

# IoT Based Intelligent Traffic Management and Violators Recognition System

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**ABSTRACT-** This paper presents a new system to manage traffic in a high congested area. The IoT technology is utilized for traffic management and identification of defaulters. The raspberry-pi, RFID, and IR sensors are used to implement the system. The proposed system is incorporated with decisive and round-robin algorithm to detect the optimal path to further indicate the direction for traffic. IR sensors regulates the density of traffic in an area by RFID. The traffic signals connected with cameras in metro cities can be upgraded by connecting to IoT. This system is very useful during the pandemic. The police can easily control the traffic from mobile phone from their home and identify the defaulters also. The proposed system helps in sequestering of ambulance, firefighting vehicles from daily traffic. There is an extra benefit of using RFID that supports in locating the robbed or snatched vehicles.

**KEYWORDS-** IR Sensor, IoT, RFID, Raspberry-pi.

## I. INTRODUCTION

In technology which is used by most of the metropolitan cities around the world to make their life more comfortable and easier, by using the technology of IoT. An accurate result can be achieved if the techniques implemented correctly. The personal or official database can be created in personal gadgets by using IoT. Afterwards their stored database can be used for their further specifications. IoT eliminates the need to be close to operating a component, as components can be accessed and controlled through great distances. This makes the proposed framework more autonomous and reliable. Every distinct command can be used to command and control a particular area in IoT [1]-[2]. According to the Google report of most populated countries in the world India comes on 2<sup>nd</sup> position after China with a total population of around 1,296,834,042 approximately people and counting, so with this ranking in a populated country without any doubt there is a big issue of traffic gridlock on roads. There is a need of control framework for traffic control and movement in appropriate way such as congestion issues is eliminated. Subsequently by utilizing IoT framework idea this can be achieved. On the off chance that traffic lights work's contingent to the number of vehicles in a path or street, at that point the proper time control should be there for the traffic light so

that the gridlock on roads should be reduced and every normal and crisis vehicles should pass without any problem. Priority should be given to the crisis vehicle such as ambulance, fire brigade etc., next priority is given to the highly decorated government officials, and after that to the daily vehicles, also if there is any possibility of robbed or snatched vehicles or disappeared vehicles, instead of complaining it to the nearest police station and waiting for the cops to take action, we can use RFID (Radio frequency Identification) to take care of both the problems [3]-[5].

## II. LITERATURE SURVEY

Traffic gridlock is of a major concern in metropolitan cities. This problem can be mitigated by combining IoT with PIC microcontroller, IR sensors, optimizing algorithm and XBEE. IR sensors and XBEE need to perform cohesively so that the amount of traffic and light control can be easily managed by IR sensors and XBEE to identify high priority vehicles. Be that as it may, this plan was actualized as it were for programmed method of activity [6]-[7]. A calculation was additionally composed with the goal that maximum number of vehicles should pass in each period. IR sensors read each RFID tag that passes through in front of it and categorizes it based on the priority system by which the vehicles are registered in traffic database such as high priority vehicles like ambulance and fire brigade are given higher priority than day to day traffic. In a traffic gridlock situation the IR sensors are important because it calculates the traffic density between the first sensor and last sensor and compares it with neighboring streets, if the traffic found in a street is greater than the prior threshold set then the green light is automatically turned on giving the gridlock area priority. Shops and Malls also use RFID to keep track of their inventory so that no item can be taken out of store without billing. The same principle is applied for vehicles to track them in case of any matter and to also identify them as a priority vehicle or not. Optimizing algorithm is also used to give the priority to the most congested direction so that the traffic will be controlled [8]-[9].

## III. PROPOSED METHODOLOGY

In this proposed model we will give solution for gridlock Problem and the identification and prioritization of Crisis

