International Journal of Innovative Research in Science and Engineering
Volume 08, Issue 11, 2022
www.ijirse.com
ISSN: 2454-9665

IOT BASED OVERSPEED DETECTION OF VEHICLE

Jeetu Debbarma[1] , Dalia Debbarma[2] , Shivaji Debbarma[3],Sajal Debbarma[4], Ananya Mukherjee[5]

[1]*Jeetu Debbarma Assistant Professor, Department of Electronics and Communication Engineering, Tripura Institute of Technology Agartala 799009, Tripura, India .*

[2,]*Dalia Debbarma , Assistant Professor, Department of Electrical Engineering, Tripura Institute of Technology Agartala 799009, Tripura, India .*

[3]*Shivaji Debbarma Assistant Professor, Department of Electrical Engineering, Tripura Institute of Technology Agartala 799009, Tripura, India*

[4] *Sajal Debbarma. Assistant Professor, Department of Electrical Engineering, Tripura Institute of Technology Agartala 799009, Tripura, India.*

[5]*Ananya Mukherjee Assistant Professor, Department of Electronics and Communication Engineering, Tripura Institute of Technology Agartala 799009, Tripura, India .*

Abstract:

Nowadays we hear news about accident on highways very frequently. .And in most of the cases main reason of accidents is over speeding of vehicle. Although all highways do have signboards indicating maximum speed linit for the sake of drivers safety, but still people does not obey highway speed limit. So these problems motivated us for the recommended system. By using this project' Overspeed detection of vehicle' we can check rash driving by calculating the speed of a vehicle in the highways. In order to overcome this problem speed detector will detect the speed and inform to concern authorities. Moreover if the vehicle crosses the speed limit, a buzzer sounds alerting the police and also a camera will capture the image of the vehicle to send to the traffic police. It has been demonstrated in this work that an automated system performs better than one that is operated by a human.

Keywords: *Arduino software IDE, BLYNK APP, IoT, WIFI module: ESP-32S.*

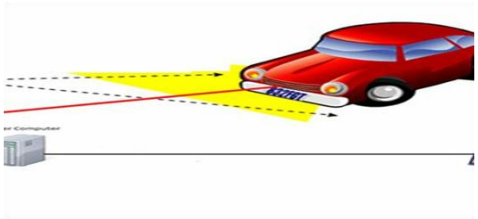
1. Introduction:

Now a days it is very difficult to monitor vehicle in the current years.With the help of technology this paper target how to detect the speed so that speed of the vehicle remain under control.At present due to the increase of vehicles and roads the number of accident rate increase so this paper focus the method of Technology to reduce the accident rate and making the system of road traffic management easier.

In this paper the speed of the car is decided from the time reaching from the first point to the second point. This the data is sent to the IoT system where it is process and give the the speed of the car.

ISSN: 2454-9665

The ESP32 microcontroller detect the speed with the help of its Wi-Fi module.The microcontroller is program to check the speed or detect the speed if it is more than 40 km per hour which activate the camera to take the photo of the car .The photo of the car is uploaded to the cloud server from where it can be collected for traffic management system or to identify the car.



Section 2 presents the literature pertaining to the automatic speed detection systems. The suggested system's implementation information is provided in Section 3. Section 4 presents the system's mathematical model, and Section 5 discusses the findings. Section 6 closes the article, followed by the references.

2. Related Work

Mohammed Ahmer Khan et.al [1].In this paper the time is first calculates when car moves from one point to the other. Depending on this data smart vehicle speed detector estimates the vehicles speed by speed app using Radar. Data send collected and after that send through IoT technology wirelessly to the concerned authorities at a remote portion. The device contains GPS sensing module with transmitter and receiver that operate in combination with tracking device for vehicles speed detection purpose. The road identification accuracy is based on the name of the roads that inserted on the Google maps. Calculated vehicles speed will be displayed on LCD display. If over speed detected then the proposed device sounds a buzzer signal to the authorities.

Pradeep Kanavi [2].In this paper the output signal is amplified by very high gain amplifier. Hb100 sensor senses the moving vehicle and produces output output sinusoidal signal. Output of the amplifier is fed to the digital pin of arduino. The microcontroller measures the frequency of the input signal and calculates the speed of the vehicle from the value of frequency.The value is displayed on LCD panel. If the speed limit is exceeded raspberry pi trigger the camera attached to the board. The image is then sent to the server via internet.

Athira Gopal Haricharann D Vet.al [3] In this paper include RFID reader, a control board, an LCD screen, a buzzer and an ECU. Tags are installed at the beginning of speed limit zone and at traffic control. When vehicle enters in the speed limit zone, RFID installed in vehicle detects tag code.. When controller gets the code then it compares the speed of the vehicle with specified speed limit. If vehicle speed is more then buzzer gets on and combustor is asked to reduce the speed. If speed is not reduced within the stipulated time, ECU takes over and stops vehicle.

