iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** X **Month of publication:** October 2021

DOI: https://doi.org/10.22214/ijraset.2021.38292

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue X Oct 2021- Available at www.ijraset.com

Smart Traffic Light System

Abhishek Bhore[1], Rugved Joshi[2], Pranav Hanamar[3]
[1, 2]Electronics & Telecommunication, DBATU, [3]Shivaji University

***Abstract:** Wise city management, good road management is one of the most important things. Traffic congestion can be effectively controlled, provided that the number of vehicles passing through a traffic junction can be determined in advance. The proposed approach introduces a framework, which has the potential to continuously transmit traffic and generate alarms in the event of a major traffic congestion at the Sangli control station or in similar Indian cities. The number of vehicles passing through the area well before the required road junction can be estimated using the help of image processing techniques. In addition, monitoring information can be shared with a remote control centre near the city via the Internet. The tests performed show the effectiveness of this Internet-based technology (IoT) technology.*
***Keywords:** Traffic Volume Estimation, Genetic Algorithm, Wireless sensor network, Vehicle detection, Intelligent Traffic Signal Controller.*

I. INTRODUCTION

The indian city management system is a combination of many interdependent systems, in which traffic management plays a major role. moreover, it can be said to be one of the highlights of a wise city. the country is moving very fast and must continue to move in this direction for continuous development. in contrast, modern transportation fails to provide people with the best possible transportation. excessive traffic can lead to delays in getting to work or home, fuel wasting, crashing and crashing into cars or the frustration of frustrated and frustrated drivers. in addition, an increasing number of people are directly leading to increasing road problems such as speeding, accidents, hitting and running, and so on. criminal acts such as cell phone hijacking also take place in major cities during heavy traffic. thus, smart car management has evolved as a mandatory requirement for a successful civilization. at present, smart and flexible traffic control systems are preferred over a set period of time in many developing countries. this type of traffic control is largely controlled by centralized control systems / servers. with this in mind, the internet of things, which has shown its importance in almost everything in our daily lives, can be considered as a tool for managing traffic on a central server. in our proposed project, a low-speed vehicle count counts before traffic convoys are transferred to control the traffic management station. timely information on jam jam node in the city can be transmitted using the internet and the cloud to manage traffic flow. for real-time traffic calculations, we have implemented image processing programs in open-cv software. we have proposed to solve the problem of sangli's traffic with the help of the raspberry board - expensive pi. the implementation of our proposal is less expensive and requires very little infrastructure. therefore, the proposed system controls traffic to local and central servers by exploiting the concepts of iot and intelligent image processing. in the proposed system of urban settings in india, real-time video data is available for the first time. after that, it is divided into frames, and after the binary conversion and sound removal, blob detection is performed and finally the calculation is calculated using the proposed vehicle calculation method. the tests were conducted in the street squares of sangli city. statistical representation of traffic data can also assist authorities in real-time control and traffic management. in addition, it can also help with future planning. the number of vehicles available and then available to the control channel through a real-time online-based database.

A. Objectives

1) Control of traffic using iot
2) Control traffic using image processing python
3) Prioritize the ambulance's clear route width

The traffic control system is considered to be one of the largest metrics for the smart city. with rapid population growth and urbanization, traffic congestion is often seen on the roads. to address the various problems of traffic congestion and to assist the authorities in proper planning, a smart traffic management system using the internet of things (iot) is suggested in this paper. the hybrid method (a combination of middle ground and community distribution) is used to increase traffic flow on the roads and the algorithm is designed to manage different road conditions effectively. for this purpose, the system detects traffic congestion such as input from (camera) b) sensors, and controls traffic signals. another algorithm based on artificial intelligence is used to predict future traffic congestion to reduce traffic congestion.

Apart from this, rfids are also used to prioritize emergency vehicles such as ambulances and fire trucks during traffic congestion. in the event of a fire on the road, smoke sensors are also part of the program to detect the condition. demonstrating the effectiveness of the proposed vehicle management system, it is made in a way that not only increases traffic flow but also connects rescue departments close to a single server. in addition, it also provides useful information that has been provided with graphical methods that can assist the authorities in future road planning.

