Automatic Penalty of Vehicles for Violation of Traffic Rules using IoT

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Abstract: ***Traffic accidents have increased numerously. Even though of the vehicle has increased exponentially in our country, the road infrastructure is still a problem. The idea is to automate intimation of the penalty using Raspberry pi and IoT. Here the sensor is placed in the vehicle and used to detect the speed. The transmitter is used to send the required signal from the outside environment using zigbee. This transmitted signal is received by the receiver placed in the vehicle and the raspberry pi unit compares the speed of the vehicle with the transmitted signal and if it is more than the transmitted speed a message intimation will be sent to the user, thereby accidents can be avoided at maximum. Here the transmitted signal have been fixed as 80kmph as per the revolutions per minute of the vehicle so if any vehicle that crosses and receives the transmitted signal through the receiver it compares the transmitted signal with the speed of the ongoing vehicle and once this speed exceeds the limit given by the transmitted signal an penalty intimation will be sent to the user intimating him that he/she has been penalized for over speeding the limit in certain areas.***

Keywords: raspberry pi, Arduino, zigbee transmitter, zigbee receiver.

I. INTRODUCTION

The number of vehicles have been increased drastically in India, in according to that traffic accidents have also been increased. In order to decrease these accidents various steps have been initiated by the government but these initiations have been failed numerous times and citizens breaking traffic rules have been increased. To avoid this various projects and coordination have been initiated. One of the coordination is imposing penalty for those people who violate traffic rules especially speed. In this title the idea which has been proposed will definitely decrease the traffic accidents and avoidance. In this title the speed of the vehicle is determined by the proximity sensor which determines the speed of the vehicle is sent to the raspberry pi controller in which the speed of the vehicle as well as the received signal from the transmitted side controlled by the arduino. Once the compared speed is greater than the fixed speed an penalty intimation will be sent to the user intimating that he/she has over speeded the limit. Due to this type of penalty intimation the traffic rules will be strictly followed and traffic accidents can be avoided at a greater extent.

Revised Manuscript Received on February 10, 2020.

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This system consists of main components that plays vital role for transmission and reception of signals. They are discussed below

II. RASPBERRY PI

Raspberry Pi as shown in figure 1.1 is used to interface sensor with relay. It is an open source electronics platform. It is able to read input from sensor and produce output to actuate a motor. The program for Raspberry Pi might be written in any programming language. The Raspberry Pi Integrated Development Environment (IDE) is an platform application (for its Pi Operating System) that is written in the programming language Python.

It originates from the IDE for the languages processing and wiring. The Python IDE supports the Python Programming using special rules of code structuring. The programs are dumped in the memory card and can be interfaced with external hardware.

Figure 1.1 Raspberry pi

III. Zigbee

The zigbee transmitter is shown in figure 1.2. It is used outside the car which is same as the receiver used inside the car and it is used to compare the speed by the proximity sensor. The main component used in place of the transceiver is the zigbee. The zigbee is used to transmit the signals continuously so that when the receiver received in the car is compared with the signal from the proximity sensor for the process.