Vijay, R., et al [4].The main aim of the project is to avoid the accident and to save the life from the accident.In this project sensors are used to detect the accident.GPS is used detect the accident.GPS is used to find out the location of the accident .The IoT will send the message to the cloud platform and it will send the message to the rescue system. Sensor is used to detect the accident with the help of the vibration happened when the accident

ISSN: 2454-9665

occurred. The GPS is used to detect the location of the place in this earth where accident is occurred.GSM is used to the updated numbers and it is used to send data to the linked website or the application. when accident will occur, the buzzer will give out the alarm sound, where it alerts the person about the accident.

Ahsan, M., Haider [5] In this paper sensor detects the vehicle running on a road and measures the speed of the vehicle. The processing unit also compares the measured speed with a preset speed limit on that particular road. If the vehicle speed is greater than the speed limit,the speed data is sent to a Central Control Centre through a wireless sensor network. The central control center collates and manages the speeding data to impose the penalty for the speed offenders. In this system a mechanical wheel can be varied randomly_and_measured by an integrated tachometer.Wireless sensor is attached to wheel to measure the vibration of the wheel.,which will be proportionate to the wheel speed.A relationship is established between the wheel vibration and speed through calibration technique.This relationship can be used for measuring wheel speed (rpm) from the vibration data .The vibration data are sent to a client wirelessly and converted them to rotational speed,which is again converted to linear speed to make it realistic vehicle speed.If the speed is greater than a set speed limit ,the data is sent to remote server. In the server, a report is generated based on the speeding data to impose penalty for the offenders.

Rajesh Kannan Megalingam et al. [6] created a wireless sensor network, or "smart traffic controller," that not only routes traffic efficiently but also monitors speeding vehicles. Crossbow's TWMS (Tiny Wireless Measurement System) and MicaZ motes' MRP2400 (2.4 GHz IEEE 802.15.4) are employed for this purpose. To acquire, transmit, and receive data, a gateway and DAC are required (Data Acquisition Card). A microcontroller for speedometer simulation and interrupt generation is included in the overspeed detection equipment.

Muhammad Tahir Qadri et al. [7] developed a device that automatically scans and recognises the number plate and is installed at the entry for security control of highly restricted areas such as military zones or the vicinity of important government buildings such as the Parliament and the Supreme Court. Before taking a picture of the car, the created system recognises it. Image segmentation is used to recover the vehicle licence plate from a photograph.

Shyr-Long Jeng et al. [8] demonstrated a device that detects dangerous highway driving and alerts traffic authorities to any violations. To catch reckless highway driving, many tools have been developed in the past. The system's primary goal is early detection and informing drivers of dangerous vehicles that are driving recklessly. The majority of methods necessitate intense human focus and a significant amount of work, making them difficult to implement.

An Intelligent Transportation System (ITS) was created by Nurhadiyatna A et al. [9] and has become a widely used traffic-related solution. To measure the vehicle speed in this scenario, a camera is employed as the sensor. It uses a method that measures the velocity of moving autos through real-time video processing. Principal component analysis (PCA) is used to classify automobiles. The Kalman filter is employed to track and identify passing cars in real time. Afterward, one can calculate the vehicle's speed using the Euclidean Distance method.

3. Implementation

The suggested system has two main parts, namely hardware and software..

3.1 ESP32 CAM WiFi MODULE :

The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It comes with an OV2640 camera and provides onboard TF card slot. The ESP32-CAM can be widely used in intelligent IoT applications such as wireless video monitoring, WiFi image upload, QR identification, and so on.

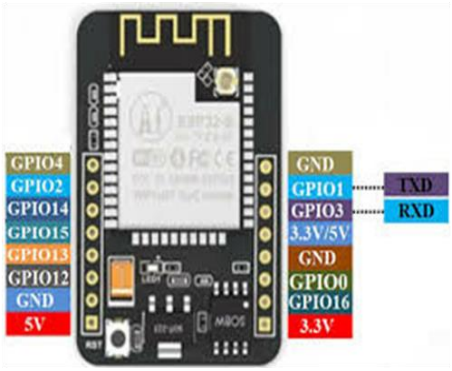


Figure 2: ESP32 CAM WiFi module

3.2.1 SPECIFICATION:

Microcontroller Features	WIFI module: ESP-32S
Processor	ESP32-D0WD
Built-in Flash	32Mbit
RAM	Internal 512KB + External 4M PSRAM
Antenna	Onboard PCB antenna
Bluetooth	Bluetooth 4.2 BR/EDR and BLE
WIFI mode	Station / SoftAP / SoftAP+Station
Security	WPA/WPA2/WPA2-Enterprise/ WIFI module: ESP-32S
WiFi protocol	IEEE WPS
Output image format	JPEG (OV2640 support only), BMP, GRAYSCALE