II. LITERATURE SURVEY

IoT technology has recently been used in a variety of applications. This section outlines the work done using IoT in traffic management. Using IoT, IR sensor and cameras. This function provided an IR-based solution that enables traffic signals to move the lights (red / yellow / green) vigorously. Hearing data collected from the IR sensor was transmitted via a Wi-Fi transmitter and received by the raspberry-pi controller.

This approach has had the potential to determine the ‘unwanted wait’ of vehicles while operating robots in densely populated regions. An IoT-based traffic control system introduced into the system used the MATLAB software to process image and WI-FI transceiver module to transfer vehicle counting data. The next signal was subject to input from the previous signal traffic congestion. The computer hardware used was raspberry-pi and Microcontroller. The system can be made more efficient, if instead of a Wi-Fi transceiver, a direct cloud data connection is selected.

A traffic control system was proposed, which used a wireless transmitter to transmit images directly to a large server. After that, the server system performed image processing and found traffic congestion. The red light time of a particular cross lane is determined by traffic congestion on the road. However, the method can be improved if the information to be transmitted is not available in pictures. Instead, the output data used is automatically transmitted, which will save a lot of time and communication costs. By using sensory sources that transmit continuous infrared light. The presence or absence of the motor was detected on the basis of the intensity of the bright light returning to the sensors.

The proposed method of providing a framework for smart traffic routing system. Here, the sensors used have the problem that the output depends on changes in temperature and humidity. In the continuous Internet of Things (IoT) system was introduced a traffic control system. In this case, an embedded circuit, operated using RFID with an integrated system, was used. By working with large amounts of data, Hadoop was installed.

In line with this, supervised learning methods were used in this study. The same approach was introduced for the purpose of locating vehicles and locating them using sensors and RFIDs. In this case, the data obtained from the sensors was sent to the central control center via a wireless connection for further processing.

A IoT-based system of improved parking management was developed in countries with road conditions such as India. Image processing was used in the form of Optical Character Recognition to verify the employee, another number extracted from the plate was sent to the server system. The plan has ensured that only candidates will be allocated available parking. The smaller controller simplified real-time analysis and vehicle optimization.

A route-based traffic monitoring system was introduced with the help of Ultrasonic sensors. Data obtained from sensors is processed using a controller. After this, it is transferred to a server with a Wi-Fi module. Traffic was controlled by the traffic signal control system, which was based on the levels of traffic on the routes.

A flexible system designed to manage the road system with regard to the automatic transmission of emergency vehicles has been proposed using IoT technology.

They used the Raspberry PI, Node MCU, RFID Tag and Reader to create a system to change signal changes by properly communicating with the sensors in the car. The alarming design of urban IoT sites that were heavily based on Lambda Architecture was suggested, to enter data through web services that provide a common display in our system, and store data in a distributed, measurable, NoSQL database.

Researchers have provided research into how cloud management and big data management can help drive traffic management decisions in smart cities. The work in this paper also used concrete evidence of the concept, based on publicly available information in the city of Edmonton. However, the proposed approach focuses on providing vehicle statistics data in Indian Urban cities to control a specific user interval station in a user-defined area that can help manage traffic, which will affect the next busy road. The following section provides details of the process adopted during the proposed framework.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue X Oct 2021- Available at www.ijraset.com

III. METHODOLOGY

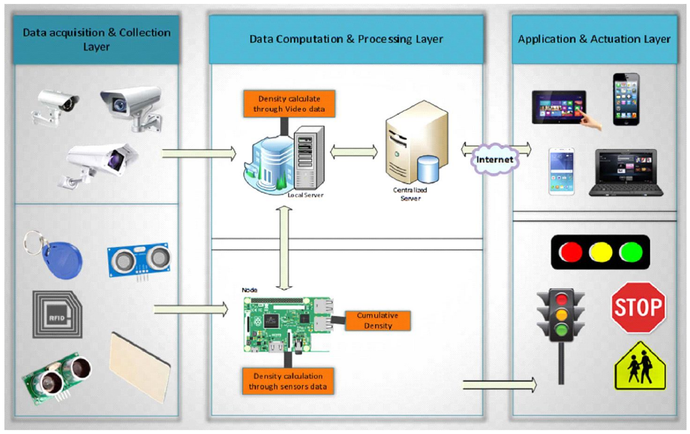


Fig 1. Methodology of System (google source)