Figure 1.2 Zigbee

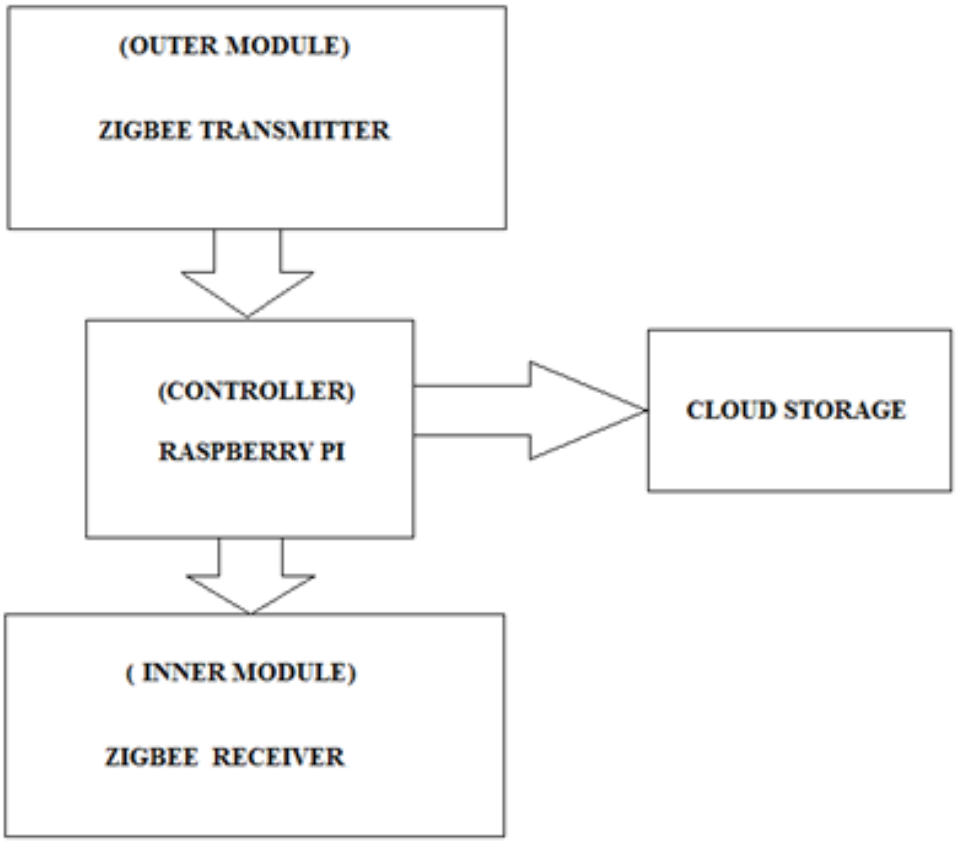

Figure 1.3 Block Diagram of Automatic Penalty of vehicles for Violation of Traffic Rules using IoT

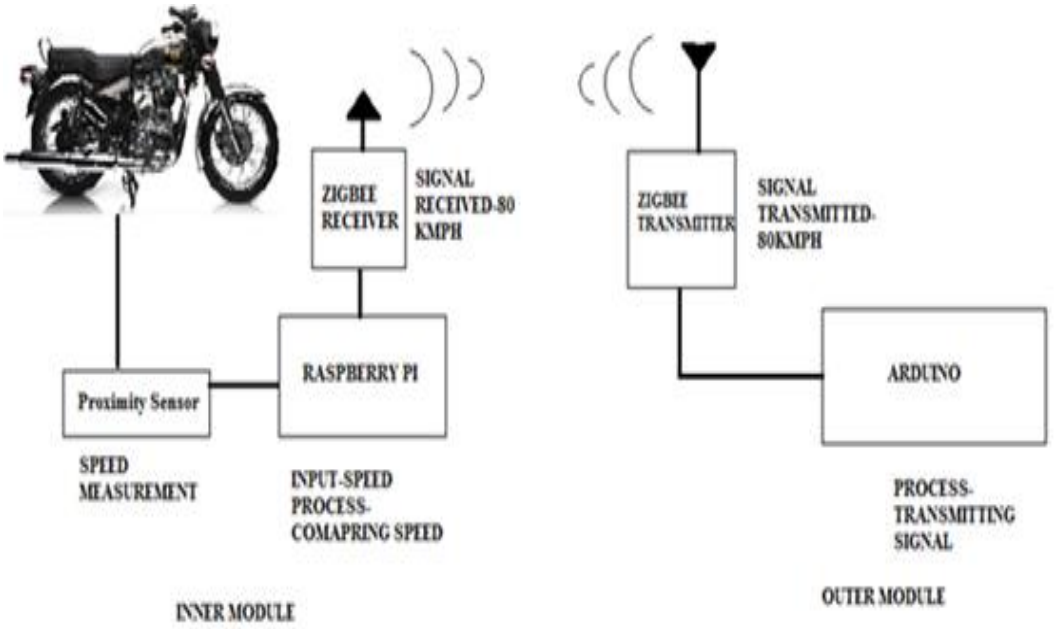

Figure 1. 4 Schematic diagram of automatic penalty of vehicles for violation of traffic rules