Supported TF card	upto 4G
Peripheral interface	UART/SPI/I2C/PWM
IO port	9
UART baudrate rate	default 115200bps
Power supply	5V
Transmitting power	11b: 17 ±2dBm(@11Mbps) 11g: 14 ±2dBm(@54Mbps) 11n:13 ±2dBm(@HT20,MCS7)
Receiving sensitivity	CCK,1Mbps: -90 dBm CCK,11Mbps: -85 dBm 6Mbps(1/2 BPSK): -88 dBm 54Mbps(3/4 64-QAM): -70 dBm HT20,MCS7(65Mbps, 72.2Mbps): -67 dBm
Power consumption	Flash off: 180mA@5V Flash on and brightness max: 310mA@5V Deep-Sleep: as low as 6mA@5V Modern-Sleep: as low as 20mA@5V Light-Sleep: as low as 6.7mA@5V
Operating temperature	-20 ℃ ~ 85 ℃
Storage environment	-40 ℃ ~ 90 ℃, <90%RH
Dimensions	40.5mm x 27mm x 4.5mm

FEATURES:

- Onboard ESP32-S module, supports WiFi + Bluetooth
- OV2640 camera with flash
- Onboard TF card slot, supports up to 4G TF card for data storage
- Supports WiFi video monitoring and WiFi image upload
- Supports multi sleep modes, deep sleep current as low as 6mA
- Control interface is accessible via pin header, easy to be integrated and embedded into user Products.

ISSN: 2454-9665

3.2 IR Sensors

The first two digital IR sensors, which consist of an IR transmitter (an IR LED) and an IR receiver (a photo diode), a comparator IC, and a few auxiliary parts, are employed. IR Transmitter and Receiver pair are put next to one another to create a Reflective Type IR Sensor.

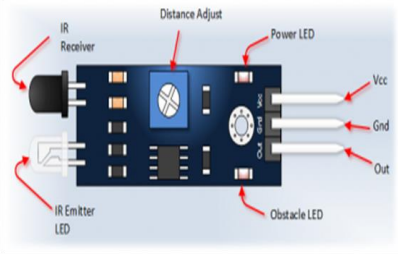


Figure 3: IR Sensor

In this type, an object in front of the sensor causes some of the infrared radiation to be reflected back to the IR Transmitter, which continually emits infrared radiations. The reflected adiation hits the IR receiver, indicating that the object has been picked up by the sensor. Without an item in front of the sensor, however, no infrared radiation is reflected back to the IR receiver. Some IR sensors have the possibility to create both analogue and digital outputs, but the module being used only has digital outputs, meaning that the output will be HIGH if an item is detected and LOW if none is.

Introduction to Software

3.3 BLYNK APP:

It is really very easy to build IoT projects using BLYNK. The first we need is to have the BLYNK App installed on our phone in its Library on the Arduino IDE. We can visualize all the data through this cloud app.

Blynk works over the Internet. This means that the hardware should be able to connect to the internet. Some of the boards, like Arduino Uno will need an Ethernet or Wi-Fi Shield to communicate, others are already Internet-enabled: like the ESP8266, Raspberri Pi with Wi-Fi dongle, Particle Photon or SparkFunBlynk Board. But even if you don’t have a shield, you can connect it over USB to your laptop or desktop (it’s a bit more complicated for newbies, but we got you covered). What’s cool, is that the list of hardware that works with Blynk is huge and will keep on growing.

A Smartphone

The Blynk App is a well designed interface.It works on both iOS and Andriod.

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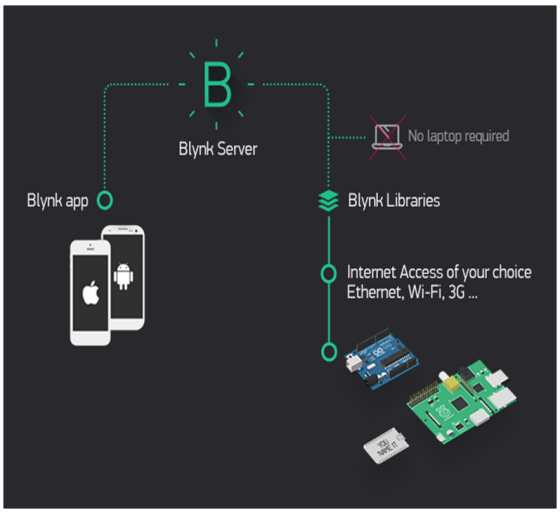

Fig 3.1- Blynk Design

4. Mathematical Model

Now Arduino measures the speed of vehicle which is measured by distance and time relationship,

$$s = \frac{d}{t}$$

Where s = speed of the moving object, d = distance between the two sensors and t = the time measured by Arduino.

