Traffic Checking and Road Management using IoT with Cautioning and Recommendations

Manikandan N. K, Manivannan. D

Abstract: IOT has an incredible job on the planet to make human life simple and furthermore make human life keen. It likewise used to make things shrewd and simple to deal with it. IOT can be executed in various territories like shrewd home, smart city, savvy fund, brilliant wellbeing and keen metering and so on observing traffic and street the executives difficult work for officials and street specialists it needs a smart method to deal with it, usage IOT in rush hour gridlock checking and street the board utilize too helpful to even consider monitoring effectively. This venture bargains about building up a minimal effort model for street traffic checking utilizing a raspberry pi. For the usage of the venture sensors and camera is introduced making progress toward get traffic data for the street, from the data picture handling (distinguishing the path of the street, recognize plate number, distinguish sorts of vehicles and recognizing mishaps) and speed checking will be executed just as modifying and proposal being completed.

I. INTRODUCTION

The Internet of things (IoT) is the system of physical gadgets, vehicles, home apparatuses, and different things installed with hardware, programming, sensors, actuators, and availability which empowers these things to interface, gather and trade information. [1] [2] [3] [4]. IoT includes broadening Internet network past standard gadgets, for example, work areas, PCs, cell phones, and tablets, to any scope of generally stupid or non-web empowered physical gadgets and regular articles. Inserted with innovation, these gadgets can impart and connect over the Internet, and they can be remotely observed and controlled.
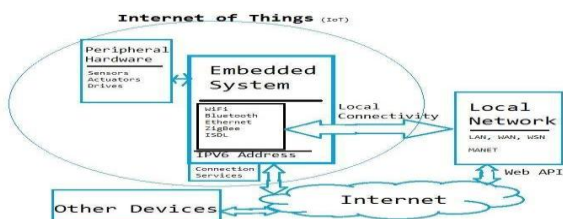

Fig 1: IoT Architecture

With the appearance of driverless vehicles, a part of IoT, for example the Internet of Vehicles begins to acquire attention.[5]

* Correspondence Author
   Manikandan N.K*, CSE department, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology , Chennai, India.
   Manivannan D, CSE department, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology , Chennai, India

A developing bit of IoT gadgets is made for buyer use, including associated vehicles, home robotization, wearable innovation, associated wellbeing, and apparatuses with remote observing capabilities.[6]. In the contemporary world, urban versatility is one of the phenomenal difficulties to be handled in the organization of a major city.

II. RELATED WORK

A few ventures are planned uniquely for open transport transportation, constrained on the Bluetooth signals that introduced on the vehicles, in some cases it might rely upon the eagerness of the driver and GPS information gave by the vehicles on the road. Some different frameworks structured distinctly for a traffic light for on the convergence of the street which isn't adequate for street traffic checking with precise data about the street traffic. In some different frameworks, they are intended for continuous traffic observing restricted on the crossing point of the street. It doesn't address more streets for traffic street monitoring. There are likewise frameworks that are planned by the restricted wellspring of a data in the street which relies upon the willing of the drivers

III. SYSTEM DESCRIPTION

a) Traffic observing and Road Management Using IOT and Image handling with cautioning and proposals, building up an ease model for street traffic checking utilizing a raspberry pi.

b) In the proposed framework checking the speed of the vehicles dependent on the allowed speed should be possible by utilizing speed sensors. Cautioning just as a potential recommendation needs to provide for the driver. The proposed framework additionally intended for distinguishing mishaps and send data to crisis administrations and cautioning the driver that drives on a similar path that conceivable offer at the equivalent time.Real-time checking should be possible simultaneously in light of the fact that the cameras are introduced out and about so the cops can get ongoing information zones to shape the camera terminals. Utilizing camera sensor proposed framework can get data for example path of the street, plate number of vehicles, sorts of vehicles and kinds of mishaps.

c)   [**Hardware Specification**]
Raspberry pi 3B+/3B plus motherboard

- Broadcom processor - BCM2837B0, Cortex 64-bit SoC @1.4GHz.
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2/BLE.
- Faster Ethernet (Gigabit Ethernet over USB 2.0, the maximum throughput of 300Mbps)
- Power-over-Ethernet support (with separate PoE HAT)● Ultrasonic Distance Sensor
- Working Voltage: 5V(DC)
- Static Current: Less than 2mA
- Output Signal: Electric frequency signal, high-level 5V, low-level 0V
- Sensor Angle: Not more than 15 degrees
- Detection Distance: 2 cm to 450 cm