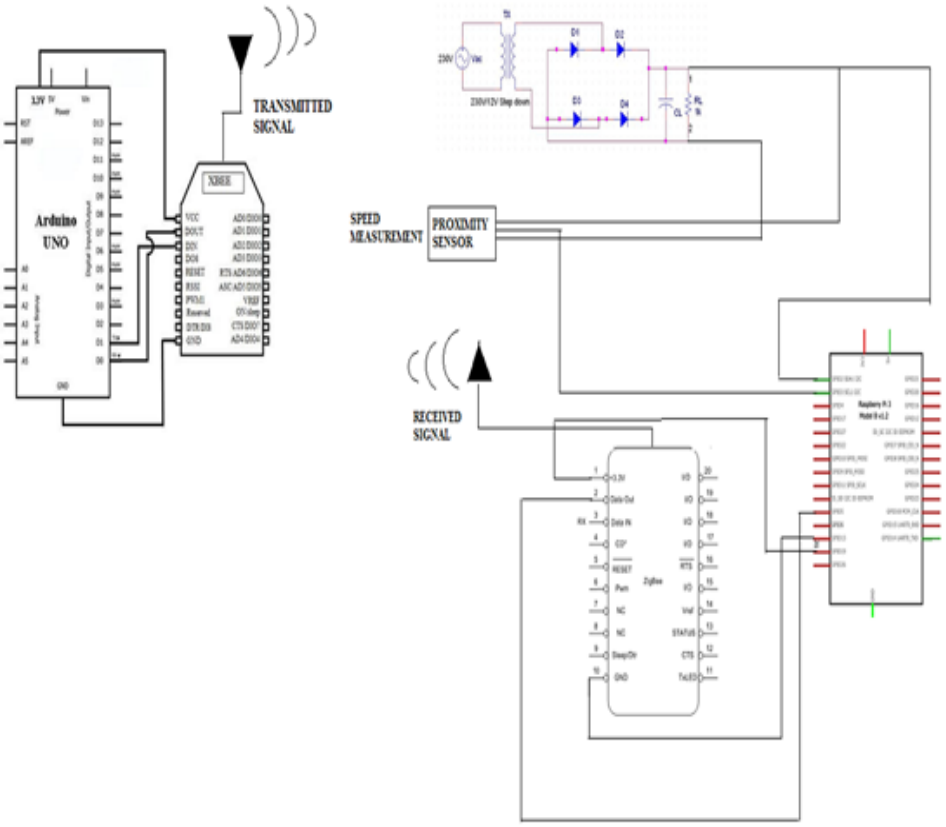

Figure 1.5 Circuit Diagram of Automatic Penalty of Vehicles for violation of traffic Rules using IoT

IV. METHODOLOGY

A. Data acquisition

The basic diagram shown in figure 1.3 is the general arrangement of the parts or components of a complex system or process, such as an industrial apparatus or an electronic circuit. Figure 1.3 depicts the process involved in traffic light control which includes acquisition, analyzing, and signal processing which are explained below. And it is connected with zigbee which acts as a transmitter here. The arduino is set to the particular location (such as school, college, hospital, etc,.)with particular speed value is allowed to transmit by the transmitter(zigbee).Inductive proximity sensors is used as non-contact detection of metallic objects. The damping oscillation in amplitude is caused by the metallic object. The rise or fall by the oscillation is identified using a threshold circuit which changes the output of the sensor. The nature of the material is strictly linked with the size and shape of detecting material which Deeside's the operating distance. The proximity sensor is placed near the wheel in this project. It reads the signal for every time it is detected and the output of the proximity sensor is send to raspberry.