5. Results and Discussion

This equipment is more beneficial than any other because of the clear display of the speed detector and the LCD screen, both of which provide precise data. Figure 1 shows the results of an automatic speed detector that was used to gauge the speed of the vehicle.

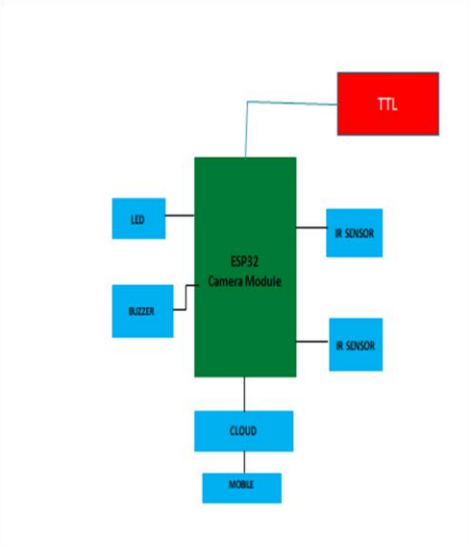

Fig. 4- Block diagram

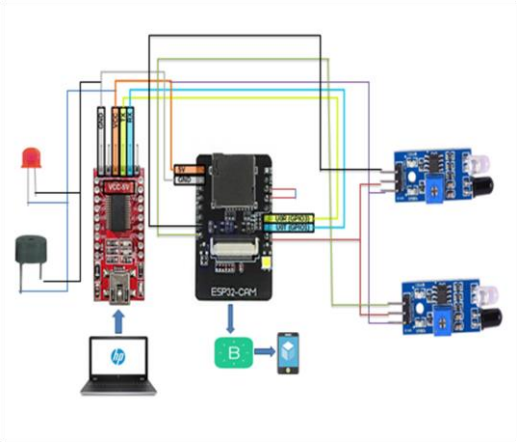

Fig.5- Circuit diagram

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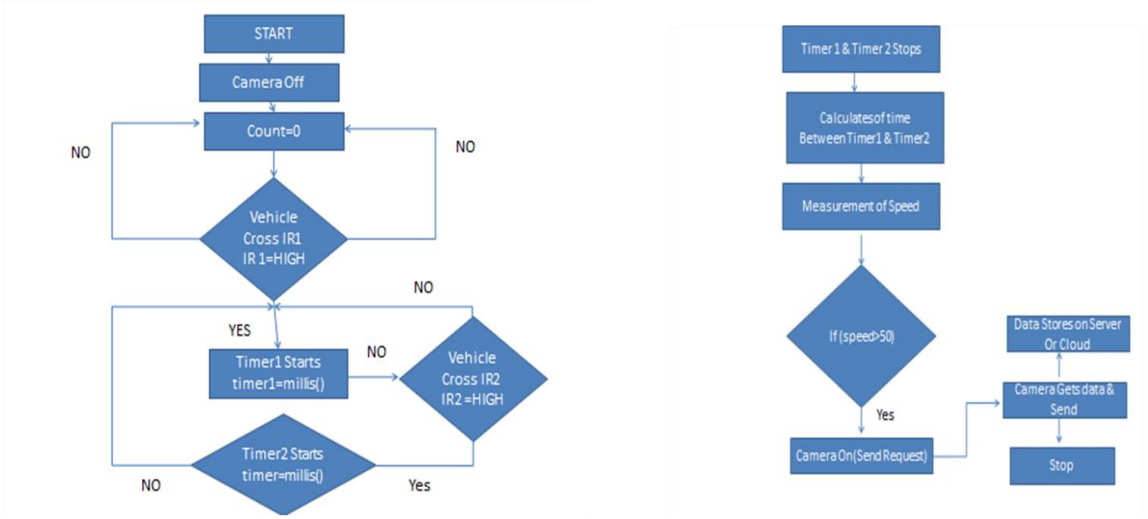
5.1 FLOW CHART



6. Conclusions and Future scope

In this paper, the problems of conducting accurate vehicle overspeed detection using IoT technology to support developing vehicular applications are addressed. Smart Vehicle Over speeding Detector is used to sense the driving conditions to attain great detection accuracy. Especially, the proposed system is used to detect over speeding vehicles and reports to concerned authorities to avoid frequent accidents.

The project can be developed even more by adding vehicle detection wireless sensing networks and implementing a wireless sensor network will be another interesting which will open up much more application areas. The proposed system in future can be used to reduce the accident. Also it lead to the safer traffic. Proposed system will also help to the parents to track their children and know how they drive the vehicle.

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