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Raspberry Pi Based Traffic Density Monitoring and controlling System

J. Naga Phanindra[1], V. Srinivas[2]
[1]*M.Tech, Embedded Systems, MREC, Hyderabad, India*
[2]*Assistant Professor, Department of ECE, MREC, Hyderabad, India*

Abstract*: *Raspberry Pi controlled Traffic Density monitoring system. Raspberry Pi is a single board computer which can be effectively used for multi-functionalities. Here is the one of the ways of using this for multiple purposes. It is used for traffic surveillance purpose where the traffic is continuously monitored and viewed through live streaming. In addition to this, it is used for detecting the traffic density and gives the traffic report to the travelers. Here we are monitoring the traffic ,based upon the density of the vehicles on each side the time period for that side changes automatically, for eg : If the density is low on a particular side the time period for that side is normal, if the density is medium the time period for that side will automatically increases ,if the density is high the time period will automatically increase compared to normal density , after finishing the time period the signal will pass to other junction .Here time period means time given to green light to glow to that particular side The density of vehicles of each side can be identified through using IR sensors Traffic for each side can be monitored by live streaming for this we are using a usb camera interfaced to pi3 , by rotate camera 360 degrees , one step 90 degrees In raspberry pi3 are a great choice for traffic sensing because it is equipped with a variety of sensors such as wi-fi, L293D,IR sensors ,DC gear motor ,Camera and microphone. These sensors can be exploited to collect traffic data. This traffic report is updated periodically and displayed on the screens installed at the public places.

***Index Terms*: Raspberry Pi; Traffic Density; Live Streaming; Traffic Surveillance ;IR sensors; l293d driver ;DC gear motor.**

I. INTRODUCTION

At present the number of vehicles is increasing day-by-day increasing the traffic congestion on the roads which leads to accidents, jumping off the traffic signal. It needs to be reduced as per the vehicles which are available on road lanes.

The traffic surveillance process plays a very crucial role in finding the victim who caused the traffic obstruction leading a way to development of traffic surveillance which is done using Raspberry Pi rather than using conventional methods. The installed Raspberry Pi system gives live streaming of the monitored traffic in a particular area. This method is adapted by considering the other advantages that comes along using Raspberry Pi with live streaming, This proposal system allows the camera to check the traffic density in the surrounding places. These adds an additional advantage to our system by simultaneously doing another task without interrupting the main task.

It gathers the information about statistical distribution of traffic over the geographical area which is under surveillance and stores it in a database. let the traveler's know the information about traffic density, display on to the screens there will be a website which is specially designed to show the traffic compactness

A particular place. Thus people will be aware of the traffic in advance and change their path to reach their destination in time.

A. Raspberry Pi

Raspberry Pi3 model B [1] (shown in Fig. 1) is a credit card sized single board computer. This board is cost effective when compared to an actual computer, uses power rating of 5V, 700mA and it weighs not more than 50g. It is also available as Compute Module Development Kit, which is handy device for industrial applications and has more flexibility.

Figure:1 RaspberryPi

This powerful credit-card sized single board computer can be used for many applications and the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processer, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

B. Specifications

1) Processor Broadcom BCM2387 chipset. 1.2GHz Quad-Core ARM Cortex-A53.
2) 802.11 b/g/n Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE) .
3) GPU Dual Core VideoCore IV® Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure.
4) Operating System Boots from Micro SD card, running a version of the Linux operating system or Windows 10 IoT.
5) Dimensions 85 x 56 x 17mm .
6) Power Micro USB socket 5V1, 2.5A.