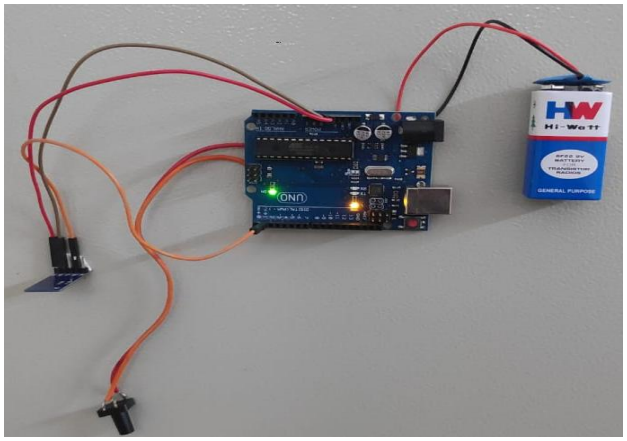

Figure 1.6 Transmitter using zigbee

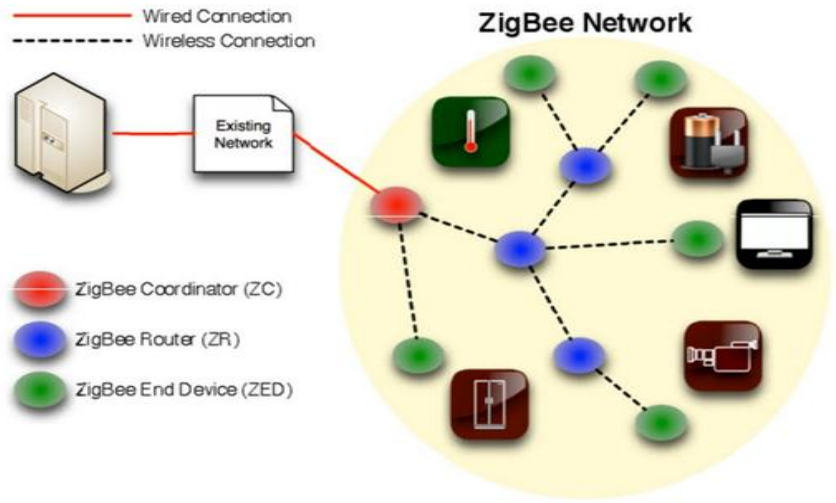

Figure 1.7 Zigbee system structure

Figure 1.8 speed measurement system

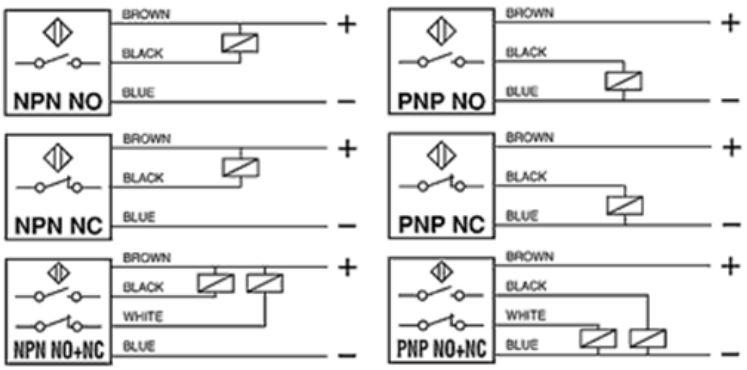

Figure 1.9 Circuit of proximity sensor

B. Analysis and data generation

The Raspberry Pi is based on Broad-com BCM2835 SOC (i.e.system on chip board). It collect the information from the receiver(i.e. zigbee receiver) which is directly connected with raspberry pi as well as from the readings from speed measuring sensors(say proximity sensor) . The zigbee can be tuned so that it can only receive the particular range of zigbee's transmitter's frequency.

