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Traffic Load Minimization Using IoT

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Abstract - *We addressed the traffic issue and how to fix it using WSN and IoT in this article. As we all know, the Internet of Things (IoT) is the most recent technology that is currently being utilized in a variety of industries and is proving to be extremely successful. As we all know, traffic congestion is becoming more of a problem in today's major cities, resulting in a slew of issues such as traffic, accidents, and pollution. Traffic management is both a necessary and arduous task. There have been many approaches to solving these issues. In addition, concerns such as vehicle theft have become more prevalent in recent years, and ambulances are having difficulty getting to hospitals in a timely manner owing to heavy traffic. We've spoken about how to use IoT to solve this issue in our paper. There will be a sensor node and a base node. The sensor node will count the traffic in each lane and transmit the information to the base node, which will decide how they should be allocated. In addition, the base node will be equipped with an RFID reader that will be used on a continual basis. Reading the RFID cards that will be present in the vehicles and comparing them to the data base, searching for stolen cars and ambulances, and notifying when a stolen automobile is found. This will aid in the resolution of traffic management issues, theft issues, and emergency circumstances for ambulances.*

Key Words: IOT, WSN, RFID

1.INTRODUCTION

The traffic signaling system is a broad area in which WSN and IoT may assist in solving problems by utilizing sensors to monitor traffic loads. The traffic load may be detected via a wireless sensor network. Because they operate on the sensor, these sensors use extremely little electricity. These sensors are linked to a battery that is charged by the sun throughout the day so that it may be utilized for the second half of the day. Consider a high-traffic region with vehicles such as automobiles, motorcycles, trucks, ambulances, and VIP cars. The timings of traffic signals are now hardcoded and cannot be altered. This may result in the waste of time, which is crucial in the case of an emergency vehicle. The suggested system includes two components to handle such situations: a base node and a sensor node. For this, the suggested system employs the wireless sensor technique. The sensors that measure traffic density will be installed on the base node. It will transmit the data to the base node after measuring the traffic density in the four lanes. The sensor nodes will be wirelessly linked to the base node through Wi-Fi. The base node will decide on the time after receiving the traffic density and will enable the priorities and timing to be set appropriately.

RFID readers will be linked to the base node, which will detect the RFID cards that are present on the vehicle. It will compare the RFID cards to the database and look for missing or emergency cars before performing the necessary procedure.

2. LITERATURE SURVEY

There have been many traffic management methods deployed. Each system has its own set of flaws. Because of the numerous difficulties caused by traffic congestion these days, such as being late, a design was created using a PIC microcontroller, infrared sensors, and ZigBee. The IR sensor was used to determine the traffic density, and the ZigBee was utilized for emergency circumstances; furthermore, the system solely worked in automated mode, with no human control. [1].

An algorithm was also created to pass the number of cars. The various types of vehicles were assigned a priority number. A vehicle such as an ambulance or a fire department is given first priority. VIP cars will be given first priority. Priority will be granted based on traffic density as well. The road with the highest traffic density will be given first priority. [2].

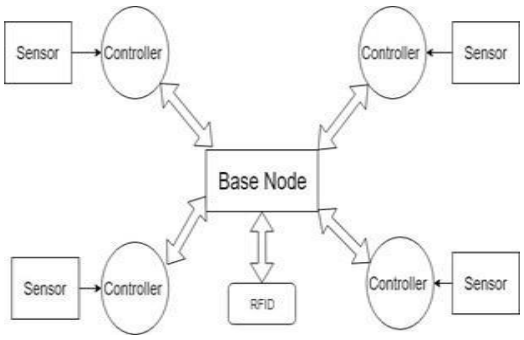
RFID stands for Radio Frequency Identifications, and it's often used in malls to identify stolen merchandise. It's also been utilized on signals to detect stolen vehicles with RFID tags. Long-range RFID may be utilized in this, which will aid in the system's incorrect implementation. [3].

When an ambulance was spotted, the green lane for emergency vehicles enabled all vehicles to go ahead [4]. However, one drawback of the method is that it may cause traffic bottlenecks for emergency vehicles from both sides.

