Helmet

IV. CONCLUSION

- This project ensures safety of the rider .prevents from accidents.
- It captures the images and sends it to the owner . Which helps in proper surveillance and authentication.
- The device makes the ignition off when the rider is drunk...there by making it a smart vehicle and a safer one.
- The device makes the ignition off when the rider is not wearing helmet ...there by making it a smart vehicle and a safer one.
- The smart indicators helps by automatically indicating the direction of the vehicle movement.
- These smart indicators helps the vehicles behind to judge.
- Even when the rider forgets to put indicators, the smart indicators helps in this regard and prevents unnecessary crashes
- Helmet for Motorcyclist using Raspberry Pi and open CV which in future will inspire safety features for motorcyclists.

V. AKNOWLEDGEMENT

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