The raspberry pi Camera board

- Dimensions: 25mm x 20mm x 9mm
- 5MP resolution
- 2592 x 1944 pixel static images
- 1080p30 video

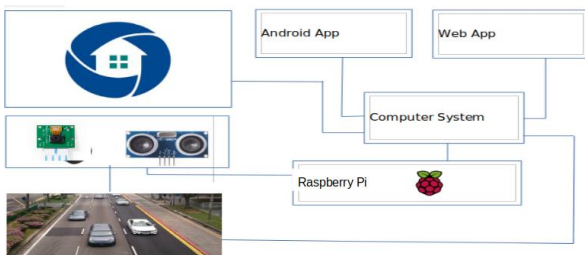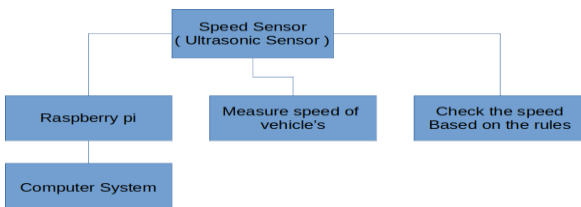This module is only capable of taking pictures and video, not sound.

Fig 2: Overall System Architecture

The implementation of the project has to be done with different parts of modules. The following modules are done through the project lifecycle.

3.1 Speed Monitoring using the speed sensor (Ultrasonic sensor)

3.2 Implementation of image processing using camera sensor (Pi Camera)
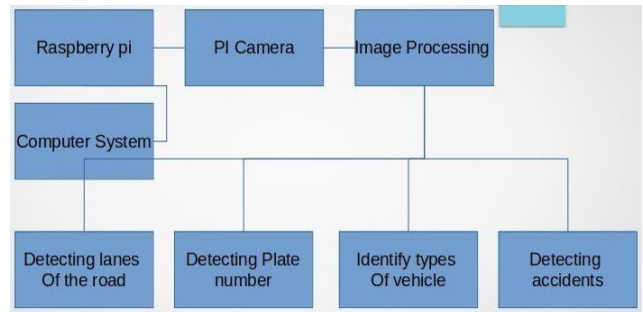
IV.   MODULE DESCRIPTION

- Speed Monitoring using the speed sensor (Ultrasonic sensor)

Using the speed sensor is for measuring the speed of the car on the road and it is interfaced with raspberry pi. Raspberry Pi is connected with a computer system for sending the information that comes from the speed sensor.

- Implementation of image processing using camera sensor (Pi Camera)

The Pi camera is responsible for performing the following activities

- Detecting the lane of the road
- Detecting plate number of vehicles
    - Identifying types of vehicles
    - Detecting accidents

And it is interfaced with raspberry pi. Raspberry Pi connected to the computer system to sending information.

V.   RESULTS

The input of the system can be categorized into two
1. The speed of the vehicle
2. Camera image

The speed of the vehicles. Input for the speed sensor is the speed of the car that drives on the road in a specific lane of the road. the moving object towards the speed sensor actually can be an input for the sensor. After getting off the data from the speed sensor then data is will be sent to the connected raspberry pi. Raspberry Pi is responsible to do analyzing the input speed with the presented data and make some decisions If the input speed of the vehicle is obeying the rule that permitted to on the road it automatically sends the data to the computer system with an associated plate number. A computer system is responsible for giving alerting the possible suggestion for the drivers and police officers. So that input will be the speed of the vehicles and output will be alerting and possible suggestions.

Measuring the car speed needs the movement of the car on the road toward the sensor and it the sensor can measure the speed of the car.

The input is the movement of the car toward the sensor and the output is the speed of the car.

The following steps will be takes place to measure the speed of the car using ultrasonic sensor

- Connect ultrasonic sensor to the breadboard for creating connection using jumper wire
- Then the next step will be connecting raspberry pi to the board using jumper wire but make sure that the GPIO pins are aligned with the sensor that plugged in the board which means Vcc(Voltage for sensor which is 5 V), Ground pin , GPIO pins for the trigger and and echo pin of the sensor.
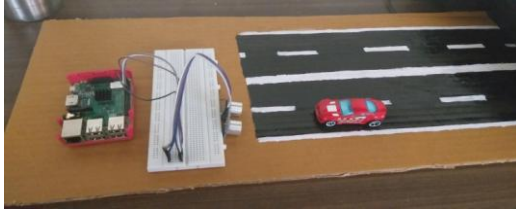
Output:

Speed Of the car is : 2.5 cm/s

Speed Of the car is : 30.2 cm/s   → Greater than maximum limit

Warning!! the speed is greater than the maximum speed

Speed Of the car is : 6.4 cm/s

Speed Of the car is : 0.4 cm/s

Speed Of the car is : 0.6 cm/s

Speed : 0 cm/s

Speed Of the car is : 26.9 cm/s → Greater than maximum limit

Warning!! the speed is greater than the maximum speed

The input for the camera sensor is an image of the road and objects on the road (lane of the road, accidents on the road, vehicles, plate number of the car) that can be analyzed using image processing algorithm process. From the data then the computer system give an alert and possible suggestion to the users.