3. PROPOSED METHODOLOGY

Figure 1 depicts our proposed wireless sensor network design. It does not have a central station that coordinates the behaviour of the traffic controllers; instead, each traffic light regulates the junction locally without the assistance of an external organization. The idea of intelligent traffic routing utilizing wireless sensor networks is explored in this project. The sensor nodes or motes, which are made up of sensors and a transmitter, are the main components of this system. The sensors interact with the physical environment, and the transmitter sends the data from the sensors to the central controller. Each road has a 4 × 4 array of sensor nodes for

this system. This denotes four traffic levels and four lanes on each route. The sensors are IR-based optical sensors that provide status information depending on the presence of a vehicle nearby. The sensor nodes provide data to the central controller at each intersection at predetermined intervals using the ZigBee protocol. Based on the intensity of traffic, the controller receives the signal and calculates which route and which lane should be issued a green light. To conduct intelligent traffic routing, the controller employs the described method. In addition, an RFID reader has been installed to the base controller, which will scan RFID cards and detect stolen vehicles.



Architecture can be divided into two part

3.1 The Sensor Node

It will include sensors linked to the microcontroller that will detect traffic density, mostly using infrared sensors. The data will be collected by the microcontroller and sent wirelessly to the central node through a wireless device.

3.2 And the central node

All of the sensor nodes will be wirelessly linked to the central node, which will collect data from the sensor nodes and allow for timing based on density. The database will be kept on the central node, which will also scan the RFID tags on the cars to detect theft.

3.3 Raspberry Pi

RPI is present at the base node. The Raspberry Pi 3 Model B Original quad-core 1.2GHz 64Bit SoC with integrated Wi-Fi and Bluetooth is the most recent device in the Raspberry Pi series from Robu.in. The latest version product, which has the same popular board structure as previous Raspberry Pi modules but adds a faster 1.2GHz 64Bit SoC, as well as integrated Wi-Fi and Bluetooth. In our project, the Rpi will serve as the Base Node.

3.4 Arduino UNO

The Arduino Uno is a microcontroller-based board with an atmega328p on board. It includes 14 digital IO pins, 6 analogue inputs, 1 UART port, 1 I2C port, and 1 SPI port, among other capabilities. The Arduino Uno is a board that is simple to use and program. It's extensively utilized in Internet of Things (IoT) projects all around the globe. It will be utilized at the Sensor Node to receive input from the sensors and transmit it to the Base Node in our project.

3.5 RFID

RFID stands for Radio Frequency Identification and refers to a technique in which RFID readers read data stored on smart cards using electromagnetic waves. Although RFID and bar codes are similar, RFID offers benefits over bar codes. It does not have to be on the same line as the reader's sign. The Card may be detected from a great distance by the long-range RFID reader. The RFID reader will be linked to the Base Node in our system, which will scan the tags that will be attached to the vehicles and ambulances to check for stolen cars or ambulances.

