# IOT Enhanced Traffic Signal Monitoring & Controlling System Using Arduino

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**Abstract – Here we propose an IOT based automated traffic signal monitoring as well as controller system that automates complete traffic signaling system and tracking the person. This prototype uses arduino based circuit system to monitor traffic signal densities and transmits the data online through internet to the controllers. We use IOT Gecko in order to develop the online GUI based system to monitor the traffic densities. The system shows current densities to help monitor traffic conditions on roads. Here the system has the ability to automatically override the signals and also the system provides an option to the controllers to override any signal and make it green in case of any ambulance or important vehicles to pass through while keeping other signals red. This sets forth a enhanced IOT traffic signal monitoring and controller system that can be operated remotely over the internet from anywhere with manual override ability.**

**Index Terms – Tracking, Arduino, IOTgecko, Operated remotely, Manual override ability.**

## 1. INTRODUCTION

The Internet of Things(IOT) ,comprising everyday objects such as lights ,cameras , motion sensors ,power swithes and appliances headed to bring the next wave of internet growth .cisco predicts that IOT connections will reach 12.2 billion by 2020. representing nearly half of all connected devices ,Homes ,enterprises are normal in the instrumental with hundreds of smart IOT devices that can individually interact with each other and remotely controlled/monitored .Here we propose an IOT based automated traffic signalcontrolling as well as managing system that automates complete traffic signaling system and tracking the person . The system uses arduino based circuit system to monitor traffic signal densities and transmits this data online over internet to the controllers. We use IOT Gecko in order to develop the online GUI based system to monitor the traffic densities. The system shows current densities to help monitor traffic conditions on roads. Here the system has the ability to automatically override the signals and also the system provides an option to the controllers to override any signal and make it green in case of any ambulance or important vehicles to pass through while keeping other signals red. This sets forth a enhanced IOT traffic signal monitoring and controller system that can be operated remotely over the internet from anywhere with manual override ability.

## 2. EXISTING SYSTEM

In the existing system ,the main problem is maintaining and controlling the traffic was doing manually .In our country no where is using IOT technology to control the traffic and also to track the person who is not following the traffic rules .Our government spending lot of money to control the traffic by providing money to the traffic polices.

## 3. PROPOSED SYSTEM

So our project proposed the system by that we can automatically do monitoring and controlling the traffic .Our proposed system also providing the concept of tracking through the technologies of Time Of Flight(TOF),Thermal Imaging, Monocular Vedio Analytics ,Infrared Beams by this we can easily track the person who is not following the traffic rules ,count when a person crosses the traffic signal. Our project is also having the technique of overriding the signal automatically in emergency situations like case of any ambulance or important vehicles to pass through while keeping other signals red it can be done by IOT.

### 3.1 Advantages :

1. Automatically control the traffic.
2. Tracking the person.
3. We can reduce excessive traffic jams.
4. Daily feedback.
5. The system automatically override the signals in emergency conditions.
6. operated remotely over the internet.

The architecture diagram contains the Wi-Fi module, Rectifier , Regulator ,Microcontroller (MC) ,sensors ,IR transmitter across the road and IR receiver across the road. Wi-Fi module is for communication purpose through this user can override the signals over internet ,Rectifier lets current flow in only one direction and it is mainly used for power supply purpose , Regulator acts as a buffer for protecting components from damages ,Microcontroller is used for connecting all the module ,and other sensors like TOF ,IR etc and with the use of

sensors we are going to track the person who is violating the traffic rules and we can also get the feedback about traffic daily by the technique of ultrasonic beams .we can also track the person in which direction he is moving by the technology of thermal imaging.

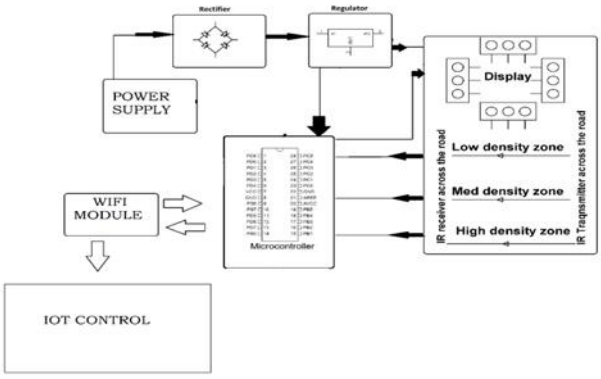


Fig 1:Architecture Diagram

3.2 Technologies :

In this system, we are presenting a real time people tracking system also able to work under severe low-lighting conditions. The system relies on a novel active sensor or cmos sensor that that provides brightness and depth images based on a Time of Flight (TOF) technology. The tracking algorithm is simple and efficient, being based on geometrical necessity and invariants. Experiments accomplished under changing lighting conditions and involving multiple people closely interacting with each other have proved the reliability of the system.