Let's see what is the input for the camera and what is the the output

The first one is detecting the plate number of the vehicle on the road.

What we will need?

- Pi Camera
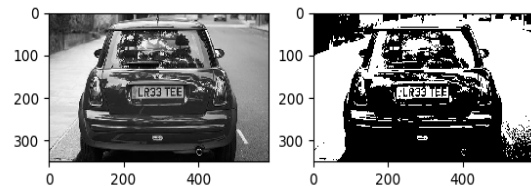- Sample Road
- Toy car with Plate number

Plate number recognition using the concept of optical character recognition so the input is image of the car and the output is the character which is plate number of the car.

License plate recognition has three major stages

1. License Plate Detection: This is the first and probably the most important stage of the system. It is at this stage that the position of the license plate is determined. The input at this stage is an image of the vehicle and the output is the license plate.

2. Character Segmentation: It's at this stage the characters on the license plate are mapped out and segmented into individual images.
3. Character Recognition: This is where we wrap things up. The characters earlier segmented are identified here. We'll be using machine learning for this.

So the input is image of the car:

Finally we get the plate number of the car using character recognition : LR33 TEE and is 78% accurate
Detecting and labeling lane of the road:
What we will need:
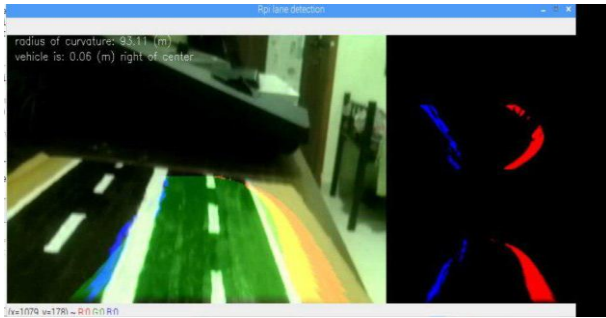- Pi Camera
- Sample Road Image
  Input image:

Output Image:

5578

Manivannan D, Assistant Professor, Department of Computer Science and Engineering,; Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology: His research area includes Machine Learning & Data Mining.

The comparison of the existing system with can be done with different parameters. But now let see the gaps that have been seen on the research review can be used as a parameter to make the comparison.

VI. CONCLUSION

Due to the fast development of the progression of traffic out and about it ought to be taken care of within the insightful transportation framework, So executing IOT in this segment is best elective. What's more, later on we are intending to actualize the use of picture handling on strength of the street with conceivable recommendation and incorporate with the proposed framework for better utilization of the framework.

REFERENCES

1. Brown, Eric (13 September 2016). "Who Needs the Internet of Things?". Linux.com. Retrieved 23 October 2016.\
2. Brown, Eric (20 September 2016). "21 Open Source Projects for IoT". Linux.com. retrieved 23 October 2016.
3. "Internet of Things Global Standards Initiative". ITU. Retrieved 26 June 2015.
4. Hendricks, Drew. "The Trouble with the Internet of Things". London Datastore. Greater London Authority. Retrieved 10 August 2015.
5. Umar Zakir Abdul, Hamid; et al. (2019). "Internet of Vehicle (IoV) Applications in Expediting the Implementation of Smart Highway of Autonomous Vehicle: A Survey".
6. Performability in Internet of Things. Retrieved 28 August 2018.
7. "How IoT's are Changing the Fundamentals of "Retailing"". Trak.in – Indian Business of Tech, Mobile & Startups. 30 August 2016. Retrieved 2 June 2017.

	Existing	Proposed
The input for the system depends on the willingness of the driver	yes partial	Not at all
Monitoring all the vehicles in the road	partial	yes
Cover the all the roads	no	yes
Can be used as real-time monitoring at the same time	no	yes

AUTHORS PROFILE

Manikandan N.K, Assistant Professor, Department of Computer Science and Engineering,; Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology: His research area includes Machine learning & Networking.