ZKG INTERNATIONAL

ISSN: 2366-1313

Smart Traffic light control in the junction using Raspberry PI

ANITHA MURARI [1], MEDIKONDA NAGESWARARAO [2]

[1]Assistant professor, [2] Associate professor

Department of Electronics and Communication Engineering

ECE Department, Sri *Mittapalli College* of *Engineering*, *Guntur*, *Andhra Pradesh*-522233

Abstract- In the current traffic system, there is a wastage of power consumption during non-peak hour as current traffic signal shows green light even though there is no vehicles on the road and also in some cases user has to wait for the signal to become green even though there is no vehicles on other roads of the junction which causes the irritation for the driver. In the proposed system, we are considering some threshold distance when the sensor finds any object within this distance using IOT technologies and when other roads are empty then it will switch on the green light otherwise it will switch off the light. This proposed system is helpful for the users during the non-peak hours and also saves the power during non-peak hours as in India most of the vehicles will be there during peak hours so there is lot of power wastage happens because of the current signal system.

Keywords- Smart traffic control, IoT Technology, threshold distance.

I.INTRODUCTION

Internet of Things (IoT) can be considered as a system of tangible devices that are connected and accessed through an interconnected network such as the internet. Here 'thing' refers to embedded devices, built-in-sensors etc. in IoT, these are allocated an IP address so that they can accumulate, transfer and communicate data over the web without intervention from the user. Actions are taken by the embedded technology hardwired in these devices based on the data obtained [1]. Basavaraju S R tells Internet of Things (IoT) as a global system of IP (Internet Protocol), associated with the devices like sensors, actuators, networks, appliances, gadget and devices in network in-order to sense and collect data. They share with each other and are achieved by the controlling device [2]. Data that is gathered can be processed and analyzed by sharing it across the internet. Various application can then use the analyzed

ISSN: 2366-1313

information. It is made possible by the development and rapid increase of Internet Protocol addressable devices connected to the network. It is rapidly going standard. By 2020 there will be around 50 billion Internet addressable device, which translates into a trillion business opportunity. IoT is creating circumstances for developing new models, and provides ways of server the customers, develop gradually their needs for more customized products explained by L. Atzori, A. Iera, and G. Morabito [3]. L. Atzori, A. Iera, and G. Morabito details Internet of things (IoT) as an innovation were tangible items are controlled using Internet. Outcome with more accurate, rapid and precise can be obtained using IOT. In IOT all data will be stored in computer using database. Internet is means through which we can store data. Later these databases are used accordingly to their requirements and applications. IOT helps in accessing the components from far place, hence it reduces human work or participation. Hence this reduces the investment of system. With respect to their domain used in IoT different protocols can be used [3]. To monitor and control the stream of motorized vehicle through the juncture of many roads traffic light control frameworks are broadly utilized. The main aim is to understand the smooth motion of cars in the transportation routes. Adhering to the conventional systems, variable flows are not handled properly when its nearer to the juncture. The following are not implemented in the existing traffic system - mutual interference between adjacent traffic light systems, the inconsistency of cars flow with time, the accidents, the movement for all emergency vehicles, and the crossing of pedestrian. Cons of this leads to congestion and traffic jam. We propose a framework dependent on Raspberry Pi that assesses the traffic density utilizing IR sensors and achieves dynamic timing slots with different levels. In-order to solve the emergency vehicles that are stuck in congested roads a portable controller device can be designed [4].

II.LITERATURE SURVEY

As the present traffic control system is static in operating the traffic lights and hence there is a wastage of resources like power, time and fuel and also . So many people have worked towards changing this system. Ruha izan Fazrren Ashraff Mohd Nor et. al have worked on the problem of reducing the congestion in urban areas using IoT and LoRaWAN technologies[5]. G S Miratunnisa and A H S Budi have proposed another solution to reduce the traffic congestion by monitoring the traffic level at various places and sending

ISSN: 2366-1313

messages to the mobiles using IoT technology [8]. Jhanavi, Mamtha and Basavaraju have proposed a solution to parking problem using IoT Technology. Harry Machado, Kartik Shah have talked about the impact of Internet of Things (IoT) on Supply Chain. In these days the static traffic lighting system at traffic junctions has drastically in- creased the traffic congestion and frustration for drivers while waiting for the statically defined time even at the non-peak hours also wasting the resources like power, time and fuel. Hence this work is proposing an efficient approach to manage the traffic at the junctions dynamically based on the density of vehicles using IoT technology.

III.PROPOSED SYSTEM

This proposed system is helpful for the users during the non-peak hours and also saves the power during non-peak hours.

A.Algorithm

```
[Nomenclature
Adist : Actual distance of the vehicle
Tdis t:  Threshold distance
Vexist : Existence of the vehicle on other
roads]

if(vehicle exist on any road)
{
   if (Adist<= Tdist  && Vexist==Empty )
   {

    Switch on the green light

   }
   Else
   {
    Switch off the light
   }
}
Else
{
 Switch off the light
}
```

B. SYSTEM MODEL

Traffic control system, Relay, sensors are considered to be in the physical layers as shown in figure 1 is connected to the relay and Raspberry Pi is in Data link layer which act as device manager and Internet is in network layer and in application layer will have web portal through which we can control IOT devices remotely

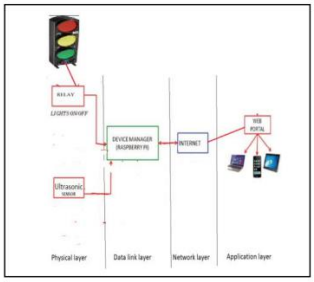

Fig. 1. System model of the smart traffic control

C.IMPLEMENTATION

The traffic management system with complete connection set-up along with its implementation of the proposed solution is

ISSN: 2366-1313

as shown in the Figure 2. The algorithm implemented is:

• Echo and trigger are two pins termed in the ultrasonic sensor. On the raspberry-pi ports 18 and 24 is used to connect to one of the ultrasonic sensor and ports 12 and 23 is used to connect to another sensor.

