Online Car Parking Allotment System

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Abstract - **Online parking allotment system typically obtains information about available parking spaces in a particular area and process is real-time to place vehicles at available positions. It involves using low-cost sensors, real-time data collection, and mobile-phone-enabled automated payment systems that allow people to reserve parking in advance or very accurately predict where they will likely find a spot. When deployed as a system, Online parking allotment system thus reduces car emissions in urban centers by reducing the need for people to needlessly circle city blocks searching for parking. It also permits cities to carefully manage their parking supply. Online parking allotment system helps one of the biggest problems on driving in urban areas finding empty parking spaces and controlling illegal parking. The data collection method used was pretty simple. We have used Infrared Sensor (IR Sensor) to collect the data which in here is whether the parking slot is free or occupied. We have embedded the sensor physically to the parking slot so, whenever it is triggered, as it is connected to the internet, will send the data to the remote server where it will be Updated or kept in the database.**

Index Terms - **Arduino Uno, NODE MCU, GSM, IR Sensor, Keypad, Display.**

I.INTRODUCTION

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

Our project is online parking allotment system on which will implement internet of things to facilitate the real time availability of parking spaces. Traffic congestion caused by vehicle is an alarming problem at a global scale and it has been growing exponentially.

Car parking problem is a major contributor and has been, still a major problem with increasing vehicle size in the luxurious segment and confined parking spaces in urban cities. Searching for a parking space is a routine (and often frustrating) activity for many people in cities around the world. This search burns about one million barrels of the world's oil every day. As the global population continues to urbanize, without a well-planned, convenience-driven retreat from the car these problems will worsen.

II.SYSTEM DESCRIPTION

The detailed Block diagram of the full project involving the main components like Arduino, IR sensor, GSM Module, Node MCU is shown below.
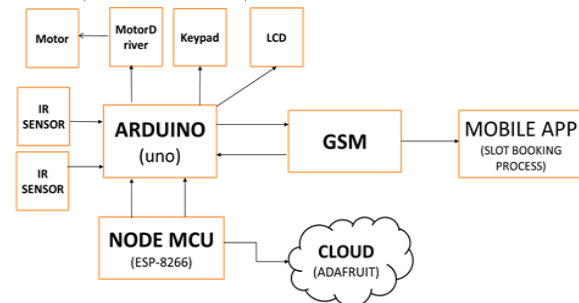

Fig1.Block Diagram of System

The above block diagram is of the online car parking allotment system that gives the information of the available parking slots and the direction towards slots on Google map. Following is the brief information of every block.

- Arduino Uno:
  The Arduino is a used as processor in our project. All the sensors, GSM module and NODE MCU will give input to the Arduino and after getting input Arduino will process on it and gives output.
- NODE MCU:
  Node MCU is used to create WIFI. And with the help of that WIFI, cloud will be accessed.

- SIM 300(GSM module):
  GSM module is used to communicate between system and user with SMS including booking status and Google map link.
- IR Sensor:
  IR sensor used to detect availability of parking slot.
- Motor:
  Motor is used to move barricade upwards and downwards.
- Motor Driver IC (L293D):
  Motor operates on high current which Arduino cannot provide. So, Motor driver is used to boost low current to high current

HARDWARE COMPONENTS USED

A. Arduino Uno:

Arduino is an open-source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. it is an open-source computing platform that is used for constructing and programming electronic devices. It is also capable of acting as a minicomputer just like other microcontrollers by taking inputs and controlling the outputs for a variety of electronics devices. It is also capable of receiving and sending information over the internet with the help of various Arduino shields. Arduino uses a hardware known as the Arduino development board and software for developing the code known as the Arduino IDE.
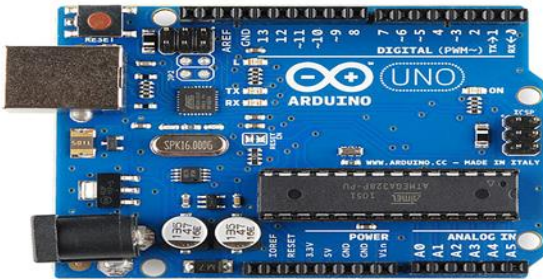

Fig2.Arduino Uno

B. NODEMCU (ESP8266):

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give Any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. The ESP8285 is An ESP8266 with 1 MiB of built-in flash,

allowing the building of single-chip devices capable of connecting to Wi-Fi. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions and requires no external RF parts. There is an almost limitless fountain of information available for theESP8266, all of which has been provided by amazing community support.