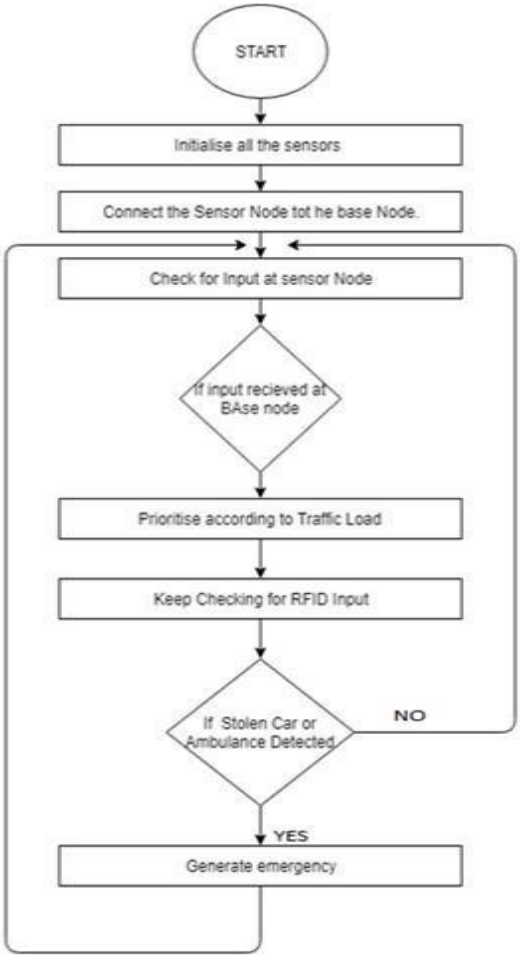
3.6 Network device

All devices must be linked to a network in order to communicate in the Internet of Things. In order for communication to occur in our system, the Sensor nodes must be linked to the Based node. We must first wirelessly link the sensor node to the base node in order to accomplish this communication. A network device, such as WIFI, will be required for this. The network device will be utilized to link the sensor node and the base node.

3.7 IR Sensor

It's an electrical gadget that emits signals in order to detect the environment. An infrared sensor can detect both the motion and the heat of an item. It usually consists of two parts: an infrared transmitter and an infrared receiver. The transmitter emits the wave, while the receiver receives it. When an infrared wave bounces back off a surface and is picked up by the receiver. By adjusting the resistance, we can change the IR sensor's range. Any item that enters the IR sensor's range of sight will be detected. For measuring traffic density, we will use several IR sensors in our system, all of which will be linked to the microcontroller.

4. FLOW CHART



5. RESULT AND DISCUSSION

A comparison is made between our system and previously established systems. The timings that were needed by the prior system and the timings that would be required by our system are included in the outcome.

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

6. CONCLUSIONS

We suggested an IoT-based traffic load reduction system in this article, and we also looked at the methodology, hardware-software requirements, and software flow needed for our project. As we all know, traffic management is a major issue that can be easily solved by using the Internet of Things concept.

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REFERENCES

[1] Khaled EIKhatib, Mohamad Kherfan, Bilal Ghazal, Khaled

[2] Chahine "Smart Traffic Light Control System", IEEE 2016. [2] Mukul Kumar Abishek C, and Kumar Padmanabh "City Traffic Congestion Control in Indian Scenario using

[3] P. P. Tasgaonkar, Rahul B. Pendor " An IoT Framework for Intelligent vehicle monitoring System", International Conference on Communication and Signal Processing, April 6-8, 2016, India

[4] Deepika Bhandari and Ayush Kr. Mittal " A Novel Approach to Implement Green Wave system and Detection of Stolen Vehicles", 978-1-4673- 4529-3/12/31.00c 2012 IEEE

[5] Abdullah A, Mohammad S. Jassas, Qasem, Qusay H., "A Smart System Connecting e-Health Sensors and the Cloud", Proceeding of the IEEE 28th Canadian Conference on Electrical and Computer Engineering Halifax, Canada, May 3-6, 2015.

[6] Nageswara, R., Srinivasa, R. V & Kumari, E. K. (2009). Cloud computing: An overview. Journal of Theoretical and Applied Information Technology, 9(1), 71-76.

[7] Broberg, J., Buyya, R. & Goscinski, A. M. (Eds.). (2010). Cloud computing: Principles and paradigms (Vol. 87). John Wiley & Sons.

[8] Wahidabanu R.S.D., Varaprasad G. "Flexible Routing Algorithm for Vehicular Area Networks", in Proc. IEEE Conference on Intelligent Transport Systems Telecommunications, Osaka, Japan, pp.30-38, 2010.

[9] Srinivasan D., Gokulan B.P., "Distributed Geometric Fuzzy Multi-agent Urban Traffic Signal Control", IEEE Transactions on Intelligent Transportation Systems, vol.11, no.3, pp.714-727, 2010.

[10] Guozhi Li, Songtao Guo, Member, IEEE, Yang Yang and Yuanyuan Yang, Fellow, IEEE "Traffic Load Minimization in Software Defined Wireless Sensor Networks" IEEE Internet of Things Journal.