IOT Based Intelligent Traffic Signal System For Avoidance of Signal Breakers & Evaluation of Traffic Density

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Abstract- *The existing traffic system is based on the "time" which is already assigned in the system. According to these times the signals are working in each lane. But in these system condition occurs as all vehicles in lane are passed and another lane still in waiting state because time is not over and hence signal still is red. These system is very inefficient because they are unable to handle various simple situation which are occurs throughout the day. Major drawback is it has unnecessary waiting time. Some of the traffic concerns are accidents which have caused a huge waste of time, property damage and environmental pollution.*

The project is designed to develop a system which performs execution based on density of vehicles. After the number of vehicles, we will come to know in which side the density is high based on which signal will be allotted for a particular side. Raspberry pi is used as a microcontroller which provides the signal timing based on traffic density.

The proposed system can improve road traffic tremendously. The system introduces the use of radio-frequency identification (RFID), wireless sensor technologies and internet-based information system which will continuously monitor the signal and if any person breaks the signal system will capture the image and will send it to the mail of the concern person to detect the traffic rule break and system will also monitor the traffic signal.

Keywords- Internet-of-things, Wireless Sensor Network, Raspberry Pi, RFID Reader, RFID Tag, IR Sensor, Web Camera.

I. INTRODUCTION

Traffic congestion is a severe issue across the world. To make traffic light controllers more intelligent, the emergence of novel technologies such as communication networks is being exploited. RFID module is used to read documents of vehicle to ensure the legality of vehicle. A camera has to be installed alongside the traffic light. It captures image sequences of vehicle for evidence purpose.

The proposed system controls the traffic breakers by capturing image of vehicle &using raspberry pi module this image will be send to the concerned person through mail. To end the breaking rules at traffic signals is the key feature involved in this method.

The architecture introduces the use of an active radio-frequency identification (RFID), wireless sensor technologies and Internet-based information systems in which tagged traffic objects can be automatically represented, tracked, and queried over a network.
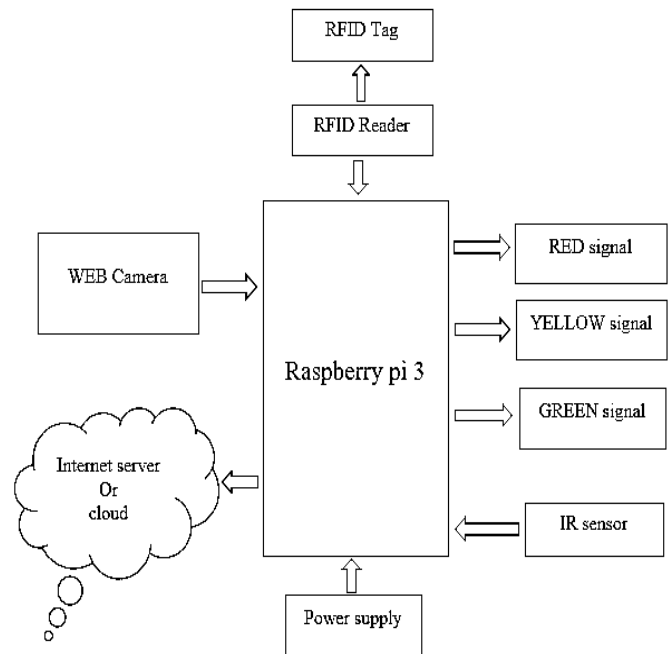
II. PROPOSED METHODOLOGY

Figure 1. Block Diagram

Working

Camera module is used to identify the vehicles which are violating the traffic rules. With the help of RFID module, we can able to detect the owner of vehicle & all related documents of that vehicle thus through email system a mail is

to be send to that concern person regarding the fine for breaking the traffic signal.

When there is a huge traffic on the one side of the traffic signal, it should be cleared as soon as possible. But in our existing traffic system, one should wait until their turn comes even if there is a heavy traffic in that particular lane. To avoid this, we can provide a sensor which is capable of analyzing the traffic intensity. This can be used to clear the traffic as soon as possible before causing a traffic jam.

A. Raspberry Pi

A 1.2GHz 64-bit quad-core ARMv8 CPU, 802.11n Wireless LAN, Bluetooth 4.1, Bluetooth Low Energy (BLE), 1GB RAM, 4 USB ports, 40 GPIO pins, Full HDMI port, Ethernet port, Combined 3.5mm audio jack and composite video, Camera interface (CSI), Display interface (DSI), Micro SD card slot, Video Core IV 3D graphics core.
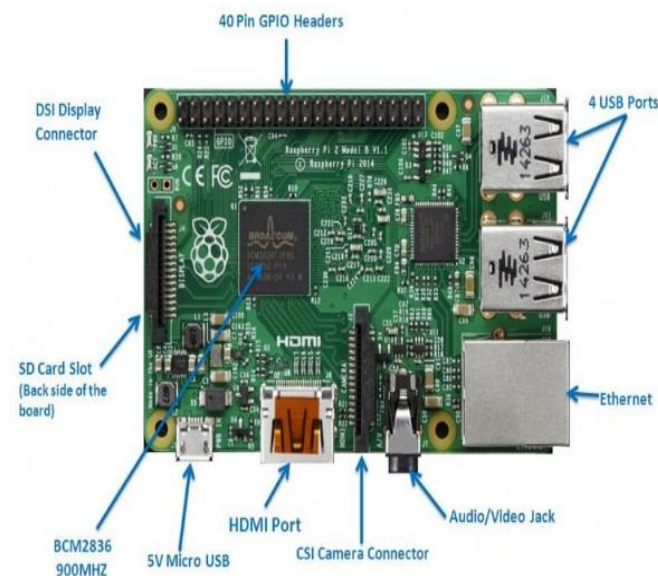