Fig.3NODEMCU (ESP8266)

C. IR sensor:

IR technology is used in daily life and also in industries for different purposes. For example, TVs use an IR sensor to understand the signals which are transmitted from a remote control. The main benefits of IR sensors are low power usage, their simple design & their convenient features. IR signals are not noticeable by the human eye. The IR radiation in the electromagnetic spectrum can be found in the regions of the visible & microwave. Usually, the wavelengths of these waves range from 0.7 µm 5 to 1000µm. The IR spectrum can be divided into three regions like near-infrared, mid, and far-infrared. The near IR region's wavelength ranges from 0.75 – 3µm, the mid-infrared region's wavelength ranges from 3 to 6µm & the far IR region's infrared radiation's wavelength is higher than 6µm.

Fig4.IR sensor

D.GSM (SIM 300):

SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz SIM300 provides GPRS multi-slot class 10 capability and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.With a tiny configuration of 40mm x 33mm x 2.85 mm , SIM300 can fit almost all the space requirement in your application, such as Smart phone, PDA phone and other mobile deviceSIM300 provide RF antenna interface with two alternatives: antenna connector and antenna pad. The antenna connector is MURATA MM9329-2700. And customer's antenna can be soldered to the antenna pad. The SIM300 is designed with power saving technique, the current consumption to as low as 2.5mA in SLEEP mode. The SIM300 is integrated with the TCP/IP protocol Extended TCP/IP AT commands are developed for customers to use the TCP/IP protocol easily, which is very useful for those data transfer applications.
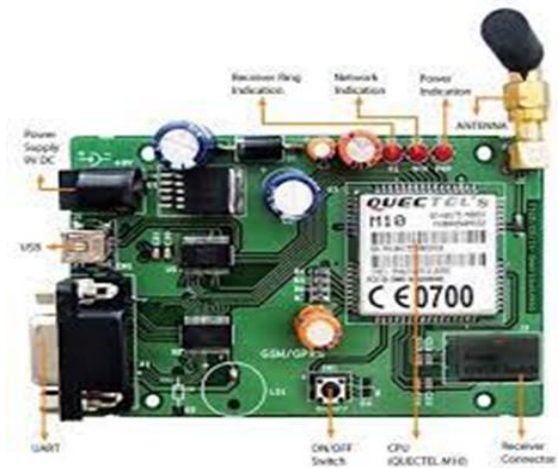

Fig.5 GSM (SIM300)

E. Keypad 4x4

Keypad is used as an input device to read the key pressed by the user and to process it.4x4 keypad consists of 4 rows and 4 columns. Switches are placed between the rows and columns. This 4x4 matrix keypad has 16 built-in push buttons contacts connected to row and column lines. A micro-controller can scan these lines for a button-pressed state. In the keypad library, the Propeller sets all the column lines to input, and all the row lines to input. Then, it picks a row and sets it high. After that, it checks the column lines one at a time.

Fig.6 Keypad 4x4

Display:

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day-to-day life, either at PCO's or calculators. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. A Single character with all its Pixels is shown in the below picture. We know that each character has (5×8=40) 40 Pixels and for 32 Characters we will have (32×40) 1280 Pixels. Further, the LCD should also be instructed about the Position of the Pixels. Hence it will be a hectic task to handle everything with the help of MCU, hence an Interface IC like HD44780is used, which is mounted on the backside of the LCD Module itself. The function of this IC is to get the Commands and Data from the MCU and process them to display meaningful information onto our LCD Screen
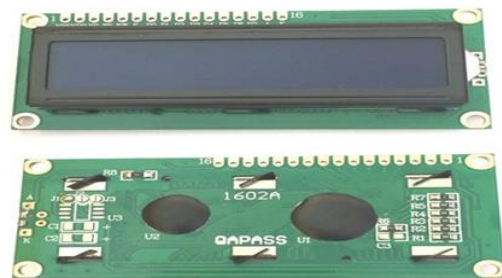

Fig.7 Display

III. WORKING

In this system there will be one which will first ask for user's phone number. After that app will show booking slots as well as it will also show whether they are booked or unbooked. The status of slots is continuously updated on cloud and with the help of Wi-Fi status of slots is updated on app.

