

Smart Car Parking System and Saving Car Details

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Abstract—This paper provides a solution to minimize parking issues such as congestion proper way data management secure entry and exit etc. the paper is written on the basis of prepared and tested model. Arduino Uno is the main controller, IR sensors for car sensing servo motors for the entry and exit gates, all these is managed and run with the help of Arduino IDE. For Data Management we have used NetBeans v8.1 as our front-end and MySQL as back-end, the Frontend provides a attractive interface with security lock for unauthorized access, the security can enter the details of car and it will be saved at the backend. This provides a very reliable, secure and easy way to manage parking. With the help of our Smart Car parking System, we are trying to minimize the issues our system will a User friendly, just by seeing the display the driver can see where to park his vehicle without any delay or confusion. This will help to reduce traffic maintain record of cars provide easy access and a clear path to park

Keywords—*Arduino IDE, NetBeans v8.1, MySQL*

I. INTRODUCTION

In the modern and growing world managing vehicles and controlling the traffic has been a burning issue not just for climate change but seeing overall scenarios like mental pressure, time management etc being a tech enthusiastic I consider to solve or minimize this issue from basic level and come up with an organised data by smart approach and make faster way to parking bays. [1] Finding a parking space is a problem around the world. The parking in malls, multistorey building, IT hubs and other parking facilities where several hundred cars are parked, it becomes difficult to find a spot-on side roads and interior lanes. The general approach to finding a parking space is to drive randomly until you find a free space. Finding a parking space could be the easiest task, or it could be the most difficult when it involves wide acres of distributed space across one floor or multiple floors.

The destination is unknown which causes the time and fuel to be consumed unnecessarily. The simplest approach is to provide targeted access within the parking lot. Instead of driving aimlessly, smart car parking systems provide a visual output that indicates available parking spaces. The driver looks up to the Lcd display which tell the availability of parking space. [2] The main IR sensors detects whether the space is occupied or free respectively. These display is placed at the ceiling of parking space and the driver looks up to choose this parking space . The Lcd display works automatically with help of I2c , sensors and the feedback is given through the display section . This system not only makes the accessibility easy but also manages the congestion of vehicles by avoiding long search and wait time.

Arduino UNO

Arduino (Fig 1) is an open-source software and hardware company and user community that designs and manufacture single-board microcontroller kits for building digital devices. [3] The hardware product is licensed under the CC BY-SA license, while the software is licensed under the Lesser General Public License or General Public License. The official website has a list of authorized distributors.



Fig 1. Arduino Uno

16X2 LCD Display

Liquid crystal display (Fig2) is a multi-segment and a flat panel display which uses liquid crystals as primary form of operation. Consumers and businesses can find a variety of use cases for LEDs, which can be found in everything from computers to instruments. [8] Light-emitting diode and gas-plasma displays were new technologies that were replaced by liquid crystal displays. The displays were thinner than the CRT technology.

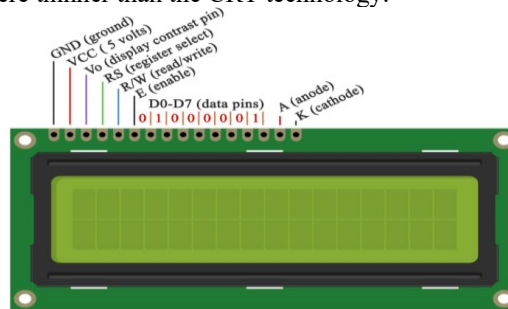


Fig 2. LCD Display

The principle of blocking light rather than emitting it is what makes the displays more power efficient. An image can be created using a backlight and liquid crystals in an LCD. New display technologies such as OLEDs have begun to replace older display technologies.

I2C Module

I2C stands for Inter-Integrated Circuit (Fig 3). It is also known as TWI. The bus interface connection protocol is used in devices for serial communication. It was designed in 1980. It is used for short distance communication. The working of I2C communication protocol. It only uses 2 open-drain lines for data communication. [4] The lines are pulled high. The data is transferred through this pin. The clock signal is carried by the serial clock. Each data bit is synchronized by a high to the low pulse of each clock on the SCL line. The data line can't change when the clock line is low, according to I2C protocols. Since the devices on the I2C bus are low, a pull-up resistor is needed to keep the lines high.

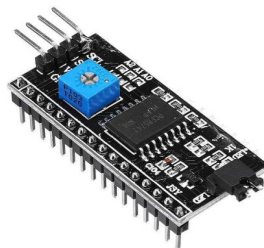


Fig 3. I2C

Infra-Red Sensor

An electronic device called an IR sensor (Fig4) emits rays of light that can detect object in certain given range. An IR sensor can detect motion as well as gauge the warmth of an object. The IR sensor produces Infrared waves that travel in space and bounce back when reflected by any obstacle and then detected by sensor. These types of radiations are invisible to our eyes. The only way to identify it is by an IR sensor. The IR photodiodes are sensitive to IR light of wavelengths similar to those emitted by IR LEDs. [5] When IR light hits the photodiode, its resistance and output voltage change depending on the size and intensity of the light. They do not require contact for detection and are immune to oxidative attack. In this project an IR sensor is used to get the most out of it. IR systems use IR receivers to control and operate devices. A photodiode is a key component of an IR receiver.

