Smart Parking for Smart Cities

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Abstract- In the most of the modern cities it is difficult and expensive to create more parking spaces for vehicles since the numbers of vehicles that are running on the road are increasing day by day and the count of the free spaces in the cities are the same. This problem leads to congestion for parking seekers and drivers. To develop an IoT framework that targets Parking Management which is biggest challenges in modern cities. Pervasive presence of smart phone encourages users to prefer mobile application based solutions. Growth of IoT has paved way for integration of mobile devices, wireless communication technologies and mobile Applications. This project is an IoT based Smart parking system for smart cities that integrates with webpage. It provides a comprehensive parking solution both for the user and owner of the parking space.The main feature of this project is to identify the nearest free parking space and to navigating to the parking slot. IR sensors are used to identify if a parking spot is free. Availability of a free slot with its location information is transmitted using GSM/GPRS module technology, microcontroller and wireless communication technology to the server and is retrieved through a message application. A decision making algorithm is used to identify whether the parking slot is empty or occupied. The owner of the parking space can also get the analytics of the number of filled and available slots lively just by pinging our system through short message. This system helps in improvising the management of parking system by following rules of the government, for example handling different parking spaces in the city

Keywords- IR Sensors, Arduino Uno, GSM Voice Modem, Transformer.

INTRODUCTION

Currently, the IoT applications in our daily life are blooming, and there is also a growing trend in the applications of smart cities which can help in improving to reduce smart cities issues. In Smart City we faces many difficulties while developing, to solve smart city issues we have to develop such system which is combination of the new technology also of low cost and based on the different network combination of the Internet, such as a telecommunications, broadcast, wireless and sensor networks where Internet of Things (IoT) is base technology. One of the major issues in a smart city is the Parking.

A parking slot should provide customers enough spaces to park their car since car plays a huge role in transportation, there is need of finding out parking area to park the vehicles. By creating a new system, it can help manage and reducing the road traffic. A new system helps customers to save time in finding a parking spot. The Internet of Things is about installing different sensors like ul active and passive IR etc that connect to the internet through different protocols for exchanging information and to communicate, in order to achieve monitoring, management. Using IoT, Smart City can be established by integrating these features for IoT development. The Internet of Things (IoT) uses devices which are connected to each other and systems to collect the data by using embedding sensors, actuators and other physical objects.

The web based portal used provides the information about the free parking space available through an URL link. The use of portal eliminates human error as the availability can be checked then and there instead of using an application which is prone to malfunction and human errors. As there is no admin interference it establishes a direct communication between the provider and the user.

STATUS OF CUREENT AVAILABLE SYSTEMS

The existing system describes the evolution of traditional parking system that it does not only provide live information to users in order to make it easy for them to look for vacant parking lot, it also give authority to operators to monitor and perform simulations to illustrate the real parking system. The purpose of this project is to apply the principles of queue theory into parking system modeling. The queue system model enables the predictions of arrival and service time in the system through analysis and calculations. Aside of it, Graphical User Interface (GUI) is also designed and integrated into the parking system in order to allow parking zone operators to monitor the status of the parking lots and view the statistics of arrival rate, service time and so on. This project focuses on the system modeling and software development and implementation. It is expected that this project will be able to assist parking zone operators in designing their system that will work efficiently and generate high income. It will also provide convenience to the operators in managing the parking zone remotely. Users will also experience a time-saving and stress-free parking zone.

Limitations of Existing System:

The main limitations of the existing system are

Availability of parking slot is not tracked by physical presence of vehicle in a parkingslot.

System gets failure when the user parks the vehicle mistakenly in another parking slot.

III. Less reliability and there exists a unpredictability in parking slot availability.

USERS OF THE SYSTEM

Individuals owing private vehicle.
System administrator.

REVIEW ANALYSIS OF EXISTING SYSTEMS

Although recent updates in the application like giving the creation highlights like apportioning the spaces dependent on the client's area ,still the applications are not excessively effective to give the doable arrangement. There are the applications created like ParkMe stopping, SwissParking and so forth were not ready to give the answer for the issues to the degree.

Present e-parking application	Defects in the present application	Ratings	Proposed e-parking application
Park E-Parking	1. It gives inadequate data to the client. 2. It gives less stopping places.	Average	The application gives finished data to the client.
Parkitekt Bangalore	It doesn't give legitimate login and enrollment.	poor	It has the easy to use interface.
Get My Parking	Sometimes it does not provide you with proper parking places.	Good	Provides with the user required parking places.

Table 1. Comparison of different parking applications with the proposed system.

PROPOSED SYSTEM

The diagram below (Fig 1) shows the entire process of how the system works for finding the nearest parking slot nearest to user.The project proposes an IoT based Smart parking system that integrates with webpage. It provides a comprehensive parking solution both for the user and owner of the parking space. The main feature of this project is to identifying nearest free parking space and to navigating to the parking slot. The user will check for the nearest station and he/she will send a message to the mobile number allotted for a particular station. The user in return will receive a URL containing information about the free parking space available.

IR sensors are used to identify if a parking spot is free. Availability of a free slot with its location information is transmitted using GSM/GPRS module technology, microcontroller and wireless communication technology to the server and is retrieved though a mobile application. A decision making algorithm is used to identify whether the parking slot is empty or occupied. The owner of the parking space can also get the analytics of the number of filled and available slots lively just by pinging our system through short message. It establishes the direct communication between user and the service provider without any internal/external interference.