When user selects the slot, he has to book it. After the slot is booked, user will get a link which contains one OTP and one link. The link will show the direction towards parking place.

Once user reaches to the parking place, he has to enter that OTP. If that OTP matches with the OTP which was sent, then only the barricade will open, and user will allow entering.

IV. RESULTS

The above Fig. 8,9and 10 shows the output result of the projects. It shows the message on user's mobile and location link.
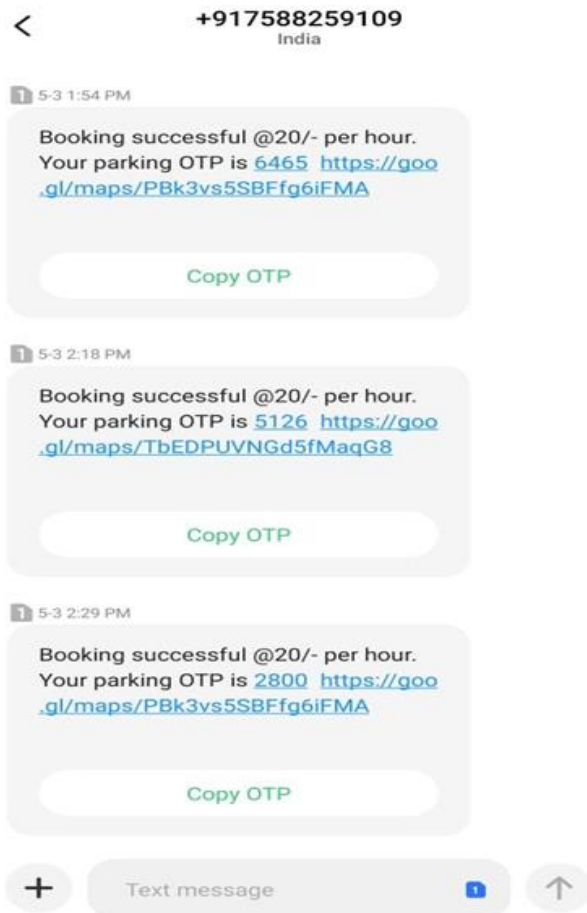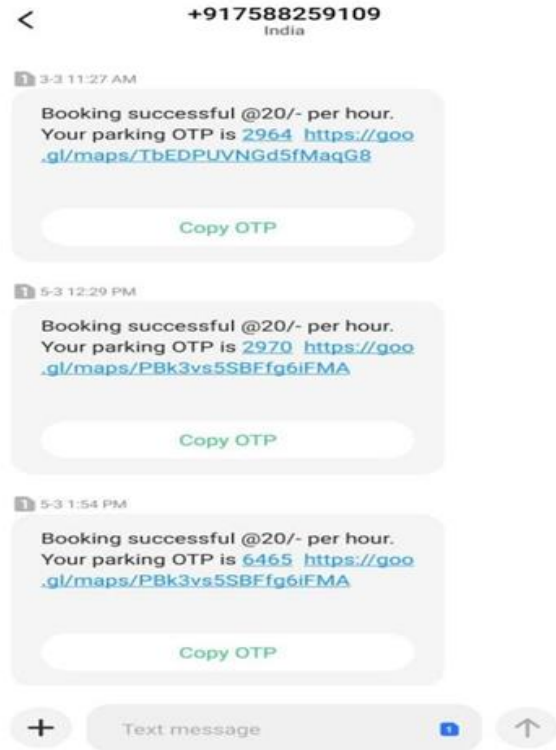

