Abstract—IOT is the network of physical devices that enables the devices to collect and exchange data using internet. In this paper, we focus on to an urban IoT system that is used to build intelligent transportation system (ITS). IoT based intelligent transportation systems are designed to support the Smart City vision, which aims at employing the advanced and powerful communication technologies for the administration of the city and the citizens. The system has three components ; the sensor system, monitoring system and the display system. The sensor system has Global Positioning System (GPS), Near Field Communication (NFC), Temperature and Humidity sensors, which are always connected with the internet via a GSM network to track the location, commuter and ambience inside the bus. The monitoring system is used to extract the raw data from the sensors database, convert it in to a meaningful context, triggers some events with in the bus and provide information to the bus driver. The display system is used to show the context data (bus and travel related information) to all the commuters in the bus stop.

Keywords—Traffic control , parking problem ,tollgate payment, android app.

INTRODUCTION

As the Wireless Sensor Networks have technologically developed more rapidly and more efficiently, they have become the key source for the development of IoT. They find application in almost all areas including smart grid, smart transportation systems, smart home, smart hospitals, and so on. The achievement of the above lead to the smart city development .The idea of internet of things (IoT) was developed in parallel to WSNs. The term internet of things refers to uniquely identifiable objects and their virtual representations in an “internet-like” structure. These objects may range from huge buildings, planes, cars, machines, any sort of goods, industries, to human beings, animals and plants and even their specific body parts. One of the major evolutions of WSNs will be after they are integrated with IoT.

This paper aims to develop an intelligent transportation system. The roads will be able to manage traffic congestion much better than today's networks. The existing traffic system would improve to an extent where cars can communicate with each other without any human interaction to control the traffic. Hence travel could be made smoother and safer. Sensors would be fitted in cars and these cars will be placed on the roads. These would monitor traffic and send the information wirelessly to a “central traffic control system,” a hub that compiles data to feed back the information to vehicles on the road. For instance if there’s lots of traffic, the central traffic control system would be told over WiFi and they in turn react by imposing speed limits that have to be followed by the vehicles in that congestion area. Since millions of money is spent on traffic congestion every year, it has been estimated that, by the implementation of smart transportation systems, the money spent will get reduced by at least 15%.

Additional benefits include parking guidance. Rather than driving around the whole area looking for space, the drivers would be told over the WiFi about the vacant spaces available near to their location. In addition to this, the drivers would be intimated with the shortest possible paths to reach the destination so that carbon dioxide emissions can be controlled. This system could even warn the drivers about school zone where there may be lots of children crossing the roads and the alternative route would also be suggested. In this technology the telecoms combine with WiFi thereby producing better efficiency for the customers as well as the consumers both in the work place and even out of it. The paper presents a method to Solve the problem of Invisibility of the traffic signal due to huge vehicles blocking the view. Prevent congestion caused at toll gates Give Collision Warning to the vehicles.

A system comprising of a microcontroller, RF module and a traffic signal status display system is installed in every automobiles. The RF module installed in the vehicle is capable of transmitting and receiving appropriate data which is controlled by the backend software algorithm in the microcontroller. The system is capable of communicating with similar systems installed in other automobiles in order to update the signal status or to provide advanced collision warnings to the automobiles travelling on the same road. The vehicle identification data such as registration number etc is stored in order to facilitate the electronic payment services at the toll gates. Vehicles at the toll gates are not required to stop thus avoiding congestion.

Managing multiple toll booths is a very complicated task. We here propose a smart card based toll booth system that is monitored over IOT. The Internet server maintains all the data of user accounts and also their balance. All vehicle owners would possess an rfid based card that stores their account number. Our system at toll booths will monitor the cards
scanned when a car arrives at the toll booth. The system now connects to the online server to check if the card is valid and if valid what is the balance. If user balance is sufficient, the user balance is deducted online and web system sends signal back to the card scanner system that the user has been billed. On receiving this signal the system operates a motor to open the toll gate for that car. The system is controlled by a microcontroller to achieve this purpose. The microcontroller uses wifi connection to connect to the internet through which system interacts with web server to perform the online verification process. Also system allows to store data of all the vehicles passed at particular time intervals for later reference and surveillance. This system thus automates the entire toll booth collection and monitoring process with ease using RFid plus IOT based system.

I. PROPOSED SYSTEM

A. Parking Space Problem

The flow diagram of the proposed system is shown in fig.1. The cars entering and leaving the parking slots are taken into count. The information thus gathered is sent to the garage management systems. Two types of sensors are employed here, Parking sensors and roadway sensors. In a similar manner two meters are used such as, existing parking meters and new parking meters. The information obtained from the sensors is passed to the sensor management systems. Parking meters send their respective data to the meter management blocks. All the information obtained above is sent to the central data management system where they are being collected and processed. They are in turn sent to the data warehouse for monitoring and storing. Hence this system helps the customers to make optimum use of the resources that are available for safer and smoother parking of their cars and vehicles. Hence there will be an orderly way of parking.

Fig.1- Data flow diagram of IoT based smart parking assistance.

Sensors identify the vacant parking spaces and send the information to the central server. On the other hand smart phone app requests for a parking space and the vehicle is directed to the available parking space. At the same time the parking fee is paid directly through the mobile app. This system can also be integrated to provide intelligent lighting of the streets. Here the street light is turned on when the street is being used by the vehicles and other times it remains switched off.