Time of Flight**:** Time of Flight detects the time of light between the camera and the object. By sending the laser beams to many directions, the sensor knows the exact positioning of objects. Kinect is also a sensor that detects people in motion. The video camera, depth detector, and multi-array microphone generate a three-dimensional image of objects within the field of view. The camera also detects body-type and facial features. Time-of-flight works like sonar: If you know how long the light takes to return, you know how far away an object is .Camera-based TOF scanner-less sensors are able to deliver an entire depth image at a time without employing any moving mechanical part.

Middleware : The Kinect has an on-board processor which is using algorithms to process the data to render the three-dimensional image. The middleware also can recognize people distinguishing human body parts, joints and movements, as well as distinguishing individual human faces from one another. When you step in front of it, the camera "knows" who you are.

THERMAL IMAGING: Thermal Imaging detects emissions from moving objects. Since thermal technology is not sensitive to light, it can function in any physical space.The accuracy challenge is the "blending" of a person's heat signature for standing in the same place. In most situations, thermal sensors achieve 95% accuracy rates. And they are easy to install and calibrate. Thermal sensors are versatile and wide spread.

Infrared Beams **:** Infrared Beams count when a person crosses the doorway and "cuts" the beam. The pros are low cost and simplicity. Because the sensors can be mounted in gateways, they are widely deployed .The cons is accuracy. The sensors cannot recognize the direction of motion. They also have trouble differentiating between one or more people. Moreover, the system over-counts and under-counts with no data consistency. Thus the data is not recommended by professional data analysts.

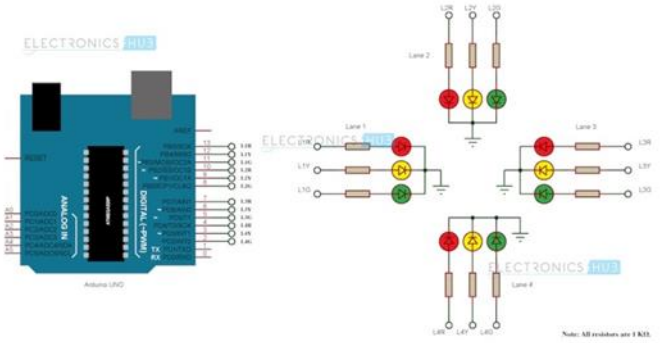

Fig 2:Pin Diagram

Since the project is a traffic light controller, the circuit consists of many LEDs (12 as a matter of fact) as we are implementing traffic lights at a 4 way intersection. The project is a simple representation of traffic light controller and hence no other extra components are used.We need three LEDs of Red, Yellow and Green colors at each intersection. The intersection is divided in to four lanes: Lane1, Lane 2 Lane 3 and Lane 4.All the LEDs are connected to the Arduino UNO's digital I/O pins through respective current limiting resistors of 1KΩ. Also note that Arduino UNO in this project acts as source of current for all the LED i.e. it provides the necessary current to turn ON the LED. Hence, a reliable power supply (like a DC adapter) to power the Arduino UNO must be used.All the connections are made as per the circuit diagram. The complete wiring diagram of the circuit is shown below.

## 4. IMPLEMENTATION

4.1 Working principle:

The first task is the segmentation of the scene between background and foreground (moving) regions using depth information's. This is performed by means of a simple background subtraction procedure based on a pixel wise parametric statistical model. The out coming foreground pixels with reliable depth are used to build a 3-D point "cloud" in the camera reference frame. The subsequent task consists in

building the plan view maps arising from these points . A plan view map can be thought of an orthographic projection of the scene as though it were a planar view .Usually, the projected data are collected in bins, like in the occupancy map (the amount of viewed objects area falling into each bin). The algorithm exploits only a limited set of geometric features associated with each tracked person (i.e. position and speed of the centroid). Two different classes of TOF depth sensors exist, depending on the method they adopt to measure distances and the properties of the transmitted signal. The first class is represented by Pulse Modulation (PM) sensors. Distance is computed directly from the time of flight using a high resolution timer that measures the delay between signal emission and reception. Depth measures d are simply obtained.

## 5. CONCLUSION

So, this project is very helpful to the society to control the traffic efficiently. It takes very less amount and also takes less time to complete the project. By using IOT technology we can develop our country.

## 6. FUTURE ENHANCEMENT

We can invoke the technology, so that tracking the person can be done effectively with low cost .we can achieve the task of automatically overriding the signals perfectly.

## REFERENCES

[1] 2017 IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS): SmartCity17: The 3rd IEEE INFOCOM Workshop on Smart Cities and Urban Computing ,Characterizing and Classifying IoT Traffic in Smart Cities and Campuses

[2] 2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI), Sept. 21-24, 2016, Jaipur, India , Strategies to Handle Big Data for Traffic Management in Smart Cities

[3] 978-1-4799-7208-1/14/$31.00 ©2014 IEEE , Target Tracking in Internet Of Things based on sensing subtraction and compressed sensing.

[4] IEEE Int.Conf.on Advances in Computer, Comunication. & Informatics (ICACCI), Kochi, Kerela 2015, pp. 2356-2363. doi: [10.1109/ICACCI.2015.7275972] , “Smart WSNbased ubiquitous architecture for smart Cities