vehicle can be done either autonomously or manually. The autonomous mode depends on output given by the IR sensor and applying optimizing algorithm such as decisive algorithm and round-robin algorithm to further simplify the process whereas in manual mode the traffic operator has the decision making ability by analyzing the traffic and managing it by himself. Raspberry pi is utilized as a part of framework it takes controls on all components of framework IR sensors are utilized to recognize the amount of traffic in a particular location. To give priority to emergency vehicle and for tracking lost cars RFID is utilized. Camera is utilized as a part of the manual mode of the proposed framework; it takes still pictures of traffic in real time. By observing these pictures authorized traffic management expert in control room will direct the traffic manually. In the next part we will have a look that how the colour changing time algorithm according to the traffic , which will give the better result as compared to previous method , basically the algorithm is followed for only four directions , but in this we can change the number of directions according to the number of junctions present on road . Fig. 1 depicts the block diagram of proposed technique. All emergency vehicle will be embedded with RFID cards and its number will be saved in control room system. RFID reader will be kept at certain distance approximately near sensor 3. When emergency vehicle arrives, RFID reader will read RFID card. The number obtained from card will be compared with number present in control room system. If numbers are same, then automatically green light will be turned ON. RFID cards will also be embedded in all vehicles. The ID of card must be known by all owner. As the automobile is lost, the owner of automobile will give this ID to police and to control room. RFID reader placed in road signal when it encounters the vehicle with this number then email is dropped to owner and police station present near that locality.

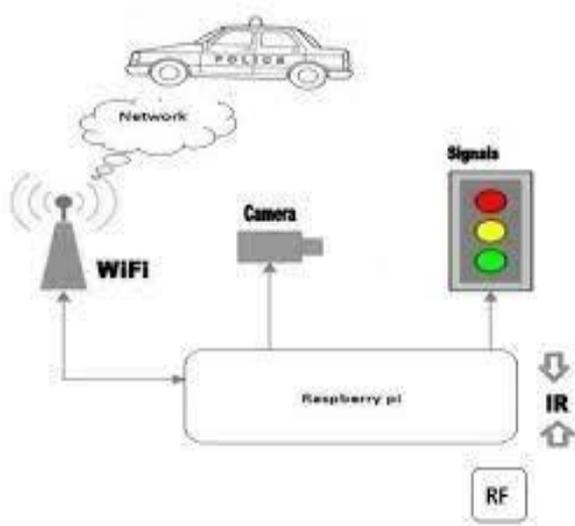


Fig. 1: Block Diagram of proposed technique

#### IV. RESULTS & DISCUSSION

The module comprises of one sensor area and raspberry pi organize which is utilized for observing and recognition reason to determine the amount of traffic in real time. IR sensors are placed from the signal light to a certain “x” distance behind the signal light to calculate the traffic

density. The first IR sensor is kept perpendicular to the signal light “x” meter, the second IR sensor is place at (x+4) meter, and the third IR sensor at (x+8) meter. If the output given by the IR sensor indicates high traffic density, then the green light is turned on for a prior specified interval of time. The traffic control room database contains all RFID card number present. As a high priority vehicle fitted with RFID tag passes through an IR sensor. The RFID tag number is compared against the RFID database to check whether it is a priority vehicle or not. If a priority vehicle is identified on a gridlock street than traffic lights will turn green for a pre specified amount of time. Every one of the areas stretching over the span of the crisis vehicle taken the same strategy. The RFID reader is basically utilized for Metropolitan transport Corporation (MTC) digitalization. Each MTC transport will be labelled a different RFID label in view of the course they cover. The RFID reader will read and illuminate the closest transport station about the approaching transport. This information can be encouraged straightforwardly into cloud. A versatile application can be created which can be utilized by the client for better information on the running status of the transport thus benefiting in his/her time management. Upon uncommon solicitations clients can likewise select their vehicle by the RFID labelling for singular consideration like vehicle observing and burglary avoidance. The clients tag will be incorporated into the focal place for checking for exceptional practices or on the other hand for security. This gets an expansive database of vehicles in the city or entering or leaving the city. Crisis asks are additionally taken care of by the inside if a help flag is conveyed Fig. 2 depicts the working of traffic lights with time delay given to each way. There are four side East, West, North and South.