The parking assistance is provided using the following steps. Sensors detect whether a parking space is occupied and transmit data to the central server. Smart phone app requests a parking space and guides the drivers to that free space. Parking fee is directly paid through the smart phone app. Access to loading zones and residential parking zones are restricted. IoT traffic architecture comprises of RFID, Wireless sensor technologies, Ad Hoc networking and internet based information systems. Intelligent traffic IoT is divided into three layers such as Application layer, Acquisition layer and Network layer. Application layer is responsible for intelligent traffic management, intelligent driver management, information collecting and monitoring and information services. Network layer makes use of WiFi, 3G/4G and WiMax or GPRS. Acquisition layer employs RFID, RFID reader, WSN, Intelligent terminals.

Table 1 Intelligent Traffic Management

<table>
<thead>
<tr>
<th>Application layer</th>
<th>Intelligent Traffic Management</th>
<th>Intelligent Driver Management</th>
<th>information collecting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network layer</td>
<td>Internet</td>
<td>WiFi, 3G/4G</td>
<td>WiMax</td>
</tr>
<tr>
<td>Acquisition layer</td>
<td>RFID</td>
<td>RFID reader</td>
<td>WSN</td>
</tr>
</tbody>
</table>

B. Traffic Management System

In Fig.2, communication between the objects intimated human communication. The system makes use of wireless sensors to obtain real-time traffic information, such as traffic condition on each road, number of vehicles, and average speed. Utilization of wireless sensors is much appropriate due to their low power consumption and low cost. In order to achieve large-scale network layout, the system uses wireless cluster sensor network. Each cluster has a set of wireless sensors and each set is represented by the head node. Data at the head nodes are delivered to the backend system by means of a mobile agent. Already some new vehicles have been equipped with GPS and sensors capable of receiving and sending driving information. This information is sent to the monitor and control centre.
trough satellite communication facilities. GPS is connected to the wireless sensor networks which can be used for measuring driving speed and driving direction.

![Image](image1.png)

**Fig.2** A communication between things imitated human communication

The traditional traffic monitoring system based on image-processing technology has many limitations. The weather conditions have serious impact on this method. During heavy rain and thick fog the license plate is not clearly visible and hence the image cannot be captured. The development of eplate based on RFID provides a better opportunity for intelligent traffic monitoring for identifying and tracking the vehicle. RFID can be used as a transponder in license plate equipped with a RFID tag and sensors. Here each car can get data it needs from the spot and deliver the data to assigned destination. The vehicle RFID tag stores information about the vehicle and the owner. Parameters such as vehicle plate number, vehicle type, speed of the vehicle, license number, the travelling location of the car are monitored and stored. This knowledge of information from every vehicle helps in estimating the number of vehicles on the road, average speed of the vehicles and the density of the vehicles on the road. The data from each vehicle is gathered or collected by means of a fixed or mobile RFID reader at each monitoring. Finally the information is sent to the central server for collecting, processing and storing.

In Fig.3, System Architecture is implemented. Once system connects to the internet, all information of vehicles on each road segment is immediately saved in database and can be used for any purpose and application. When a vehicle with an RFID tag passes through each monitoring station along the road, the RFID reader at those points will automatically read the tag data related to the vehicle and its owner and transmit to the wireless sensor active nodes. These nodes send accumulated data to the cluster head node. At the same time, a GPS receiver installed at the monitoring station can communicate with GPS satellites to obtain its position information that is taken as a position parameter of the vehicle. Then the data is transmitted using GPRS scheme to the real-time central database where the data is constantly updated to ensure data reliability.

![Image](image2.png)

**Fig.3** System Architecture

**C. Toll booth Payment**

In Fig.4, the complete RFID system is shown. RFID is an automated data-capture technology that can be used to electronically identify, track, and store instruction involve on a tag. A radio frequency reader scans the tag for data and sends the information to a database, which stores the data contained on the tag. The main technology components of an Radio Frequency Identification system are the tag, reader, and database.

![Image](image3.png)

**Fig.4 Complete RFID System**

RFID is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag or label, attached to an object, through a reader for the purpose of identifying and tracking the object. The application of bulk reading enables an
almost-parallel reading of tags but in turn may lead to collision also. Passive RFID tags do not use batteries and must be used at a close range of 3m or less. The antenna tuned to a particular radio frequency, sends out radio waves. The reader then sends out a radio signal to the tag/antenna, which is activated to transmit the pertinent information. The radio signal contains enough energy to power the tag long enough to send out its information. Most passive RFID tags use Electrically Erasable Programmable Read Only Memory (EEPROM) for small amounts of data.

**Fig.5 General RFID based Toll Tax Image**

In our project the reader is placed in a strip which is laid beneath the lane, and the tag is placed in the front side of the number plate. The object detection sensor which is placed on the side of the road detects the approach of the oncoming vehicle and intimates the stepper motor to raise the strip. Thus the reader raises to ground level and reads the information in the tag and the transaction takes place through a centralized database and the aftermath details of the transaction is intimated to the user’s mobile through GSM technology.

**ADVANTAGES**

- Reduces traffic congestion by giving warning signal to the user through the android app.
- Used to find empty parking space and parking payment is done using the app.
- Toll gate congestion can be avoided by paying through the app.

**CONCLUSION**

This paper presents a real time traffic monitoring system to solve the problem of real time traffic controlling and monitoring. The proposed system provides a new way of traffic control by the better utilization of resources. The traffic administration department can use this real time traffic monitoring information to detect the dangerous situations on the road and thereby react by imposing immediate actions. On the whole IoT will play an important role in traffic monitoring by improving the efficiency of traffic safety and travelling costs.

Designed a system to give complete solution for traffic and transport related problems such as Toll gate control, traffic signal control, traffic rules violation control, parking management and special zone alert using the latest RFID technology. It is proposed as a low cost optimized solution using RFID and GSM mobile technology.

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