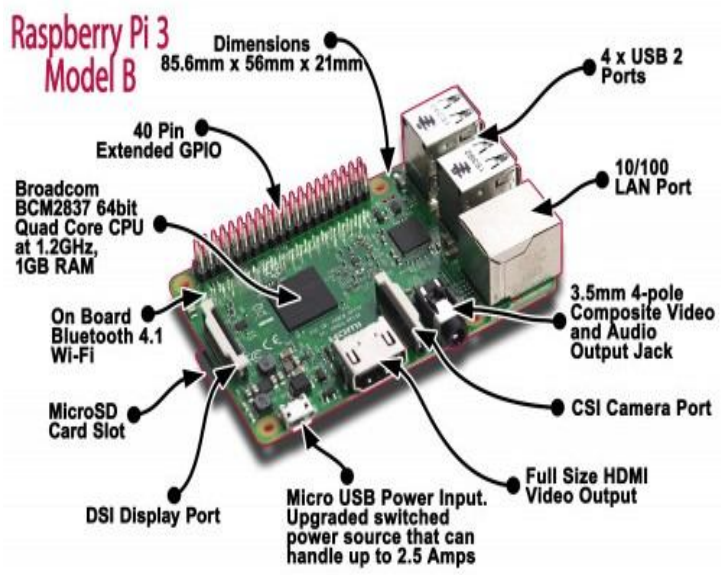

Figure2:RaspberryPi3 Model B

II. IMPLEMENTATION

A. System Design

It is used for traffic surveillance system where the traffic is continuously monitored and viewed through live streaming**.** This is done by using IR sensors and Camera. IR sensors are used to measure the traffic density. Traffic density is measured in 4 directions i.e,East,West,North and South. In each direction two IR pairs (IR Transmitter and IR receiver)are present. Initial position is at north direction. If the traffic density is low IR sensor serves for certain time for example 10secs, if density is medium IR serves for 20secs and if the traffic density is high IR serves for 40secs. Every time camera is rotated by 90 degrees.The system consists of Raspberry Pi, Camera, IR sensors, Dc gear motor. As already mentioned Raspberry Pi is a mini computer. Camera is interfaced with the Raspberry Pi through USB port.. After completing all installations, the system is mounted in the best place that fits the purpose. The system is powered on. Camera continuously monitors the vehicles travelling on the road and counts each Vehicle which is done using a piece of code written in python . The effect of density if shown in different colors like red for higher density and green for low density traffic.

The camera that is installed, continuously monitors the vehicles; monitoring can be recorded and give live streaming by the use of Raspberry Pi. So that any violations from the normal rules occur, it can be easily noticed and the person who violated the rules can be punished or fined accordingly. Thus by recording the vehicle motion and live broadcasting it to control room serves our purpose of traffic surveillance

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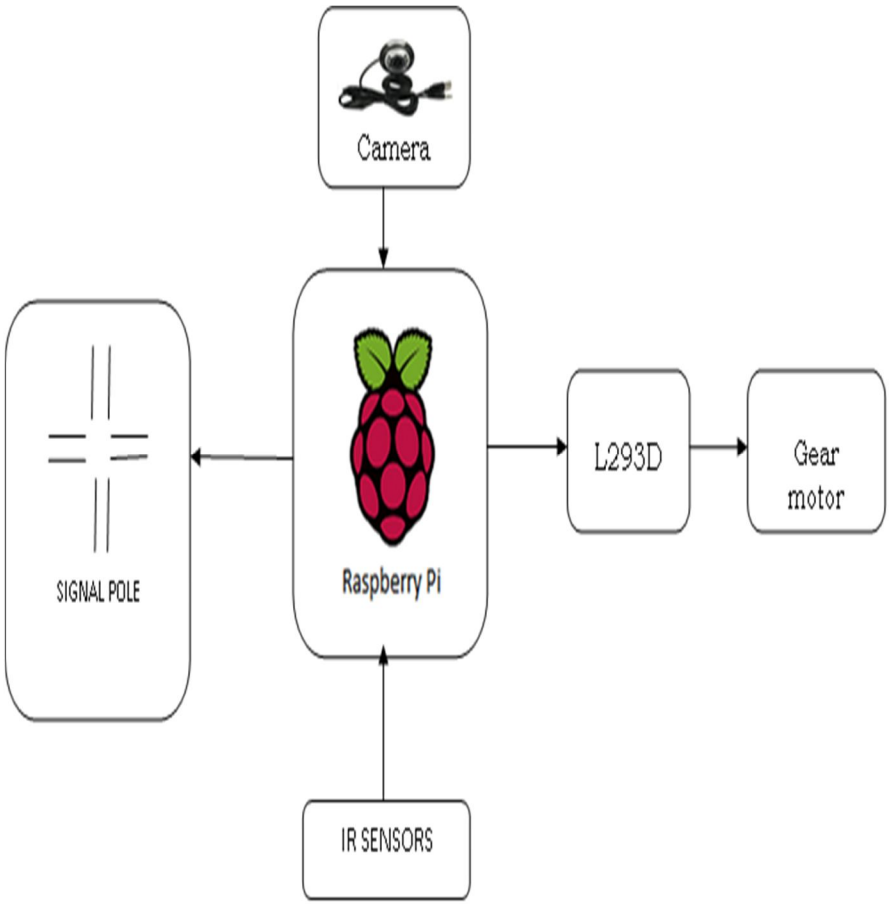

