International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 05, 2020
ISSN: 1475-7192

Automatic Vehicle Speed Contoller and Accident Detection System

Bhuvanesh Kumar, Dinesh Kumar, B. Niteesh, R. Manish,
Dr.V.D. Ambeth Kumar and A. Mohan Vamsi

Abstract--- *Speed control is in the need of the hour due to the increased rate of the accidents reported in our day-to-day life. Now-a-days in fast moving world peoples are not having self-control and driving the Vehicle in over speed and Not following traffic rules properly in restricted area, this is main reason for Accidents and traffic jams are happening and many no. of people are affecting by late to School, College, in Emergency Situations and even losing their precious life. During accident the injured people has to face lot of problems such as, the accident information is received by the police will be late or there is no one to help the injured people. So as to control the Accidents and the Traffic jams in restricted area we are using Sensors Controlling Unit and automatic accident detection system, which are used in Vehicles for emergency purpose. By using this concept we can deduce the Accident and Traffic jams by following the traffic rules properly in restricted areas and even locate the Vehicle which has made the accident.*

Keywords--- *Sensor, MCU, ECU, Controlling System (Raspberry Pi4), Camera, DX35(Distance sensor), LCD Display, GPS.*

I. INTRODUCTION

A now-a-days person in the world doesn't have self-control and patient while driving, so traffic jams and accident are occurred. Driving without patients and disobeying traffic rules are the main reason for causing accident. Nearly 1.25 million people die in road accident per year, on average 3,287 people deaths a day. 20-30 million are injured. All these are happened because of disobeying the traffic rules. Then people are dying because of proper emergency service at critical situation. Emergency service can't reach accident location because of late information and getting information is slow and sometimes no one is ready to pass the information. For simple problem people are getting angry and losing their self-control in driving. Today emergency service is the main thing needed for accident purpose. If emergency is late for a minute a loss of life and major injured will happen. So emergency is very important thing. people will get anger sometimes will lose their self-control and drive in poor manner, these may end at major or minor accident that will cause loss of life or major injuries, will happen for driver or somebody. The control of speed in traffic signals and in restricted area will stop the cause of traffic jams and accident. Disobeying the traffic rules will causes major accident and problems for people. The main objective is to stop the life loss rate and to make sure the safety for everyone, letting everyone to follow the traffic rules. Every driver follows the traffic rules will make sure no accident will occur and percentage of life loss will reduce. So we are

Bhuvanesh Kumar, Department of CSE, Panimalar Engineering College. E-mail: stbhuvi1203@gmail.com
Dinesh Kumar, Department of CSE, Panimalar Engineering College. E-mail: dineshm0705@gmail.com
B. Niteesh, Department of CSE, Panimalar Engineering College. E-mail: godoflaw718@gmail.com
R. Manish, Department of CSE, Panimalar Engineering College.
Dr.V.D. Ambeth Kumar, Department of CSE, Panimalar Engineering College.
A. Mohan Vamsi, Department of CSE, Panimalar Engineering College.

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

making everyone to follow the traffic rules and ensure the safety of everyone and making the driver move freely at anger or at any situation. thissystem will provide the safety for driver even in unconscious situation or even vehicle is felt in water. Another advantage if vehicle is stolen by using GPS we can track the live location of vehicle and found it. MCU (Main Controller Unit) these will work the major operations in controlling the speed. using raspberry pi 4 information and other special operations will be operated. LCD display will pass the information to the driver. that he should execute in other to follow the traffic rules. This process will make sure the safe and secure driving and provide the relax free driving to people. People won't understand that following the traffic rules will make sure their safety and accident free driving. The raspberry pi 4 is can do other special operations that we input to execute for special other conditions.

II. LITERATURE SURVEY

A.VENGADESH, et.al [**1**], describes, Using **RF module** the data is transferred, using RF module the **Speed of vehicle is maintained to the limit**. This project will maintain the given speed by the transmitter. It will take action when ever speed is not maintained at restricted area. Using this accidents and traffic jams rate will get reduced. Following of traffic rules will get improve. Change in Weather condition will affect the signal. Passing information to police station will be a slow process to stop the vehicle. **GSM modem** will control the speed if driver doesn't obey the instructions send by the transmitter. Action will be taken in restricted areas only. While other will be normal no actions will taken in normal areas. Driver receive information on LCD Display.

