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# Traffic Management System Using Internet of Things and Machine Learning

Abhilasha Phatangare<sup>1</sup>, Manasi Baviskar<sup>2</sup>, Akshada Chaudhari<sup>3</sup>, Samruddhi Shinde<sup>4</sup>

Dr. R.S.Bhosale<sup>5</sup>

U.G. Student, Department of Information Technology, AVCOE, Sangamner Maharashtra, India<sup>1, 2, 3, 4</sup>

Associate Professor, Department of Information Technology, AVCOE, Sangamner, Maharashtra, India<sup>5</sup>

**ABSTRACT:**In this paper we have discussed about the problem of traffic and how to solve it using WSN and IOT. As we know IOT is the latest technology and is being used in many sectors now a days at it very effective. As we know the problem of traffic management is increasing now a days is big cities which causes many problems like traffic, accidents and pollution. Management of the traffic is very important and a tedious job. There have been many methods used to solve this Problems. Also the issues like car theft have also increased now a days, also due to high traffic ambulance also have problems in reaching the hospitals fast. In this paper we have discussed the technique of solving this problems using IOT. There will be a sensor node and a base node the sensor node will be used to count the traffic in each lane and will send the information to the base node and the base node will take the decision of allocation of the. Also the base node will have a RFID reader connected which will be continuously Reading for the RFID cards that will be present at the cars and compare it with the data base and search for the stolen cars and ambulance, and will notify after the stolen car is detected. This will help solving the traffic management problem the theft problem and the emergency situations for the ambulance

**KEYWORDS:**IOT, RFID, WSN

## I. INTRODUCTION

Traffic signaling system is a vast field where WSN and IOT can help solve the problem using Sensors tu detect the traffic load. Wireless sensors network can be used in detection the traffic load. These sensors can run on solar energy also as they require few power. During bright and sunny conditions these sensors have the capability to draw solar energy from sun light and use battery power for functioning during night and cloud and foggy condition Consider a scenario of highly congested area where many vehicles such as personal transport, public transport and emergency vehicles (Ambulance, Fire brigade, VIP cars and other rescue vehicles) have to wait for long for the change of traffic signals at intersection points. Existing traffic light systems have timers that are set at regular intervals. This leads to the wastage of precious time especially in case of rescue vehicles for emergency conditions. In order to control this situation, we have proposed a system consisting of two parts: Smart Traffic Light Control System and Smart Congestion .Avoidance System during emergencies. STLC System controls the change of traffic lights at intersection points giving high priority to emergency vehicles. SCA System is a smart traffic routing system that chooses the shortest routes having the least congestions.

## II. RELATED WORK

There have been many systems implemented for traffic management systems. All the systems have their own draw backs Traffic conjunction is a serious issue now a days because of it there are many problems caused like getting late and a design was developed with the use of PIC microcontroller, Infra-red Sensors and Zigbee. IR sensor were used to decide the traffic density and the Zigbee was used for emergency situations, more over the system only operated in automatic mode and it didn't has any manual control over it.[1].

To pass more number of vehicles an Algorithm was also designed. There were priority number that were given to different type of vehicle. Vehicle like Ambulance, Fire Brigade are given First Priority. Next Priority will be given to VIP vehicles. The priority will be given also on basis of traffic density. The road that has traffic density high will have high priorities. [2].

RFID stands for Radio Frequency Identifications, it is generally used in malls to detect stolen material it was used on signals to detect stolen vehicle and that will contain the RFID tags. Long range RFID can be used in this that will help

improper implementation of the system. [3].

Green path for emergency vehicle allowed all the vehicle to move forward whenever an ambulance is detected [4]. But the disadvantage of the system is that all side can create traffic jams for Emergency Vehicle.