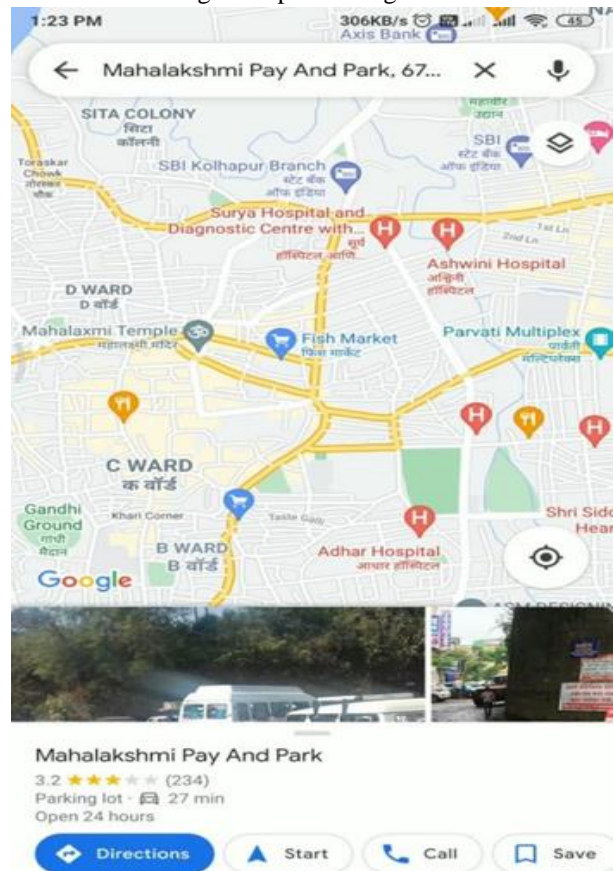Fig.8 Output message1
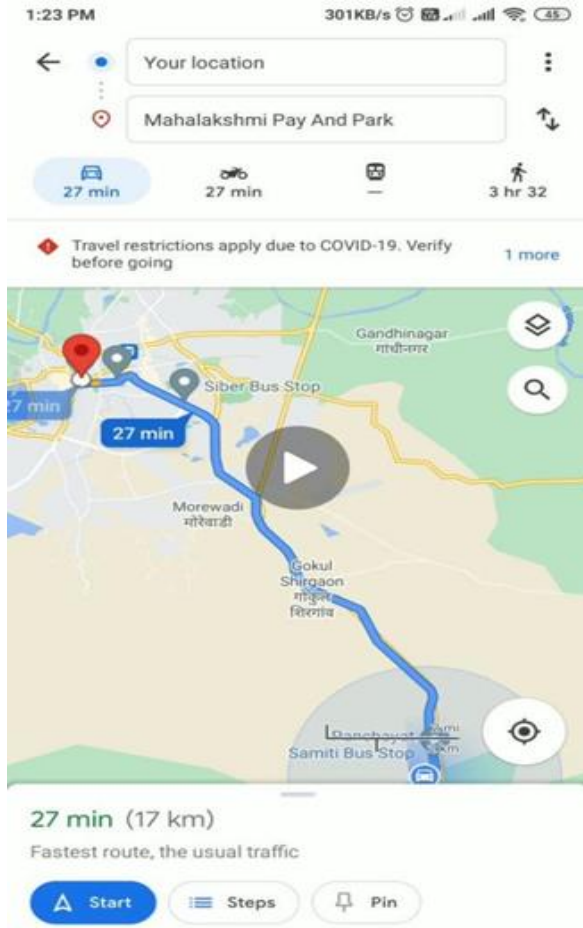

Fig.9 Output message2

Fig.10 parking location

Fig.11parking direction

V.CONCLUSION

In India, the problem of parking is tremendous as there is no proper plan for slot allocation. In comparison with other countries, there is a huge difference between total numbers of vehicles produced as compared to the number of parking slots available. In this paper, an efficient Car Parking System is proposed which will majorly reduce the parking problem. This system shows how the parking problem at crowded places can be managed efficiently. It helps the clients in finding out the availability of a parking place, get the availability confirmed, and reach the place within the allotted time. It also helps for managing easily in administrator side. It also saves the time of clients required for searching a parking slot. The system gives a visual display regarding the current parking scenario to the user. The system reduces the human efforts required in parking process by converting the whole parking process to automation. Booking or reserving a parking slot via a Smartphone is easier for a user to operate. This ultimately reduces the time and efforts required by the drivers, for searching a parking space. Which will then reduce the fuel consumption, traffic volume as well as the environmental pollution by increasing the efficiency of transportation.

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