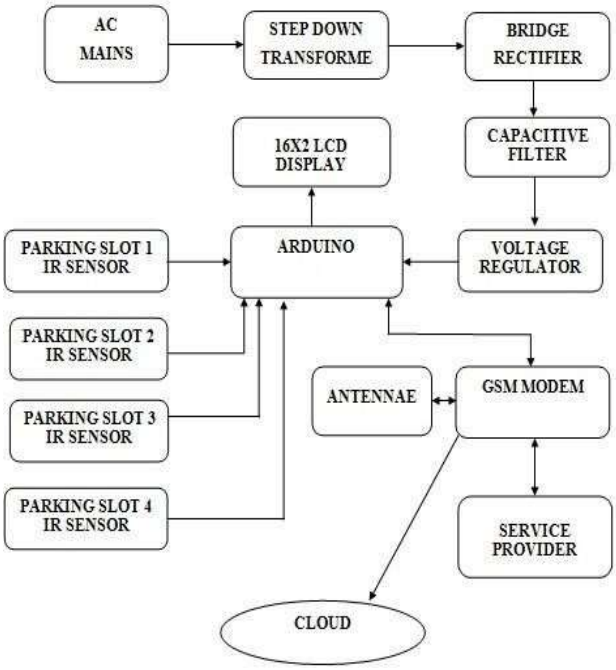

Fig.1.Block diagram

TECHNOLOGY TO BE USED

16X2 LCD:

This is an LCD Display designed for E-blocks. It is a 16 character, 2-line alphanumeric LCD display connected to a single 9-way D-type connector. This allows the device to be connected to most E-Block I/O ports. The LCD display requires data in a serial format, which is detailed in the user guide below. The display also requires a 5V power supply. Please take care not to exceed 5V, as this will cause damage to the device. The 5V is best generated from the E-blocks Multi programmer or a 5V fixed regulated power supply. The 16 x 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+5V).

Fig.2.16x2 LCD

Arduino Uno:

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter. Arduino Uno has a number of facilities for communicating with a computer, another Arduino board, or other microcontrollers.

Fig.3.Arduio Uno

IR Sensor:

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

Fig.4.IR Sensor

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GSM Voice Modem:

This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM800C is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface, the SIM800CS is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, delivers performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

Fig.5.GSM Voice Modem

Transformer:

A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic fields. Transformers are used to increase or decrease the alternating voltages in electric power applications. It is a step down transformer in which the secondary winding is more than primary winding. Due to this windings it can able to step down the voltage. A Transformer changes electricity from high to low voltage or low to high voltage using two properties of electricity.

Fig.6.Transformer

I. IMPLEMENTATION

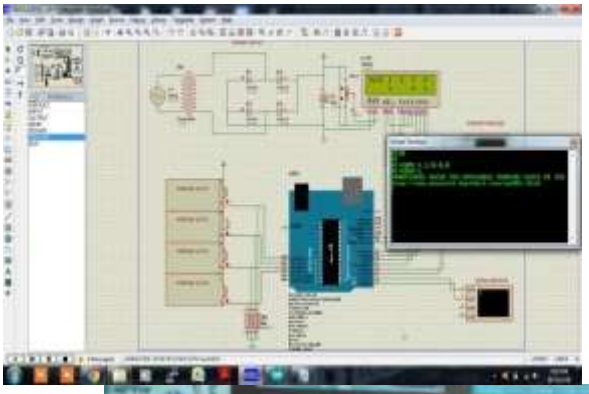

Fig.7.Stimulation Output

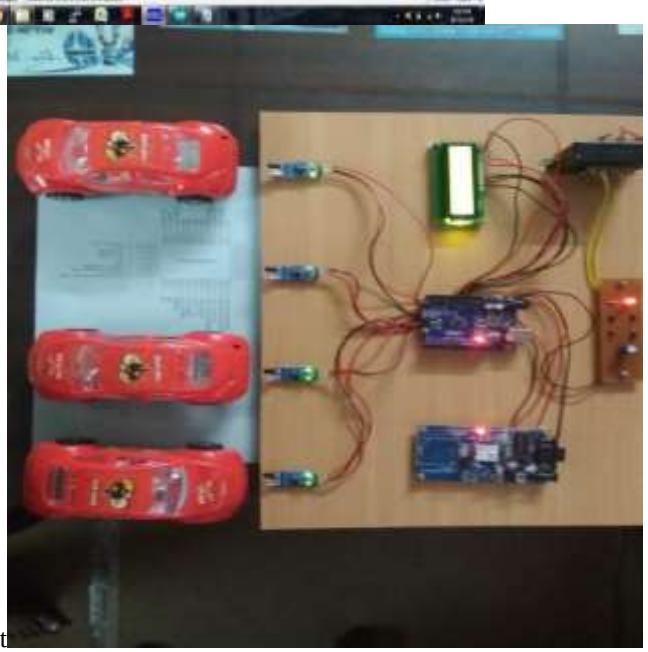

Fig.8.Final Output

II. CONCLUSION

In the smart cities, mainly people face problems like parking issue, traffic congestion, time delays etc which is nullified by this system which helps in improvising the management of parking system by following rules of the government, for example handling different parking spaces in the city. Using internet of things in a smart parking system it helps in reduction in consumption of fuel, it reduces traffic congestion in cities and cloud used for storing the information which is collected from the sensors. The system benefits of smart parking go well beyond avoiding time wasting and Developing a smart parking solutions with in a city solves the pollution problem. It also establishes the direct mode of connection between the service provider and the receiver. This also minimizes the chances of human errors and provides better efficiency.

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