Figure:3 Block Diagram

B. Usb Camera

Camera records images that can be stored directly, transmitted to another location. These images may be still photographs or moving images such as videos. The camera comes from the word an early mechanism for projecting images. The modern camera evolved from the camera. The functioning of the camera is very similar to human eye.It rotates clockwise and anti clockwise direction

Figure4: USB Camera

L293D: L293D is a motor driver integrated circuit (IC). It is used to convert low-current control signal to higher-current signal. This higher current signal is used to drive the motors. L293D is designed to provide bidirectional drive currents up to 1A at voltages from 4.5 V to 36 V. Single L293D can also drive two DC motors.

IR SENSOR

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Figure5:IR sensor

IR sensor is an electronic device and it is used to sense different characteristics of its surroundings.Sensing can be done by emitting or detecting infrared radiation. These IR sensors are also capable of measuring the heat being emitted by an object and detecting motion.

III. SOFTWARE

A. Raspbian OS

Raspbian whizzy is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi. optimized for best performance on the Raspberry Pi.However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible.

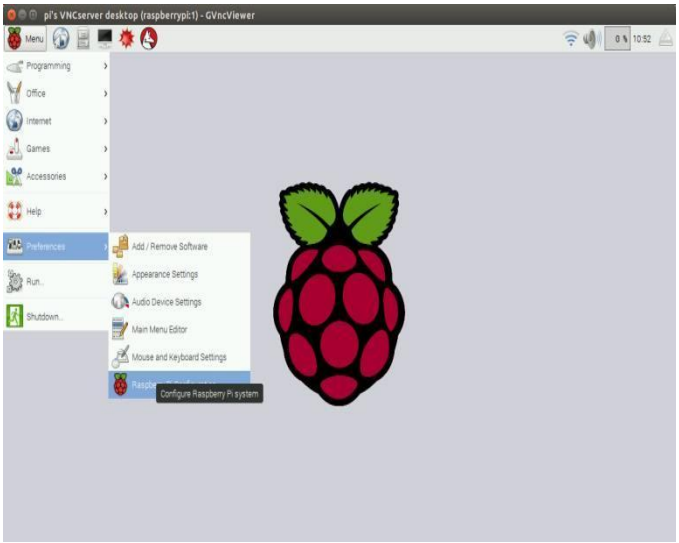
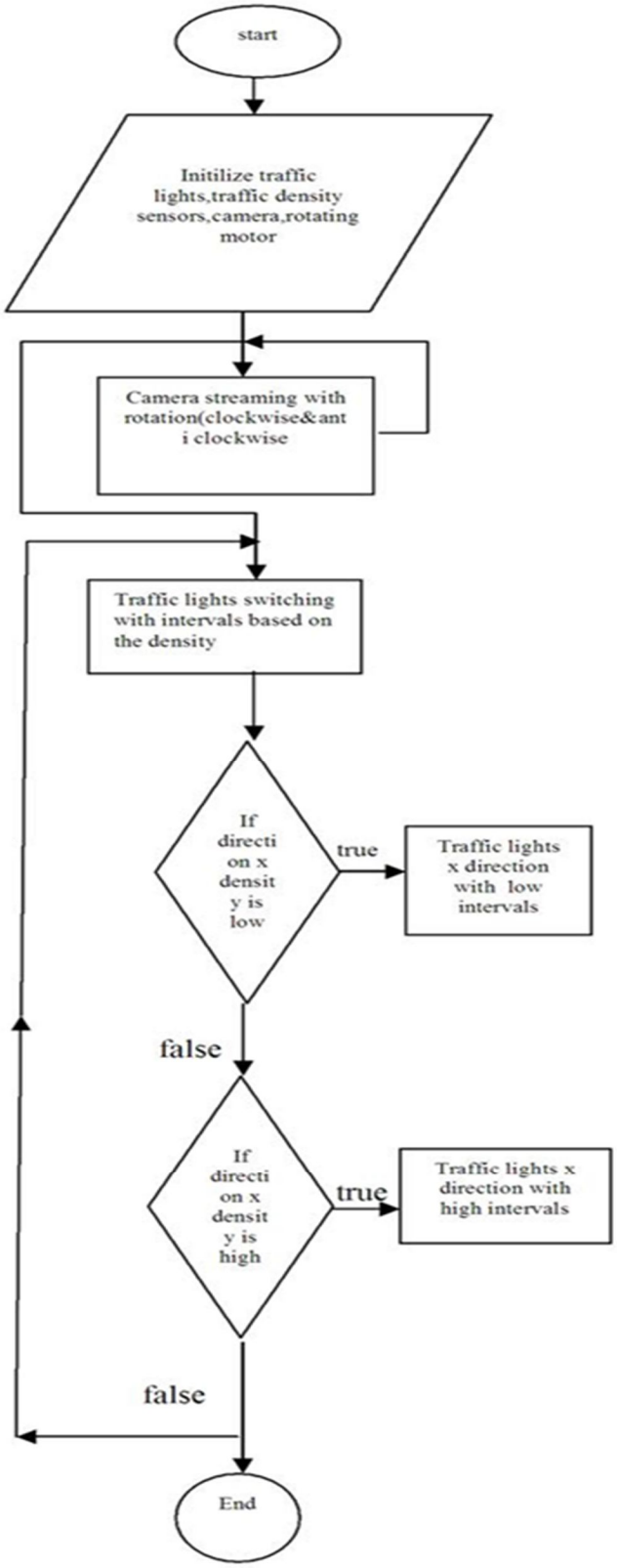