### III. METHODOLOGY

Our proposed wireless sensor network architecture is shown in Fig1. It has no centralized station that coordinates the traffic controller's behaviour, but rather, each traffic signal controls the intersection locally without the help of external entity. In this Project the concept of intelligent traffic routing using wireless sensor networks. The primary elements of this system are the sensor nodes or motes consisting of sensors and a transmitter. The sensors interact with the physical environment while the transmitter pages the sensors data to the central controller. This system involves the 4 x 4 array of sensor nodes in each road. This signifies 4 levels of traffic and 4 lanes in each road. The sensors are Ultra sonic sensor based optical sensors which transmits status based on presence of vehicle near it. The sensor nodes transmit at specified time intervals via Zigbee protocol to the central controller placed at every intersection. The controller receives the signal and computes which road and which lane has to be given green signal based on the density of traffic. The controller makes use of the discussed algorithm to perform the intelligent traffic routing. There is also a RFID added to the base controller which will read the RFID cards and identify the stolen cars.

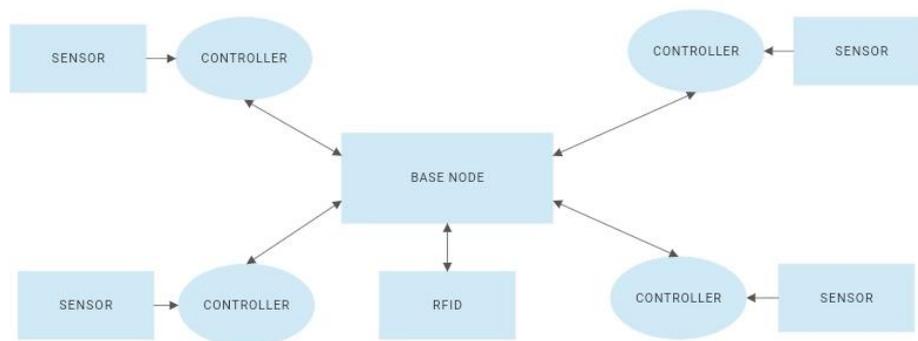


Fig.1. System Architecture

#### The Architecture can be divided into two part:

##### A. The Sensor Node:

It will have the sensors connected to the microcontroller which will measure the traffic density, mainly ultrasonic sensor sensors will be used for the same. The Microcontroller will gather the data and send it wirelessly through a wireless device to the central node.

##### B. And the central node

The central node will have all the sensor node wirelessly connected to it, it will gather the data from the sensor node and allot the timing according to the density. The central node will also have the data base stored and will read the RFID tags on the car to detect the stolen.

#### Hardware used:

1) **Arduinonano:** Arduino nanois microcontroller based board which has a atmega328p on it, some of its features are that it has 14 digital IO pins, 6 analog inputs, 1 UART port, 1 I2C and 1 SPI Port. Arduino Uno is easy to use and easy to program board. It is widely used in IOT projects all over the world. In our project it will be used at the Sensor node to take the input from the sensors and give it to send it to the Base node.

2) **RFID:** RFID stands for Radio Frequency Identification and refers to a certain technology where data encoded by smart cards is read by RFID readers Using Electromagnetic waves. RFID are somewhat similar to Bar codes but RFID has advantages over the bar code. It does not have to be in the line of sign of the reader. Long range RFID reader can detect the Card from a long range. In our system the RFID reader will be connected to the Base Node



which will read the tags that will be connected on the cars and the ambulance to check for stolen cars or to check for ambulance.

**3) Network Device:** As all the device needs to be connected in a network so as they can communicate in IOT. In our system The Sensor nodes should be connected to the Based node so as to communication to happen. To achieve this communication first we need to wirelessly connect the sensor node to the base node. For that we will need a Network device like WIFI, the network device will be used to connect the sensor node and the base node.

**4)Ultrasonic Sensor:**Ultrasonic sensor is a digital sensor that uses an ultrasonic wave to calculate the distance it uses a trigger pin to trigger the ultrasonic wave and an echo pin to detect the reception. It has a range of 2cm to 400 cm. We have used ultrasonic sensor to detect the traffic level using multiple sensors.