The proposed system, shown in Figure 1, is designed to manage traffic on road networks, detecting sensors, surveillance cameras, and RFID installed on the side of the road. The system works in a distributed way, processing sensor data at node level and video data on the local server, calculating the congestion it collects to control traffic in bulk. In addition, it also deals with emergency vehicles such as ambulances, firefighters. it also helps users to be aware of traffic congestion by predicting. The program is divided into three layers. A) Background to data acquisition and collection. B) Data Process and Decision Layout C) Application and Performance Background. Automatic calculation of vehicles passing through the selected area was obtained using image processing techniques. The camera system is used to detect real-time video flow videos from the street. After capturing the video with the camera, a raspberry-pi processing system was used to process this data. Finally, after obtaining a vehicle number for a specified period of time, the same processing system is used to transfer the same data to the central control system. The full details of how the work was done are described in the following two sections:

A. Car Calculator using Image Processing

After receiving video clips from the camera, processing is done on the raspberry pi using Open CV software. The flow of visual activity to determine the number of vehicles passing through the area of interest is shown using figure 1. A description of the steps adopted is provided as follows:

1) As shown in the image above, the first step involves the removal of individual frames from the video sequence This is done using the command 'cap.read ()' in Open-CV.
2) After this, a single image frame was processed to determine the total number of vehicle components available in the frame.
3) OpenCV background output function: ‘createBackgroundSubtractorMOG2 ()’ was inserted to produce a mask with the ability to extract the background from the image frame. Now, after the installation of the above steps, only the front elements remained in the image frame.
4) To reduce noise, the background image is transferred with a Gaussia filter. In addition, the morphological function of the closure was used to positively accommodate the objects present in the image.

In the next step, the processed image was converted to binary form, in which case, the pixel value was converted to '1 'or '0' depending on the limit value. The OTSU bimodal threshold method was used to generate this limit value. Binary image limit is created, because it is easy to get the look of objects in things like the image. Following this, street access is obtained using 'FindContours ()' Open-CV functionality. Once, all the roads are found in the image, their various structures can be used to find the category of the item you want. For our use, the size of the routes obtained is regarded as a separate property such as a vehicle or not. The region of interest is selected from the image by arranging two lines in the picture frame: one at the top edge of the region, and the other at the bottom of the region. The car counter is only renewed if the recovered vehicle was in the area of interest. Once, we found the value of no. of vehicles presenting with a single image frame, the next step was to determine the average number of traffic in the area of interest. This information is very helpful in determining traffic load over a period of time. In this case, for the second time it has been chosen to calculate the average number of vehicles available at this time of the end.

The amount of count to be transferred online is limited at each time point. The following section discusses the process of transferring data from a raspberry- pi processor to a standard server system via the Internet. Transfer of traffic management system transmission using the internet This process of communication between the camera-directed processing system and the online user endpoint system can be described in four stages. The full block presentation is presented in Figure 2 and each step is discussed in detail as follows:

a) Automatically Download Car Census Data on Open CV: The average amount of vehicle available at downtime is downloaded and stored within a variable that is updated every time.
b) Google Firebase server integration with Raspberry Pi using Python: Next, sending remote data to control the room must have a server and the portable Raspberry system must have an Internet connection. On the server we used the Google Real Time Database server, that is, Firebase. In order to use the Firebase Real Time Database, we must comply with the Processor or Controller. To do this we use Python language.
c) Establishing a connection with Firebase (Real Time Database): After the merger, the next step was to start communicating with our database. With that, we built a new database on the firebase server. Next, connect to the database using Credentials (API keys (Application Programming Interface), End Point URL (Universal Resource Locator)) using Python.
d) Sending vehicle calculation data to Real Time Cloud: After connecting to the database, our job was to send the vehicle census data to the remote server.

IV. WORKING

When we start using this system following cases can be eliminated using this type of Signal. The Following cases are:

A. *Prioritization of the Road*

Comparing with currently used signal system, Our Intelligent Traffic system gives prioritize the road as per density of the vehicles and adjust signal timer accordingly. For Example, If the road has more traffic or gridlock, our system gives more priority to that road and takes more time to switch back the signal to red for the same road. At the same time, other cameras are watching remaining roads and calculating the traffic flow so that when the current signal is turned back to red, the signal is turned to green on the road where is more traffic. A continual transition of signals will ensure reduction of traffic congestion. and also, A gradual, yet timely transition of signals will ensure smooth traffic flow.