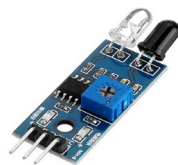


Fig 4. IR Sensor

A photodiode sense light and convert into electrical energy. The current is generated when the photons are absorbed. Devices like which are able to pick up signals from remote control like a RC toy, television etc. On receiving the rays, the signal is amplified. [9,10] You need to locate the receiver in the vicinity you want to use it in. The two major parts are

the emitter and receiver generally where one is emitting light hence being white in colour and other receiving IR light hence black in colour yet principle being different, they are proposed to be together it helps to increase range and overall efficiency of the sensor. A hardwired extender unit uses a transmitter and receiver. You can put the transmitter in one room and the receiver in another, and run the cables through the walls. When the signal is sent to the receiver, it travels down the cable and is converted to light by the transmitter on the other end. An example of a receiver with a good price/performance ratio is the LM 358P.

NetBeans and MySQL

We have NetBeans as the front-quit and MySQL (Fig 5) as our again-stop the SQL port to link is 3306 the JDBC stands for Java Database Connectivity this presents the software to JDBC supervisor connection or in brooder phrases an API that lets you get entry to honestly any tabular data supply from the java programming language

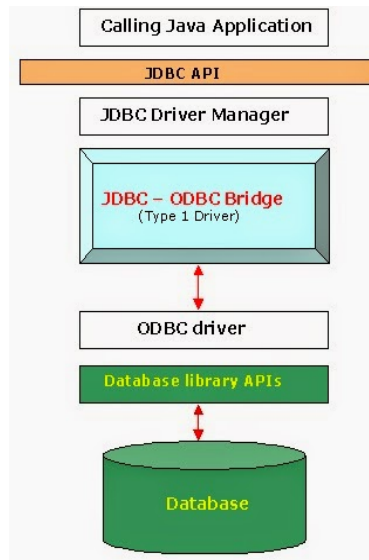


Fig 5. JDBC structure

I will describe the database management system in this article. You can read "Other Databases" for other database systems. [6] "How to Set Up MySQL and Get Started" is how to install the database. The default port for the MySQL server is 3306. You can write your own client programs to access the MySQL server, instead of using the "MySQL" command-line client program provided. Your client programs will connect to the database server at the given address and issue commands to process the results (Fig 6) received.

- STEP 1: Attach a Connection object to the database server.
- STEP 2: Under the Connection created earlier, locate a statement object.
- STEP 3: The statement and connection were created to execute the query.
- STEP 4: The query result should be processed.
- STEP 5: The resources can be freed up by closing the statement and connection.

MySQL contains important data feeds like: -

```
mysql> desc entry;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| carnumber  | varchar(30)   | YES  |     | NULL    |       |
| date       | varchar(20)   | YES  |     | NULL    |       |
| amount     | varchar(20)   | YES  |     | NULL    |       |
| leavinghrs | varchar(10)   | YES  |     | NULL    |       |
| leavingmin | varchar(10)   | YES  |     | NULL    |       |
| timehrs    | varchar(10)   | YES  |     | NULL    |       |
| timemin    | varchar(10)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
7 rows in set (0.01 sec)
```

Fig 6. MySQL Table

The columns of the fields show the data accepted at the interface, the number of the car, the date of entry, the time of entry and exit in hours and minutes. Time is deducted in minutes and total entry time is deducted from total exit time in minutes. The amount is multiplied to obtain the fee charged by the parking lot owner. The basic language used by

Netbeans is Java declarations of various variables, the implementation is simple and reliable. The system speeds up the process, reduces costs and manpower requirements, and creates a technical atmosphere.

II. WORKING & IMPLEMENTATION

The previous section described the architecture and technology stacks involved in smart parking systems. This section describes the implementation and functionality of the system in real-life scenarios. [7] The flowchart below describes the complete process of reserving a parking space, parking the car in that parking space, and exiting the parking area. Experiments were conducted to demonstrate how the system works at each step from checking the availability of parking spaces to parking the car in an actual available parking space. This is achieved by deploying intelligent parking systems in shopping mall parking lots (Fig 7).

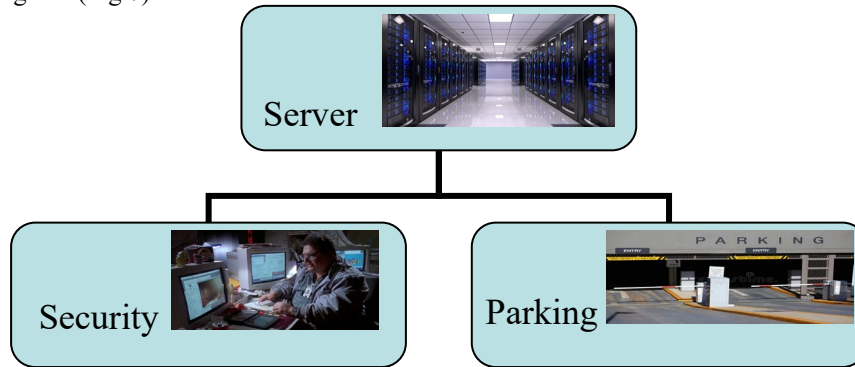


Fig 7. Function

The above process of booking a pitch and parking the car on the exact pitch is illustrated (Fig 8) using the following screenshots.