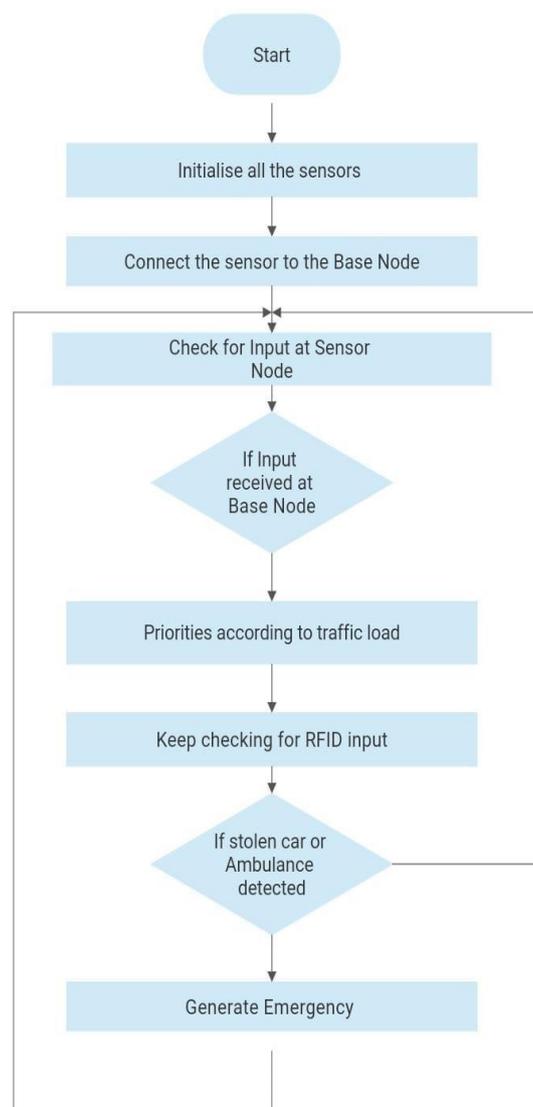


Fig 2: flowchart

IV. EXPERIMENTAL RESULTS



Fig 3. Login Page for theft detection tool

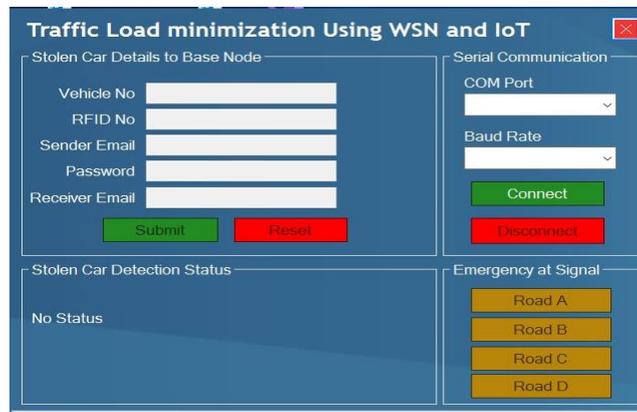


Fig 4. Home Page for theft detection tool

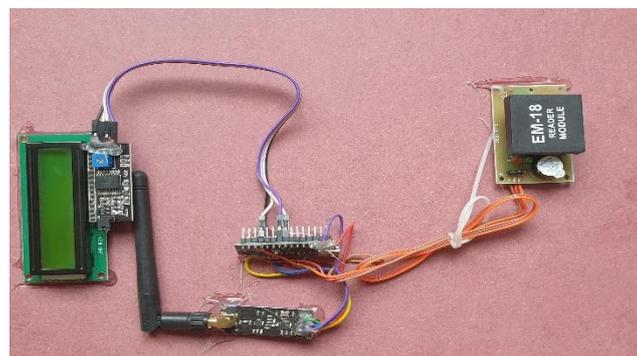


Fig 5. Base Node



Fig 6. Sensor Nodes

A matching analysis is done between the existing traffic management system and our proposed system. Consider the time given for the non-crowded side and making use of that time for to the crowded side. A vast increase in time for the crowded side is assured, and in that time more vehicles can pass through the traffic junction, thus reducing the traffic congestion dynamically.

Sr. No.	Type	Proposed Model	Regular Model
1	Traffic Timer	60secs	80secs
2	Waiting Time	30secs	70secs
3	Unnecessary Wait	10secs	30secs

### V. CONCLUSION

In This paper we have proposed a IOT based Traffic load minimization system, we have also seen the methodology, the hardware software requirements and the software flow required for our project. As we know Traffic management is a very serious problem using the Concept of IOT for can help it solve the problem very easily.

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