B. *Assigning the Timer*

Part of the system works on the detecting the traffic flow and assigning timing to the specific part (road) of the signal. Depending on the traffic stuck at the same side of the road, the time to the same signal is added and Number of cars determine when the signal turns green, simultaneously. Signal with most traffic is going to be the next priority and that is that is going to turn green, and will stay green if the traffic is added into the certain measured distance, that is camera range.

C. *Emergency Vehicles*

1) *Ambulance Detection:* For Ambulance detection we have used two methodologies that is Iot based and the other one is Pi Camera based. For Iot we have used RFID sensors with encoder and decoder, in this if signal received at encoder is similar to the signal received at decoder, then that signal is given to controller and the signal is received buzzer. for this we have used Manchester Encoding for the signal conditioning.
2) *Fire Brigade Detection:* For Fire Brigade detection we have used two methodologies that is Iot based and the other one is Pi Camera based. For Iot we have used RFID sensors with encoder and decoder, in this if signal received at encoder is similar to the signal received at decoder, then that signal is given to controller and the signal is received buzzer. for this we have used Manchester Encoding for the signal conditioning.
3) *Police Car Detection:* For Police Car detection we have used two methodologies that is Iot based and the other one is Pi Camera based. For Iot we have used RFID sensors with encoder and decoder, in this if signal received at encoder is similar to the signal received at decoder, then that signal is given to controller and the signal is received buzzer. for this we have used Manchester Encoding for the signal conditioning.

V. ELECTRONIC COMPONENTS

ALE / PROG: Address Cake Enable heart rate by lowering the byte of address during access to external memory. ALE is issued with a fixed measure of 1/6 of the frequency of the oscillator, for external purposes or clock purposes, with or without access to external memory. (However, one ALE heartbeat was skipped during each external Data Memory access.) This pin is also the installation of a pulse (PROG) system during the EPROM process.

PSEN: The App Store enables a readable strobe in external program memory. When the device is running without external system memory, PSEN is activated twice the cycle of each machine (unless dual PSEN function is skipped while accessing external data memory). PSEN does not work if the device pulls out of the system's internal memory.

EA / VPP: When the EA is held high the CPU works without internal system memory (unless the Program Counter exceeds 0FFFH to 80C51). Holding low EA forces forces the CPU to output to external memory without the Counter Program value. At 80C31, the EA should have a low wire outside. For EPROM devices, this pin also receives a supply voltage (VPP) during the EPROM process.

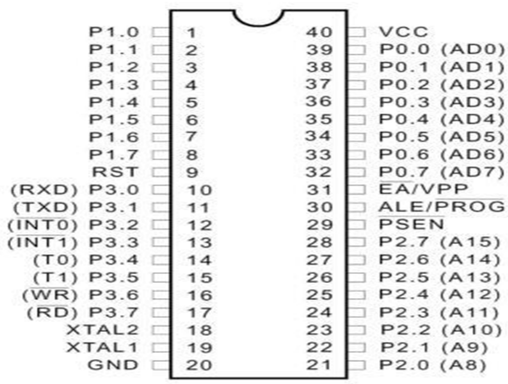


Fig 2. Microcontroller AT89C52(google source)

1) *XTAL1:* Input to inverting oscillator amplifier.
2) *XTAL2:* Output from inverting oscillator amplifier.
3) *Port 0:* Port 0 is an 8-bit open that extends the hole to both bids. As an open drainage terminal, we can sink eight LS TTL loads. Port 0 pins with 1s inscribed on them float, and in that case they will serve as a high impedance input. Port 0 is also an address with low duplicate orders and a data bus during external memory access. In this application it uses strong internal pullups when extracting 1s. Port 0 issues bytes code during system verification. In this application, external pullups are required.
4) *Port 1:* Port 1 is an 8-bit I-O hole with inner lungs. Port 1 pins with 1s inscribed on them are pulled up by the inner lungs, and in that case the input can be used. As an installation, port 1 pins pulled out will now appear due to internal plugs.
5) *Port 2:* Port 2 is an 8-card I / O hole with inner lungs. Port 2 emits a byte of the highest order address during access to external memory using 16-bit addresses. In this application, it uses strong internal pullups when releasing 1s.
6) *Port 3:* Port 3 is an 8-card I / O hole with inner lungs. It also operates on various special features of the 80C51 Family as follows:

A different Port Pin function
P3.0 RxD (serial input hole)
P3.1 TxD (serial output hole)
P3.2 INT0 (external interference 0)
P3.3 INT1 (external interference 1)
P3.4 T0 (external timer input 0)
P3.5 T1 (external timer 1 input)
P3.6 WR (external memory data memory)
P3.7 RD (external read data for strobe data)
VCC: Delivery capacity
VSS: Circuit ground strength

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue X Oct 2021- Available at www.ijraset.com

A. IR Sensors

An IR sensor is an electronic device that detects obstacles or divides objects according to their characteristics. It is usually used to measure the temperature of an object or its movement. It is a device that emits light to hear some of the things around you. Usually, in the infrared spectrum, all substances emit a certain type of radiation. The IR sensor emits or receives infrared radiation (430 THz - 300GHz) that is invisible to the human eye. The LED (Light Emitting Diode) can act as an IR emitter while the IR detector is part of an IR light-sensitive photodiode that has the same frequency as the emitted radiation. The concept of operation is simple: when the IR radiation of the LED reaches the photodiode, the output values change according to the intensity of the IR light.

B. Raspberry PI

The Raspberry Pi 3 Model B + is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2 / BLE, fast Ethernet, and PoE's ability to use a different PoE HAT Dual-band wireless LAN comes with a certificate of compliance, which allows the board to ultimately produce products with wireless LAN reduction testing, improving cost and marketing time. The Raspberry Pi 3 Model B + retains the same footing as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