AMRUTA RAMASE, et.al[**2**],describes, **RF transmitter and receiver, GSM modem, micro controller, etc.** Are used in this project to control the speed limit of the vehicles in the Restricted areas. Information is passed to receiver and displayed in LCD Screen of the vehicle. GPS System is also used to locate the vehicle after he passed the restricted area. If driver doesn't obey the instructions, number of the Vehicle and it's current speed will be reported to the nearest RTO office. But there is a drawback, there is a possibility of occurring accident before the officer reaching them. Here they don't take any action about how to control the emergency situation during accidents. This will not give the full protection to the people. They also didn't take any action on how to control the traffic jams and traffic signals.

Sunil R. Kewate, et. Al [**3**], describes, They are using the **HALL SENSOR** and **COLOR SENSOR** to control the Motor and Fuel system of the Vehicle. The colour sensor is used to control the speed of the motor in Vehicle. The information to the sensor is transmitted by RGB colour spectrum by the transmitter. Each colour has some Speed Value, according to the colour detect by the sensor the speed limit of the vehicle is reduced with help of the Microcontroller by reducing the power of the motor and throttle. Finally the speed of the vehicle is displayed on the LCD screen in the Vehicle for the Driver acknowledgement. The Hall Sensor is used to find the speed of the Vehicle by counting the number of revolution in Wheel.

Arsalan Khan, et al**[4],**describes, This project represents an quick emergency service system. This application is used in emergency purpose. They are using **API web service** and smart rescue system these are used in accelerometer sensor to detect the accident and generate the emergency message with their live location. The responder will receive live location of the victim and take further action to save the life of the victim. These will be

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

used in accident, robberies and also in the fire accident. API will help to share the live location and uses HTTP (Hyper Text Transfer Protocol) used to calculate the distance from live location. All we need to do is to login to the application So safe and So safe go. After login victim's live location, the help service all will be available. There will be 15s countdown to cancel the help service if there is no emergency situation. In case, if the mobile is broken there is no way to no way to rescue the victim, on the other hand if victim is unconscious how he/she will ask the help in the mobile. In that state what will they do? This is the draw back in this Project.

Hamid M. Ali, et.al[**5**]**,** describes, Here they use the CADANS system which means Car Accidents Detection And Notification System, which is used to detect the car accident at low and high speed. The CADANS is developed as a software which can be installed in the Smart phone. The CADANS system works by using the Smart phone Sensor, Microphone, GPS and Camera. The CADANS has two section 1. Detection system, 2. Notification System. First, Detection system has three steps; First step, The sensor in the Smart phone verify the G-force(Acceleration Force) if the G-force is greater than 3-G then the Software consider it as a sign of an Accident and goes to the second step, Now the microphone record the sound, if the decibel value is greater than the 140db, the software consider it as a sign of an accident and goes to the third step, that is now the camera in the phone gets activated and start to video of the accident for 10seconds and send it the to the web server with GPS location of the Accident to the First Response centre. Even in some case the car stop suddenly the phone acquire the G-force greater than3G, so to avoid these cases, it will prompt for the user to press the confirm or cancel button for 15 seconds, if we press the cancel button the software will not send the date to the Web server. If we press the confirm button it will send the message to the web server. In this system the software has additional features that it decides as a sign of an accident it will send the emergency message with the location to the contact you add init.

Lorate Shiny, et.al**[6],** describes, This project is mainly to avoid traffic accidents and make everyone safe from accidents. Now-a-days every drivers are driving their vehicle in high speed and not even following the traffic rules, these causing lot of accidents. Developed a new system of controlling speed, controlling by traffic signs. If driver doesn't obey it will automatically control the vehicle before an last warning message. 89C51(microcontroller) is taking control of control unit and circuit breaker. LCD will display the instruction to driver. RF module is placed for receiving and other process. Mainly IR sensor is used in this process. By this accident and heavy traffic will be reduced.IR is working as both transmitter and receiver. If circuit is shorted it will cause more damage to other parts. Auto braking by Anti collision, if driver is stopped in main road that will cause more traffic.