Figure 2. Raspberry pi Module\

B. RFID (Radio Frequency Identification)

5VDC through USB (External 5V supply will boost range of the module), Current: <50mA, Operating Frequency: 125 KHz, Read Distance: 10cm, Size of RFID reader module: 32mm (length) * 32mm (width) * 8mm (height).

Figure 3. REID Module

C. Web Camera

High quality CMOS sensor, Interpolated 20M pixels still image & 2.1M pixels video resolution, 300K pixels sensor resolution video, calling & High Quality still picture, built in JPEG compression, high quality 5G wide angle lens for sharp and clear picture, 4 LEDs for night vision, with brightness controller, build in high sensitive USB microphone, 4X digital zoom & auto face tracking, lens focus from 5 cm to infinity, maximum image resolution:5500 x 3640 pixels, maximum video resolution:1600 x 1200 pixels.

Figure 4. Web Camera

D. IR Sensor

Working voltage: 3 - 5V DC, Output type: Digital switching output (0 and 1), 3mm screw holes for easy mounting, Detection: 2 ~ 30cm and 35 ° Degree, Board size: 3.2 x 1.4cm.
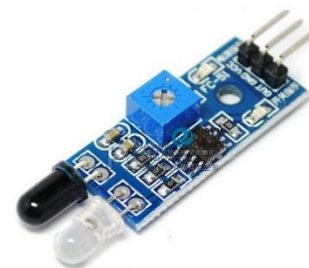

Figure 5. IR Sensor
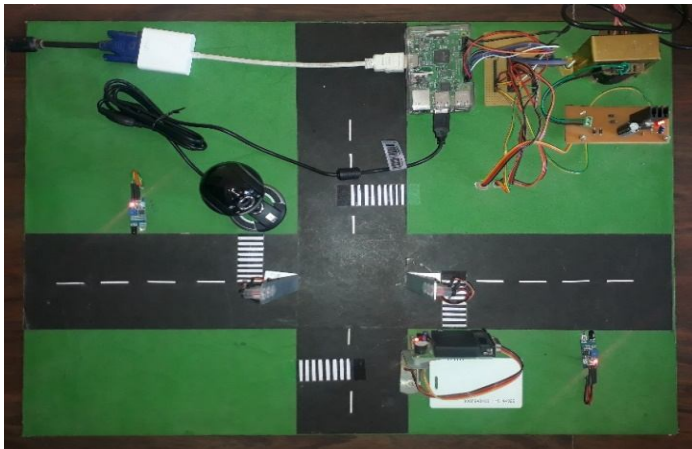
III. WORKING PROTOTYPE
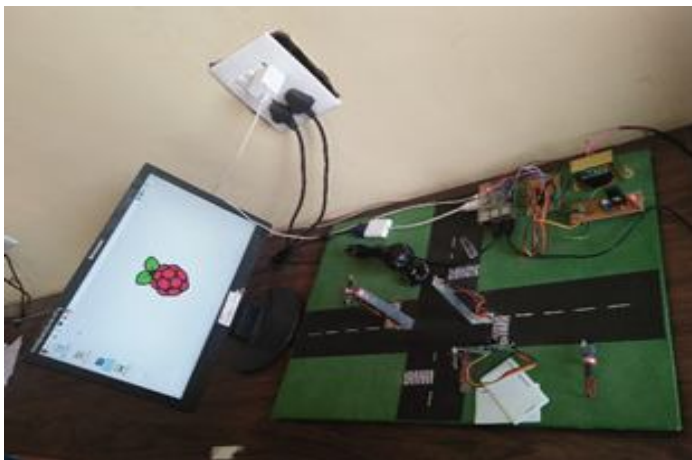
Figure 6. Working Prototype-1

Figure 7. Working Prototype-2

Fig 6 and Fig 7 shows the working of system hardware which runs automatically using Raspberry Pi without any intervention.

IV.   CONCLUSION AND FUTURE SCOPE

Dynamically switching of traffic light is based on present traffic density. So individual work of traffic policeman gets saved.it also required very less human interface.

The proposed architecture employs key technologies: Internet of Things, RFID, cloud computing and other advanced technologies to collect, store, manage the data. Using real-time traffic monitoring information, can in time detect potentially dangerous situations and take necessary actions to prevent traffic congestion and minimize number of accidents thus ensuring safety of road traffic.

In general, the IoT will play an important role in the traffic management enhancing the efficiency of information transmission, improving traffic conditions and management efficiency, traffic safety.

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