Figure6: Raspbian OS

B. Linux (Raspbian Jessie)os

Linux is the best-known and most-used open source operating system. As an operating system, Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer's ardware.

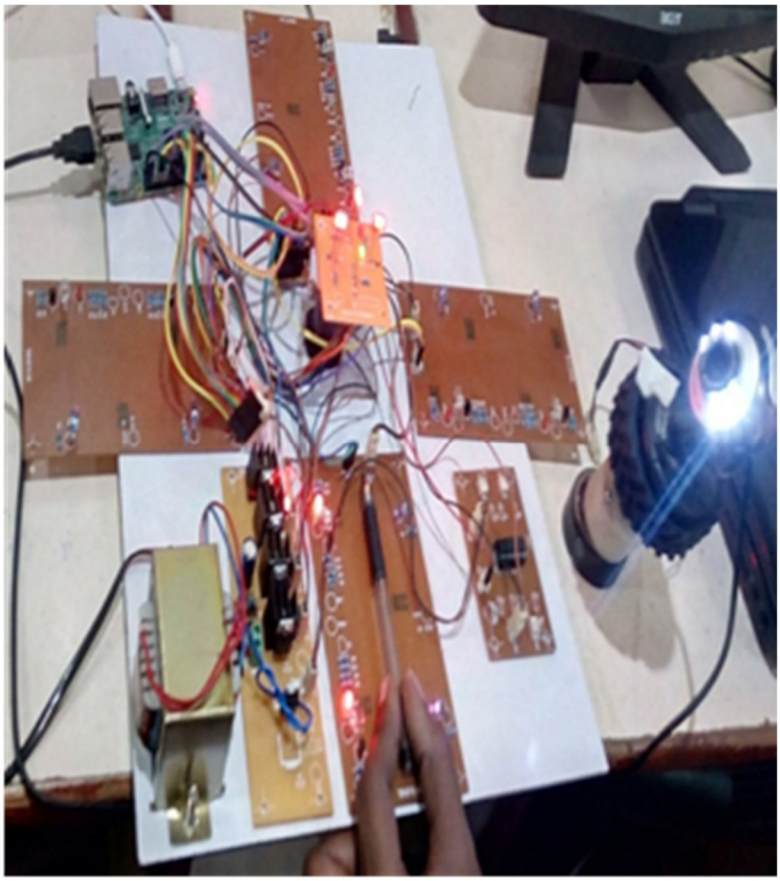
1) *Python language:* Python is a wonderful and powerful programming language that's easy to use (easy to read and write) and with Raspberry Pi lets you connect your project to the real world. Python syntax is very clean, with an emphasis on readability and uses standard English keywords. Start by opening IDLE from the desktop
2) *Sd formatter (4.0):* used to foramat all sd cards.
3) *Win 32 disk imager :* Win32DiskImager is an open sourced Windows program for saving or restoring images from removable drives like USB drives, SD Memory card