Fig 8. Entry details

New car parking details are entered in here car number, date and followed by time of entry. After submitting the data is been saved (Fig 9).



Fig 9. Exit details

The saved entries can now be used to access the exit the car number fed will give entry time and write exit time too and calculate money to be paid by user. We can also view the details of car later for enquiry purpose from the figure 10 we can enter car number the data will be fetched and showed in all the empty text fields (Fig 10).

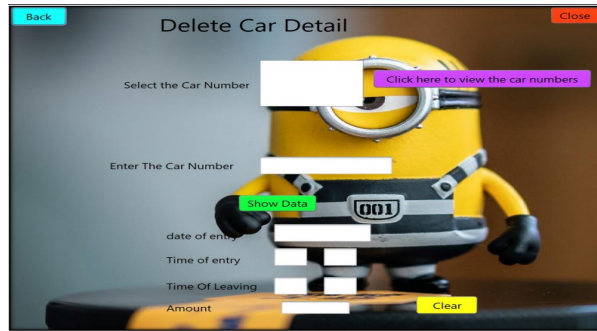


Fig 10. View details

The details can also be deleted here. But only by some super user, a key is provided to protect the data to wipe so unauthorised people cannot access it (Fig 11)

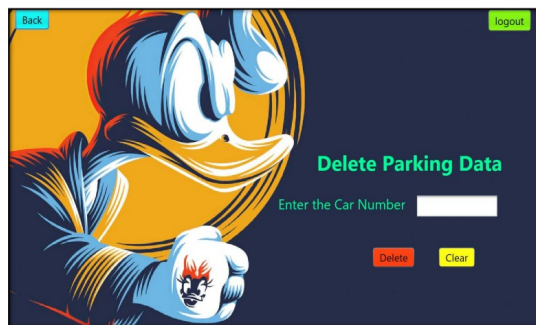


Fig 11. Delete details

Below (Fig 12) is the stimulation of parking area the entry contains a servo motor which is controlled by button 16X2 or 16x4 LCD display which will show status of IR sensors intern everything is controlled by Arduino Uno. Digital pins are given at the right side of the chip we have used pin number 4,5,6,7,8,9,10 and 11 the pin 6,7,8,9,10 and 11 are for Sensors. The Analog pins are to the left of the chip used A1 and A2 one for SCL and other for SDA. Here SCL is serial clock to control the time delay of message signal and SDA for serial data transfer its mainly react on the basis of input provided it will show the data on display the I2C module is superimposed with 16x2 LCD display in such a that all 16 ports align each other and left-over ports in i2c module controls the whole display and operates it accordingly.

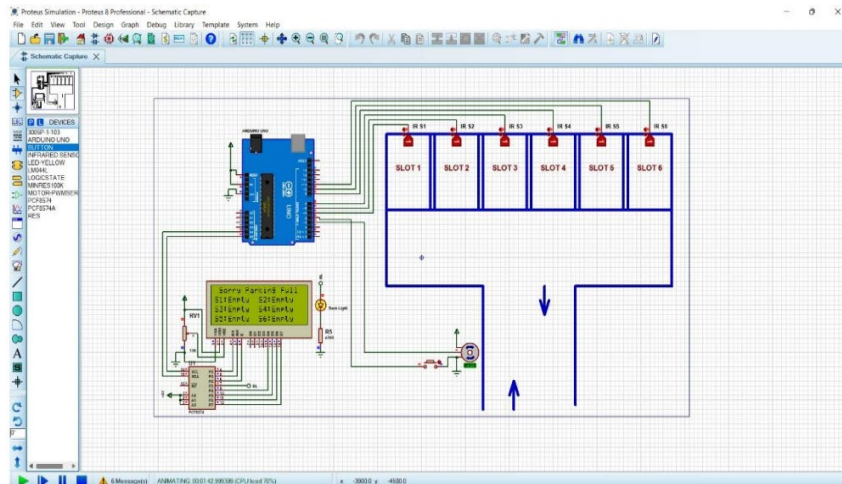


Fig 12. Parking Simulation

III. CONCLUSION

Automation is a step for a fulfilling, future in the transportation world. This design provides an effective solution to the general problem described. The intelligent parking system was designed, manufactured and tested to adjust threshold distances and provide accurate results when obstacles are detected. LCD switching based on the vehicle in the parking space was instant based on no vehicle and vehicle detected. The design can be changed freely according to the space, and it can be installed in narrow or limited spaces. Based on the number of free parking spaces displayed on the LCD, I2C recognizes a general information panel showing the number of available parking spaces. From this we can conclude that

intelligent automated parking systems can be created simply by connecting a few simple electrical components correctly. This reduces aimless driving, fuel consumption and time, and greatly simplifies the parking process.

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