Amarnarayan, et.al **[7],** describes, Bad driving behaviour cause accident and traffic jams. Now a days drivers are not following the traffic rules only few is following. This project make everyone to follow the rules. This uses **zigbee** technology, this shows as if driver doesn't follow the rules, system will get on and take control of the vehicle.

Instruction will be displayed in LCD screen of the vehicle.IR sensor is used and zigbee is used as receiver, this is experimented project. here also GSM module is used to transfer message to the traffic police with the details that can be stored and used at anytime. These uses wireless personal area network (WPANs), these are less expensive low power consumption limits transmission distances to 10–100 meters line-of sight, that will be less area covered, but zigbee can send information to long distance. It can work at any condition. without network or other connection

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

it's not possible to interact with the receiver.

Gummarekula Sattibabu, et.al **[8],** describes, Road accident and traffic jam are increasing in day today life, because of driver mistake and poor decision making. Accident is occurring mainly in restricted areas like school, hospital, etc. in highways visibility of the signboard will be less, so accident change will be high to control this, RF transmitter and receiver is used. Chip and antenna of RF transmitter will pass the message is passed to the receiver. LCD is used to display the information. LPC 2148 microcontroller is based on ARM7TDMI-S CPU with real-time emulation and embedded trace support to trace the location. ARM 7 is the main part to control the electronic controller and display unit. It uses only 40kb of RAM and 512kb of Flash memory. If the signboard can't sense, it can't able to control and take any further operation. Sensing will be affect when heavy rainy season.

Manjunath Chincholi, et.al**[9],** describes, RF technology is used to transfer and receive the information. It also used in making the smart display & Control (SDC). It's custom designed to fit this in to the dashboard. Passing message to the driver is the main objective for all speed controller. If driver obeys as per the rule vehicle will not be controlled if he doesn't it will automatically reduces the speed of vehicle. Advanced Driver Assistance Systems (ADAS) by using this the risk of driving will be reduced. Radio Frequency Identification (RFID) technology is used to tag the dangerous points and make us safe, atmel's microcontroller. That can withstand -40 to 85 degree centigrade that controls all the controller and other devices. By using Microcontroller, we Controlled the speed of the vehicle according to zones. Giving safety to everyone is important. Bad condition of weather will affect thesignals.

Ajith Kumar. A, et.al **[10],** describes, Before accident you can manage, but after accident what will you do? Accident death rate is more because of insufficient emergency facilities. This project shows that by using GPS and GCM technology, the emergency message will pass to nearby hospital. MEMS sensor and vibration sensor are used to transfer the emergency messages to the nearby hospital. **ARDUINO MEGA BOARD 2560** is used to connect all the sensors.

Sensor will trigger the emergency button automatically whenever accident is occurred. RF id in the vehicle use in stolen cases for locating and Recovery of the vehicle. Vehicle transition from one place to another, the tracking system will be active. Tracking the vehicle is the biggest advantage in this. A drawback is just it need network to pass the information. If board is broken, the chance of help will get reduced. Network is the main need in this process it has both advantage and disadvantage also.

III. PROPOSED SYSTEM

In our system, we are using raspberry pi 4, ECU, crash sensor, camera, etc., devices are used. This system will the transmit information and pass it to the required centers.

3.1 Automatic Speed and Traffic Control System

The overall proposed system for the system is given below in figure 1, This system will control the speed of the Vehicle using Sensor, It will get the input from the sensor and sent it to the Raspberry Pi4 according to the data it

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

obtained it will perform some operation on the Vehicle with the help of the MCU, Distance sensor, etc.

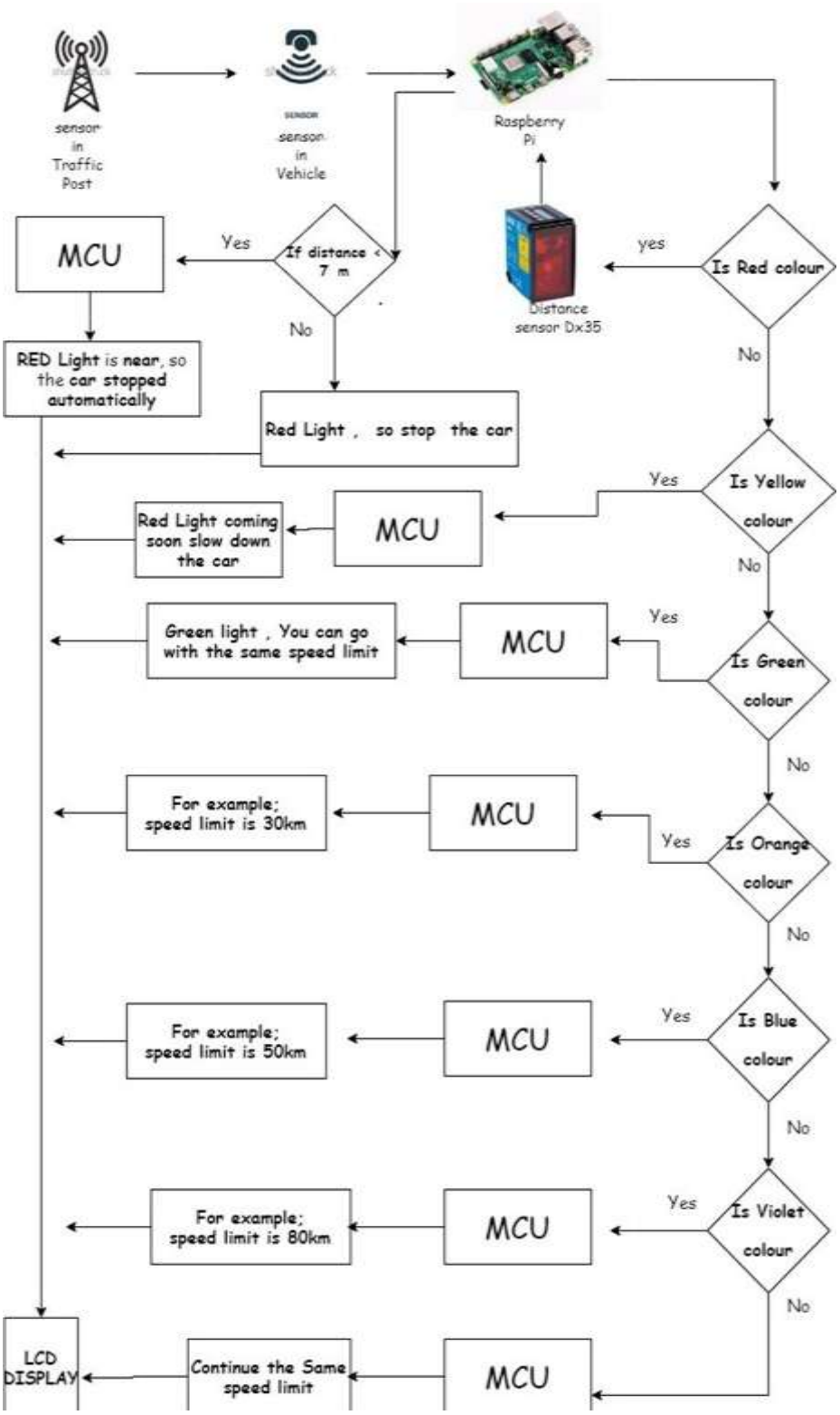

Fig. 1: The modules used for this system is explained below

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

1. Sensor
2. Raspberry Pi4
3. Dx35sensor
4. MCU
5. LCD Display

1. Sensor

Sensor is a device that detects and responds to the given input. The input may be light, pressure, heat, moisture, etc. Here the sensor is used to transmit and receive the data from the transmitting sensor. The sensor in the Post will transmit the data and the sensor in the Vehicle will receive the data. Then, the sensor will send the data for processing to Raspberry Pi 4.

For example: Now, the traffic post is showing Red light, the sensor in the post will transmit the data such as, Red to the Raspberry Pi 4 then it will do the necessary actions according the data.

Fig. 2

2. Raspberry Pi4

The Raspberry is a like a mini computer, in that we can make our own operations. It has a special feature that is GPIO (General Purpose Input and Output) system. The Raspberry Pi 4 is capable of controlling the all-electronic devices connected to it. Now here, It will get the input from the receiving sensor in Vehicle and perform some operations what we built in it.