→ where X NORTH, SOUTH, EAST, WEST

Figure7: Flowchart

IV. RESULTS



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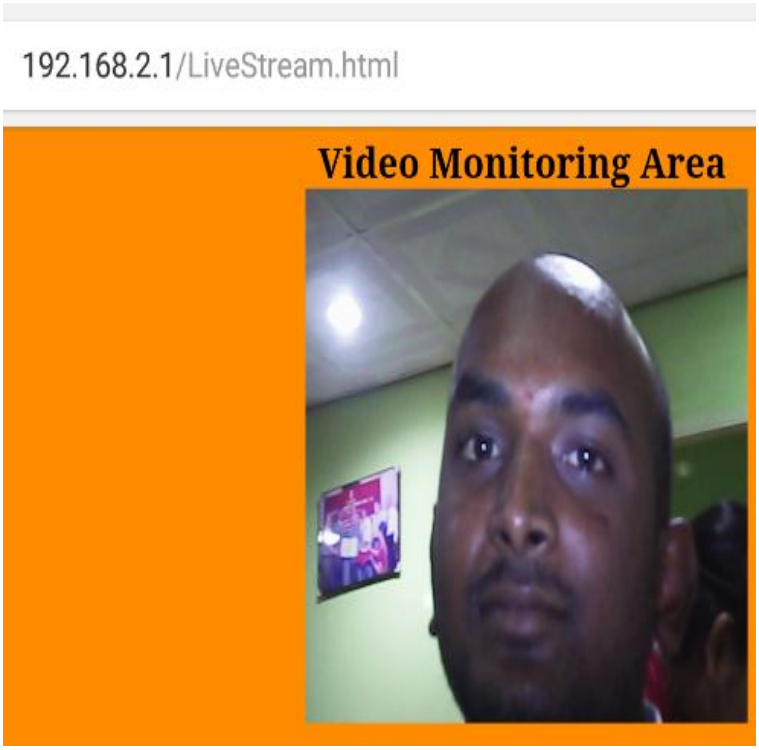

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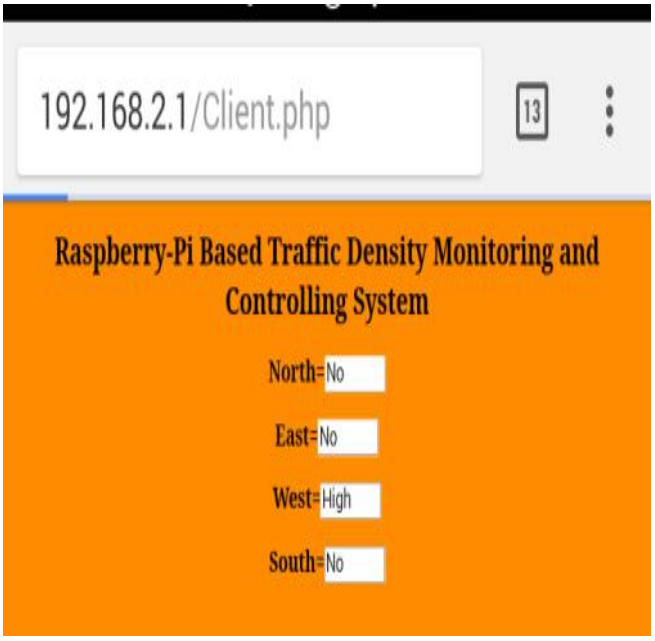