The transmitter has the ability to transfer the information to one or more receivers at the same time. The raspberry pi makes the decision by comparing the both received values.
After decision making it sends the information to the cloud if it is necessary and the information is send to subscriber and the RTO office (if it is implemented in real time). The speed of the vehicle is determined by the Proximity sensor. This sensor is placed at the side of the vehicle and the rotation of the wheel is measured and also measuring the revolutions of the wheel for a minute (RPM). Once the revolutions are measured the kilometer per hour of the vehicle is calculated by the following

Formula: kmph = wheel_dia_cm * rpm * 0.001885

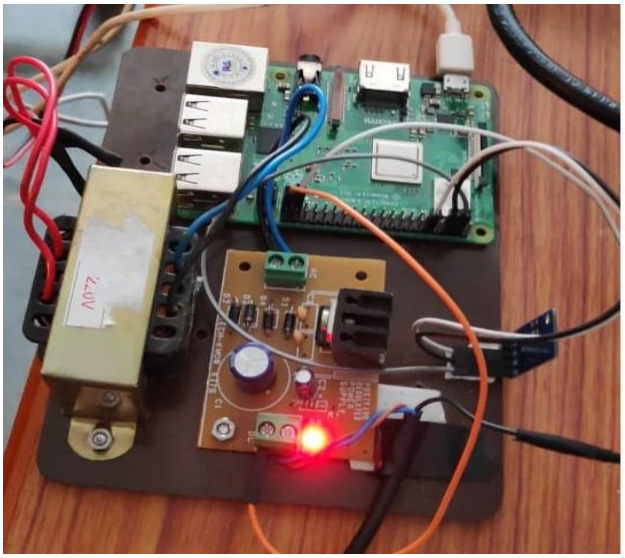

Figure 1.10 Control system setup

V. INTIMATION OF MESSAGE

The speed measured by the proximity sensor is compared with the transmitted signal from the outer module (ie.,Zigbee). Once the measured speed is not less than the actual transmitted signal, then an intimation message will be sent to the cloud interfaces. The cloud intimation platform are of lot like My MQTT, Google Drive etc.,

VI. RESULTS AND DISCUSSION

This system will automatically incur penalty intimation if the speed of the person's vehicle is more than the required speed. The speed of the vehicle once crosses the 80kmph speed will be intimated a penaltymessage through IoT.

0 kmph	Penalty amount will not be sent to user
80kmph	Penalty amount will not be sent to user

- It will avoid disobeying traffic rules.
- Faster than other penalty systems.
- No need of continuous monitoring.
- No need of recording the data manually since it is fully digitized and automatic.

VII. CONCLUSION AND FUTURESCOPE

Thus the incurring of penalty is made automatic using Raspberry Pi, thereby large number of accidents can be avoided.
The above idea can be implemented in any type of vehicles. As an extension of the project, it is planned to implement this system in cars and other type of vehicles to reduce the traffic accidents.

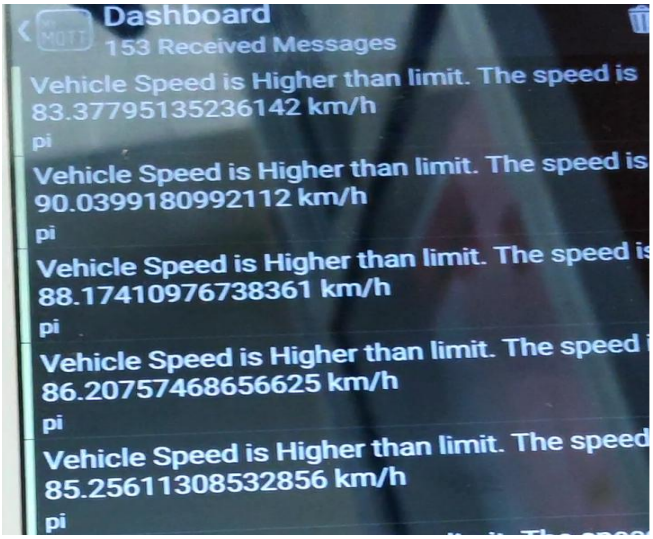

Figure 1.11 Message intimation

ACKNOWLEGEMENT

We dedicate our sincere thanks to our project guide Mr.K.N.BaluprithvirajM.E.,Assistant Professor of Electronics and Instrumentation Engineering, whose enterprise and guidance has been a source of inspiration for us throughout this project work.

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