• To check whether the vehicle is within the threshold distance or not an ultrasonic sensor deployed which is shown in the figure 2. By measuring the distance by the sensor this can be done. If the value sensed is within the 10 cm then it concludes that the distance is within the threshold and switch on the light otherwise it will not switch on the light

• Ultrasonic sensor has 4 pins such as vcc,trig,echo and Gnd

• VCC port of ultrasonic sensor is connected to the 5voltage power

• TRIG is associated to the bcm4

• ECHO is connected to BCM 17

• GND(ground) is connected to ground(39)

• Positive side of the LED is associated to the one end of resistor Negative side of the LED is associated to the GRD pin 3 of the Raspberry Pi

• Other end of resistor is associated to the VCC pin one of the Raspberry Pi

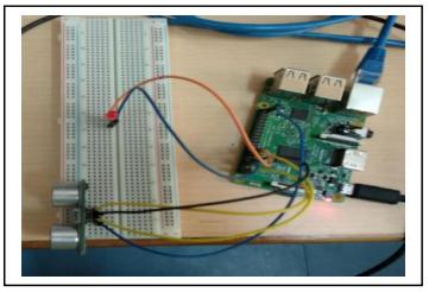

Fig. 2. Implementation of Smart traffic control system

D.TOOLS, APIs AND TECHNOLOGIES USED FOR IMPLEMENTATION Tool:

Raspberry pi. APIs: The 40 GPIO pins are present on Pi 3 with that we can interface with various hardware devices— for both writing data to devices or receiving data from devices.

• Install the GPIO library for Python 3 using the following command: o sudo apt-get install python3-rpi.gpio

• Use BCM or BOARD to set the mode as follow, o GPIO.setmode(GPIO.BCM) or GPIO.setmode(GPIO.BOARD)

• vcc port of ultrasonic sensor is associated to the 5v power of Raspberry Pi

• trig pin of the ultrasonic is associated to the BCM4 of the Raspberry Pi

• echo pin of the ultrasonic is associated to BCM 17 of the Raspberry Pi

• Gnd(ground) is associated to ground(39) of the Raspberry Pi

ISSN: 2366-1313

• Negative side of the LED is connected to the ground 6 of the Raspberry Pi

• Positive side of the LED is connected to the BCM27 of the Raspberry Pi Hardware Requirements: Raspberry Pi 3(Broadcom BCM2837 Processor Quad core A5364-bit) SD card Keyboard and mouse Jumper wires Breadboard Led Ultrasonic sensor 220 ohm resistor Software Requirements: The Python IDLE shell Raspbian with NOOBS Python In this paper, a variety of techniques are discussed for detection and extraction of exudates. When the features of both background and foreground (exudates) in fundus images are independent, it was able to obtain good results. But when the features were similar it failed to distinguish between them. The human intervention was used to mention the parameters, which resulted in a lot of time consumption. The future scope of the paper is to detect and extract the exudates correctly based on image processing algorithm along with machine learning technique. The extraction of exudates when features were similar can be done by regression ML technique which successfully distinguishes between background and exudates in fundus images. The image processing algorithm estimates the area of spread of exudates which can further be compared with database images using CBIR technique for serving doctors to prescribe medication as suggested in database images for the current patients.

IV.RESULTS

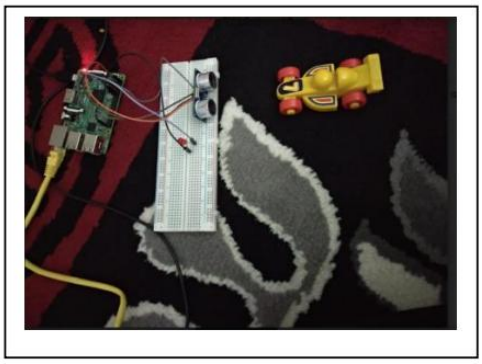

Fig. 3. Distance of the vehicle is greater than the threshold distance

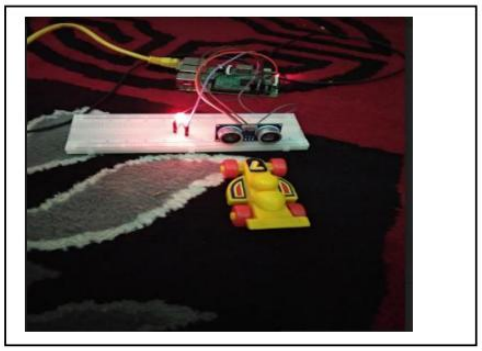

Fig. 4. Distance of the vehicle is less than the threshold distance

Raspberry Pi is connected to Ultrasonic sensor as shown in the figure 3 and 4. In figure 3 distance of the vehicle is greater than the threshold distance so it will not switch on the light but in figure 4 distance of the vehicle is lesser than the threshold distance so it will switch on the light Python program is written for this. When

ISSN: 2366-1313

we can run this in its own terminal, after which it displays the measured distance of the vehicle and lights will be switched on based on that distance.

V. CONCLUSION

This system is designed and implemented using Raspberry Pi and ultrasonic sensor. Test was conducted to verify if the sensor can trigger the controller when it senses presence of vehicles. In this test, we are considering some threshold distance when the sensor finds any object within this distance then it will switch on light and otherwise it will switch off and also this system help to save the power consumption by switching off the light when there is no vehicles on the road.

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