Figure:10

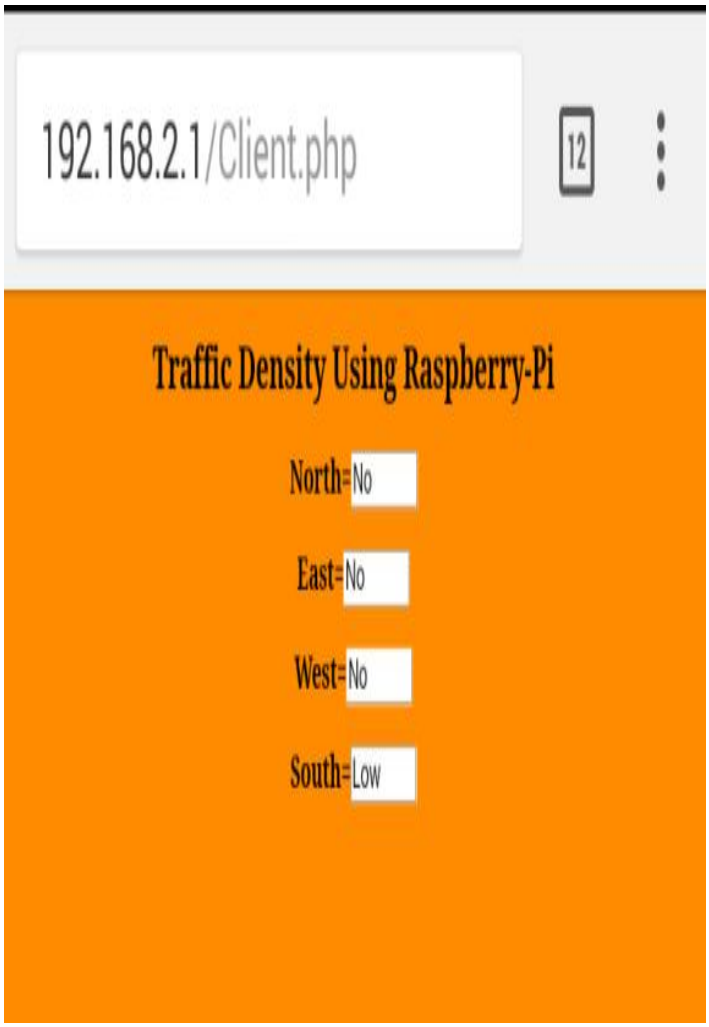

Figure:11

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V. APPLICATIONS

This whole process can be done without using Raspberry Pi. But what we need is an input image to the Python code that is written to count the number of vehicle present in that image. From the density of the traffic is found out and displayed on the screens. Similarly, the camera is used for live streaming the continuously monitored and recorded video. Here the thing is Raspberry Pi is replaced with a personal computer.

This can be further implemented to get traffic updates through mobile notifications by accessing their GPS and propose the people about best possible alternate route using Google's Location Service to their destinations depending upon the traffic intensity. It can also be used to switch the traffic signals depending upon the traffic congestion. It can also be extended to notify the people towards the shortest path.

VI. CONCLUSION

In this system we estimate the traffic level before entering the traffic section along with live streaming and updates on WEB page and controls the traffic signals based on the density by using RASPBERRY PI

The extension for this system can be done by adding RF modules as wireless devices for clearing traffic when ambulance arrives in particular direction untill when it is with in the region

REFERENCES

[1] Sarthak Jain, Anant Vaibhav and Lovely Goyal, "Raspberry Pi based Interactive Home Automation System through E-mail", International Conference on Reliability, Optimization and Information Technology-ICROIT 2014, India, Feb6-8 2014.
[2] Nicholas D., Darrell B., Somsak S., "Home Automation using Cloud Network and Mobile Devices," IEEE Southeastcon 2012, Proceedings of IEEE.
[3] Laur, I., "Microcontroller based home automation system with security," International Journal of Advanced Computer Science and Applications, vol. 1, no. 6, pp. 60-65, 2010.
[4] Matt Richardson and Shawn Wallace, Getting Started with Raspberry Pi. United States of America: O'Reilly Media, 2013.
[5] Peter Membrey and David Hows, Learn Raspberry Pi with Linux. New York City: Apress, 2012, pp. 1-149.
[6] SIM900_AT Command Manual_V1.03, Shanghai SIMCom Wireless Solutions Ltd.2010.
[7] Eben Upton and Gareth Halfacree, Raspberry Pi User Guide. A John Wiley and Sons Ltd., 2012.
[8] Python Software Foundation[US], https://pypi.python.org/pypi Raspberry Pi Fou dation, http://www.raspberry