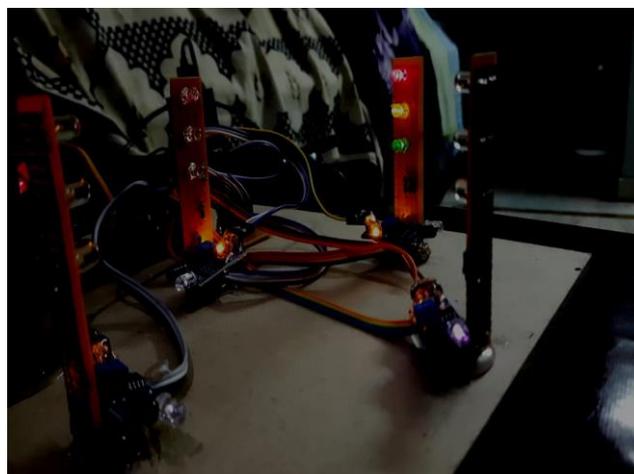


Fig. 2: Proposed System

After all the components we have to interface all components to raspberry pi module and give certain pins to pi board and we need to initialize the pins inform of code using python and as per the code traffic lights placed in four directions starts signaling as delay of time given to those lights. If violator jumps signal when he is on road, then IR sensor immediately identify and pass signal to pi camera module to capture the picture of violator. The captured image is passed through mail of the control room. Fig. 3 highlights the mail sent to control room.

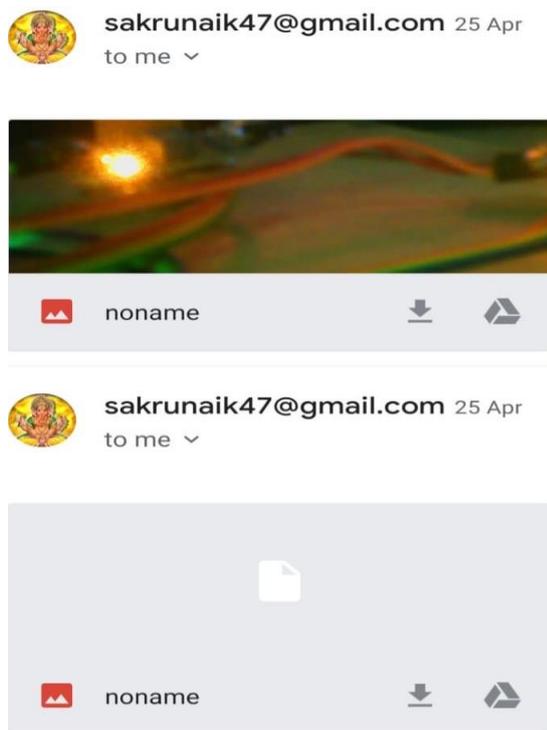


Fig. 3: Mail Sent to Control room

In case of emergency vehicles, the path is directly given by traffic shanks by using transmitter and receiver. If the driver inside emergency vehicle presses transmitter switch the traffic signals changes to “GREEN”. The way for emergency vehicle is given. Fig. 4 reveals the path to emergency vehicle after running the hardware.

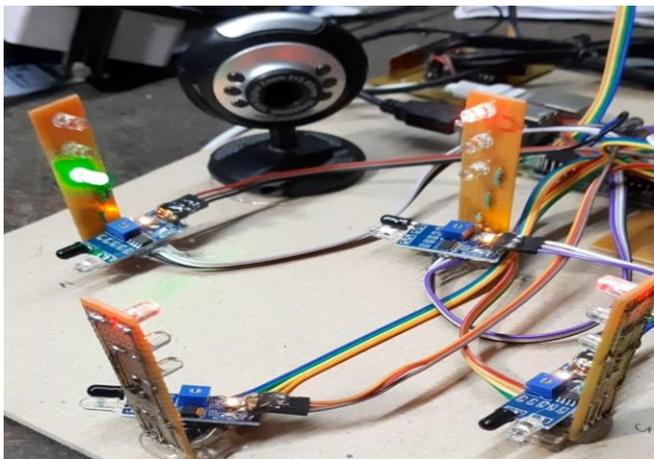


Fig. 4: Path to Emergency Vehicle

## V. CONCLUSION

The proposed framework guarantees brilliant control of movement framework and deals with the activity blockage. By this proposed framework time administration for flag lights is finished. This implies discovery of ease of movement in volume at each intersection will decrease the activity gridlock issue. Freedom of activity for crisis car is effectively utilized. Subsequently, numerous valuable lives

would be spared. Furthermore, the framework has programmed and manual activity. All the framework control and discovery are conceivable by sensors and cameras set. By this proposed system time management for signal lights is done which will reduce the traffic congestion problem. An email will be sent after identification of the missing vehicle. The proposed system successfully implemented the passing of emergency vehicle and catching of violators. Further the same system can be added with accident message alert. And at present we have implemented the design for only one road of junction. This can be extended to large number of junctions. An 'app' can be designed which uses traffic status at different location from the control station database to display so that it helps normal people.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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