The following Algorithm will explain the operations done in the Raspberry Pi 4, Step.1: Start.

Step.2: Get the input from the Receiving sensor in the Vehicle.

Step.3: Check whether the data if Red then step4 else step5.

Step.4: It will prompt the distance sensor to measure the distance between the Traffic post and the Vehicle and then go to the step6.

Step.5: Check whether the data is Yellow then step 7 else step8.

Step.6: Check whether the distance between the vehicle and the post is less than 7 metre, if yes it will automatically stop the gradually with the help of the MCU and send the same function to LCD display else it will intimate to stop the car by LCD Display.

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

Step.7: It will intimate the driver to slow down the car by displaying this message in the LCD. Step.8: Check whether the data is Green, if yes then go to the step 9 else Step10.

Step.9: It will release the break and you can drive your car by same speed limit that you have followed before.

Step.10: Check whether the data is Orange, if yes then it will send the speed limit as 30 km to MCU elseStep11.

Step.11: Check whether the data is Blue, if yes then it will send the speed limit as 50 km to MCU elseStep12.

Step.12: heck whether the data is Violet, if yes then it will send the speed limit as 80 km to MCU else it will follow the same speed limit.

3. Dx35 distance sensor

The distance sensor is used to determine the distance between two objects. It will send a signal, the signal will get reflect and will be received by the sensor, It will calculate the distance using time taken by the signal send and reflects back to the sensor. It is capable to calculate up to 35 meter distance.

Fig. 3

4. MCU

The word MCU means Motor Control Unit, which is fixed in the Vehicle. It is use to control the Motor and Throttle valve in the Vehicle. According to the order given by the Respberry PI 4.

For example

If the raspberry Pi 4 gives the order as Red, it will stop the car.

3.2 Accident Detection system

The overall proposed system for the system is given below in figure 6. This is system will help the people, who was injured in the accident and waiting for the help.. If an accident occurred the crash sensor will detect it and send it to ECU which will operates the camera and the video for 2 min and send it to a help centre with Live Location with the help of the GPS then it will send the location to the nearest police station and hospital to help the injured people.

The modules used in the system are:

1. RaspberryPi4
2. ECU
3. Camera

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

4. CrashSensor
5. GPS
6. WebServer

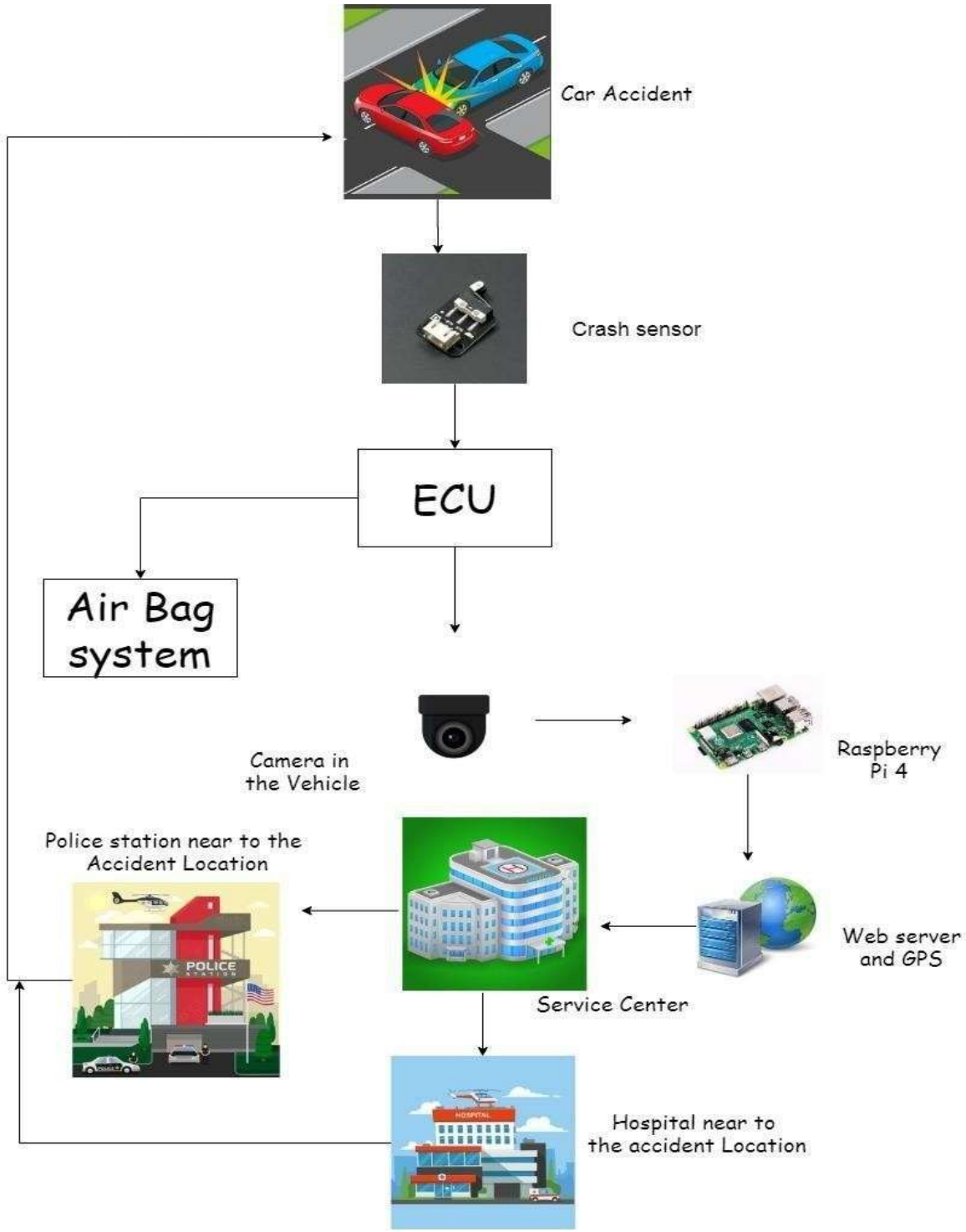

Fig.4

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

1. Raspberry Pi4

Raspberry pi 4 is a like a mini computer, in that we can create our own inbuilt options. It has GPIO (General Purpose Input/Output) system these will get input and conditions. By using raspberry pi we are apply the conditions that we needed. It is capable of control electronic devices that are connected to it. The camera will start recording when it is wanted by raspberry, to find what happened and how the accident as happened? all the details with live location is transmitted to nearest hospital. Its main advantage is user can built their own functions by this.

2. ECU

Its main advantage is user can built their own functions by this.

ECU (Engine Control Unit) is the brain of engine in the vehicle. It controls all types of functions made in engine. It maintains amount of fuel and increases the horse power of vehicle. There will be 80 ECUs are used in a car. In this we are moving to airbag system by ECU, whenever accident occurred airbag or airbags will open at that time the information is passed to raspberry than it takes further actions to get emergency help. ECU is the main function that make steps in order to pass information to nearest hospital and saving life's by opening airbags at correct time to rescue the driver and passengers to stay alive. ECU is main in this process also, it's really a needed thing in every vehicles

3. Camera

Camera is optical instrument that's used to record images and it can be stored and accessed at any time we need. The main objective of camera is recording images that we called as video. By using camera, we were recording the live scene of situation that happened. Raspberry will activate the camera when the ECU transfer that accident is occurred. Camera will record situation and store it to see what happened? Raspberry transmit live location with details to web server and there it will get transfer to nearest hospital. Then recorded video will be stored. In investigation about the accident the video stored will help to give information to police.

4. Crash Sensor

Crash sensor is used to detect collision and convert it into a signals within milliseconds. These also called as impact sensor. At collision it triggers to control unit that deploys airbags to passenger. Airbag is a bag of soft material that will protect passenger from accident impact, this sensor is reusable until its physically damaged. These are already used in car. our process, when accident is occurred impact sensor will trigger the airbags on same time raspberry pi will get signals and transmit the information with live location and details to wed server, then emergency message will pass to nearest hospital to rescue the injured persons.

5. GPS

GPS (Global Positioning System) are navigation device that used in all fields, these are mainly used in navigating the route or guide unknown places, etc., GPS is a network of about 30 satellites are orbiting earth's altitude of 20,000km. these work or pass at the speed of light these are the calculation between each satellites distance. These GPS don't need internet connection to work. These GPS used to send details to wed server and transfer the information to hospital and police station to take further steps.

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020

6. WebServer

Web server is a centre their all the information is collected and shared to hospital and police station for investigation. Web server is a base were all the information is received and transmitted. If accident occurred the information is transmitted to web server with their live location and their details is send message to nearest hospital to save their life.

IV. CONCLUSION

Our process ensure safety to driver and maintain speed at restricted areas. Both driver and pedestrians will be safe and the traffic rules are maintained and rate of life loss is reduced and traffic jams will get less and flow of traffic will be quick. Even in conscious and unconscious state passengers can be safely rescued. These GPS is also used in tracking the vehicles, if it got stolen. Crash sensor is used in different manner to pass the information. Controlling speed in main areas and stopping the people who not following the traffic rules, it will reduce the traffic jam and waste of time in traffic jam will no more.

REFERENCES

[1] A. Vengadesh and K.Sekar, "Automatic Speed Control of Vehicle in Restricted Areas Using RF and Gsm", *International Research Journal of Engineering and Technology (IRJET),* Volume: 02, Issue: 09, Page 875-877, Dec-2015.

[2] Amruta Ramase, Nikita Kambleand Jagriti Kamble, "Automatic Speed Control of Vehicle Using RF Communication", *8th National conference on "Emerging trends in Engineering and Technology (NCETET-2018),* Page 419-422,10th march2018.

[3] Arsalan Khan, Farzana Bibi, Muhammad Dilshad, Salman Ahmed and Zia Ullah, "Accident Detection and Smart Rescue System Using Android Smartphone with Real-Time Location Tracking", *International Journal of Advanced Computer Science and Applications (IJACSA),* Volume: 9, page 341-342, 62018.

[4] Hamid M. Ali and Zainab S. Alwan, "Car Accident Detection and Notification System Using Smartphone", *International Journal of Computer Science and Mobile Computing,* Volume: 4, Issue: 4, page 620 – 635, April2015.

[5] Lorate Shiny, A. Rajakumaran and S. Vijay, "Vehicle Control system with Accident Prevention by Using IR Transceiver", *International Journal of Innovative Research in Science Engineering and Technology,* Volume: 4, Issue: 6,page 121-126, May2015.

[6] Amarnarayan, Challa Saikumar, Chandra Mohan and Ajaykumar, Sridhar N, "Automatic Over Speed Controlling of Vehicle", *International Journal of Combined Research & Development (IJCRD),* Volume: 5, Issue: 5, Page 706-709, May2016.

[7] Gummarekula Sattibabu, B.V.V. Satyanarayan and VV Satyanarayana Kona, "Automatic Vehicle Speed Control with Wireless In-Vehicle Road Sign Delivery System Using Arm 7", *International Journal of Technology Enhancements and Emerging Engineering Research,* Volume: 2, Issue: 8, Page32-34,2014.

[8] Manjunath Chincholi and DrK. Chandrashekara, "Design &Analysis of Vehicle speed Control Unit Using RF Technology", *International Advanced Research Journal in Science, Engineering and Technology,* Volume: 2, Issue: 8, Page 32-38, August2015.

[9] Ajith Kumar. A, Jaganivasan. V, Sathish. T and Mohanram. S, "Accident Detection And Alerting System Usinggps &GSM", *International Journal of Pure and Applied Mathematics,* Volume: 119, Issue: 5, Page 885-891, 152018.

[10] Naeem M. S. Hannoon, V. Vijayakumar, K. Vengatesan, and Nabil Hidayat,"Small Signal Fault Analysis for Renewable Energy (Wind) Power System Distributed Generation by Using MATLAB Software (Simulink)", *J. Comput. Theor. Nanosci.* 16, 537–543 (2019).

[11] S. Venkatraj, Rajiv Vincent, V. Vijayakumar, K. Vengatesan, and M. Rajesh, "Development of Test Automation Framework for REST API Testing", *J. Comput. Theor. Nanosci.* 16, 453–457 (2019).

DOI: 10.37200/IJPR/V24I5/PR202011
Received: 27 Feb 2020 | Revised: 22 Mar 2020 | Accepted: 02 Apr 2020