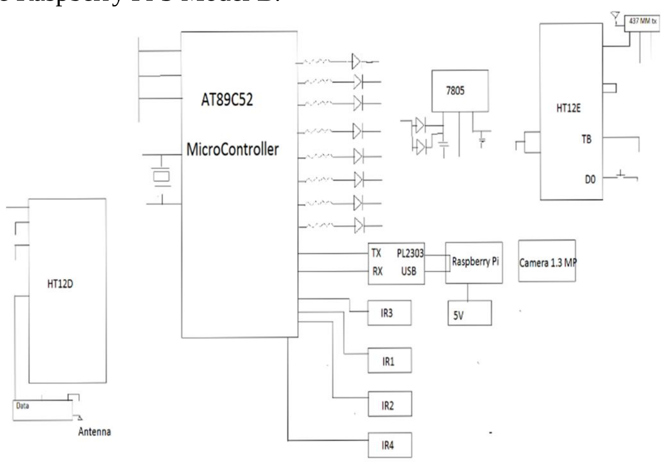


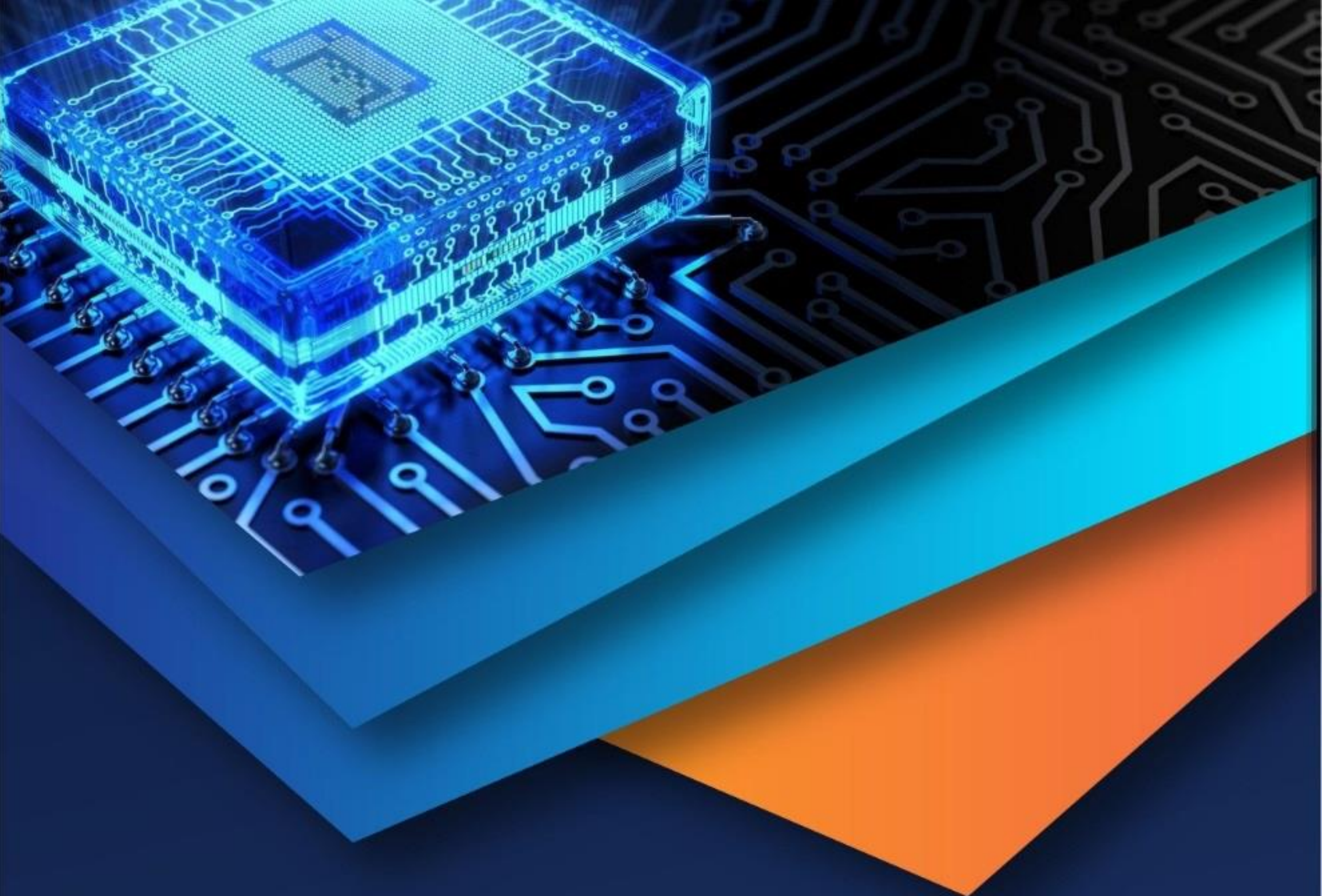
Fig 3: Block Digram of System

VI. ACKNOWLEDGMENT

This research itself is acknowledgements for all those people who have given us their heartfelt co-operation in making this research a grand success. I would like to thank our Prof. Swapnil Gramopadhye Sir, for his support and valuable suggestions regarding our research work.

REFERENCES

[1] L. P. J. Rani, M. K. Kumar, K. S. Naresh and S. Vignesh, “Dynamic traffic management system using infrared (IR) andInternet of Things (IoT),” Third International Conference on Science Technology Engineering Management (ICONSTEM),Chennai, pp. 353–357, 2017.
[2] E. Basil and S. D. Sawant, “IoT based traffic light control system using Raspberry Pi,” International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), Chennai, 2017, pp. 1078–1081,2017.
[3] T. e. a. Osman, “Intelligent traffic management system for a cross section of roads using computer vision,” in Computing and Communication Workshop and Conference (CCWC), 2017 IEEE 7th Annual, 2017.
[4] V. S. A. M. S. D. K. K. Swathi, “Traffic Density Control and Accident Indicator Using WSN,” International Journal for Modern Trends in Science and Technology, vol. 2, no. 4, pp. 2455–3778, 2016.
[5] Mahesh Lakshminarasimhan, “IoT Based Traffic Management System”, Mach 2016.
[6] H. O. Al-Sakran, “Intelligent traffic information system based on the integration of Internet of Things and Agent technology,” International Journal of Advanced Computer Science and Applications (IJACSA), vol. 6, no. 2, pp. 37–43, 2015.vehicles,” International Conference on InventiveCommunication and Computational Technologies, pp. 788–793,2018.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY