e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

SMART PARKING CONTROL SYSTEM WITH AUTO GATE

D Sri Akshaya[*1], Y.Bhoomika[*2], K.Sai Shashank[*3], A.Sri Tulasi[*4]

[*1,2,3]Students of Ece Department, ACE Engineering college, Ghatkesar, Hyderabad , India.

[*4]Associate Professor, ECE Department, ACE Engineering College, Ghatkesar, Hyderabad , India.

ABSTRACT

This project attempts to cut the time to park the vehicles in the lot and help the motorists to recall the exact parked space. Motorists often spend a significant amount of time to park their vehicles in the parking lots during peak hours. They also may not remember the parked space of their vehicle precisely, while picking up the vehicle. To solve this problem, an automated vehicle parking system is designed which serves the motorist to find a space for his vehicle within less time. The system displays about the details of freed-up parking spaces. The waiting time to park the vehicle can be reduced by providing this vacant space information to the motorists before he/she enters the system. The system recognizes the vacant space and displays automatically, this display system can be provided at the entrance of the main gate, so that while entering in to the parking space, the motorist can find his parking place without anybody's direction. To sense the vehicle at parking place, infrared sensors are used; the output of the sensors is fed to micro-controller and according to the received information from the sensors, the controller displays, that the particular parking place is vacant or full. For the demonstration purpose three sets of sensors are used to simulate three parking sites. The system is designed such that, when all parking sites are filled and there is no space for another vehicle, automatically the gate will be closed. To simulate this, DC motor is used and the controller drives the motor, a small arm of 10" is coupled to the motor shaft, which simulates either the gate is opened or closed. For displaying the information LCD panel is connected at the output of micro- controller. The status of system send to mobile app through IoT device(ESP 8266)

I. INTRODUCTION

All the vehicles have to be parked in some space when the drivers leave them. Due to unorganized parking lots, people have problems in finding a parking space in lesser time and remembering it. Time is spent in obtaining parking space while entering the lot and roaming around the lots to see any free space is available. Sometime, the driver may not notice the vacant space or would be wandering without knowing the parking lot is full. Unless the driver recollects the exact parking space, he/she cannot pinpoint the vehicle in huge lots while collecting it back. These consume precious time and lead to frustration, fuel wastage, environmental pollution, and traffic congestion.

Smart parking control systems are essential for today's environment. A developing country like India because of its financial growth, we find that each and every middle class family can afford to buy a car. Naturally vehicles are increasing day by day and because of poor planning of parking management, vehicle owners are parking their vehicles zigzag at different locations and when they return to collect their vehicle, they are forgetting the parked place. Vehicle owners are spending lot of time to find out their vehicle, which is quite inconvenient for them. Some times while parking also, drivers are spending lot of time to find empty place. To avoid all these problems, this project work is designed, which helps the driver by displaying empty place on LCD screen, so that he can park his vehicle in less time. While collecting his vehicle, he can identify his vehicle very easily, because the system identifies and displays all the parking places.

II. WORKING

Since it is a prototype module, the system is designed for three parking places and all the places are monitored continuously by the infrared sensors. These are nothing but optical sensors, each and every individual parking place is equipped with a pair of optical sensors for identifying, whether that particular place is vacant or full. The outputs of all the three pairs are fed to microcontroller through detector circuits. This microcontroller chip is pre-programmed and depending up on the program, the microcontroller unit displays the status of the entire parking lot through LCD panel. The LCD used in this project is having three rows to display the status of three parking places independently. For example if any one place is empty out of three, that particular place number

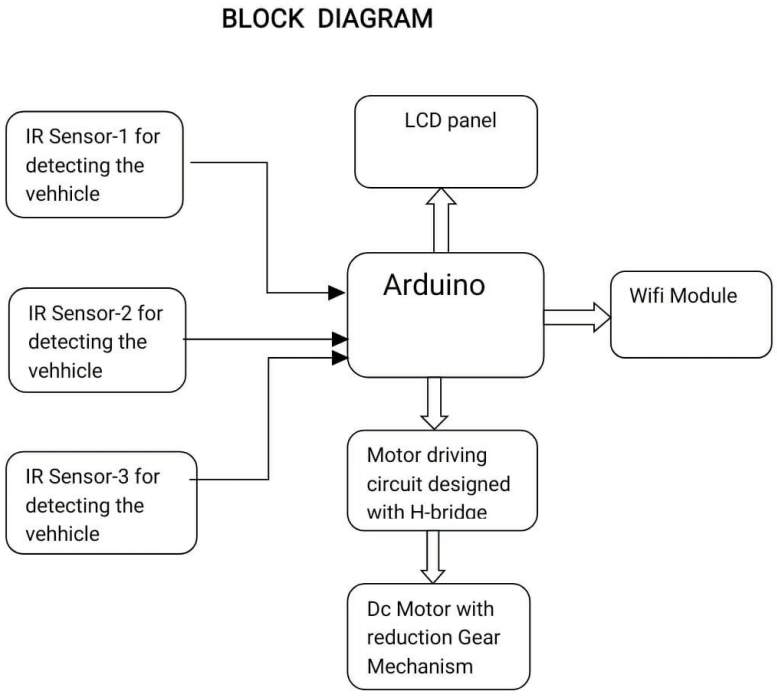
e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

in the row shows empty and other two rows shows full, likewise all the three rows displays independently. As the system is designed for demo purpose, a small panel is used and it is interfaced with microcontroller unit. The real working system should have a big display, so that the driver can monitor it from at least ten meters away. Similarly the real working system should able to display hundreds of parking places status. The LCD panel can be arranged at the entrance of parking area for the convenience of vehicle driver, so that the driver can identify empty place at the entrance itself and without any confusion he can park his vehicle within less time. The program is prepared in assembly language, details are provided in following chapters.

Another important facility provided in the system is automatic gate control system, whenever the complete parking area is filled with vehicles and there is no space for another vehicle, automatically the microcontroller unit displays all places full and closes the gate immediately. Whenever any vehicle from any parking place is removed from its parking place, automatically the controller opens the gate immediately. DC motor is used to control the gate mechanism. By implanting this kind of smart parking systems everywhere, parking place owner as well as driver both are benefited in many ways.

The system is designed with microcontroller, which controls the DC motor automatically according to the availability of parking place. Today microcontrollers are playing major role, almost in all activities. These mini chips acts as a mini computers can perform many tasks like, data acquisition, data display, data storage, etc, in addition to these, it can control any mechanical transmission, drives through motors efficiently. These chips are increasingly being used to implement control systems. It is therefore important to understand microcontroller architecture well. This project report describes about the design and development of "Smart parking control system" and mainly it focuses about microcontrollers.

BLOCK DIAGRAM:



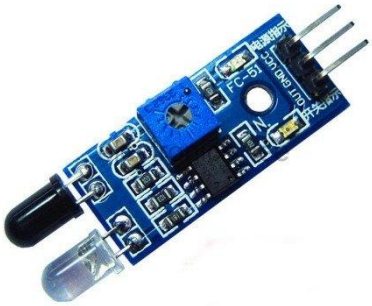
III. MODULES OF THE PROJECT

IR SENSORS

The applications and advantages of infrared sensors are plenty; mostly these devices are utilized for various types of security systems by implementing proximity detection theme. Other important applications are for counting objects, or counting revolutions of a rotating object. In any concept, the proximity detection

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

package contains two devices, namely infrared light emitting diode (IR LED) and infrared light/signal detector (IR sensor). The IR LED is always ON, meaning that this device is constantly emitting light and the sensor is detecting this light. The sensors can be interfaced with trigger circuit to generate logic high/low pulses depending up on the interruptions created by any object. This design of the circuit is suitable many applications. However this design is more power consuming and is not optimized for high ranges, in this design, range can be from 1 to 10 cm, depending on the ambient light conditions. The following are the few applications



DC MOTOR

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

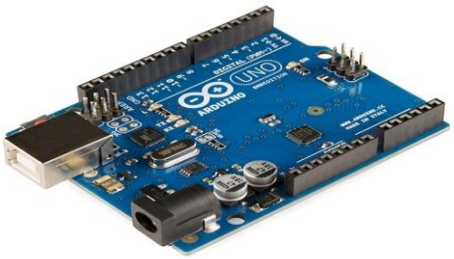
DC motors were the first type widely used, since they could be powered from existing direct- current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are used for multiple applications in the field of electronics and communications. Arduino is a basic single board microcontroller designed to make applications, interactive controls, or environments easily adaptive. The hardware consists of a board designed around an 8-bit microcontroller, or a 32-bit ARM. Current models feature things like a USB interface, analog inputs, and GPIO pins which allows the user to attach additional boards. GPIO stands for General Purpose, Input, Output. All the processors we use to

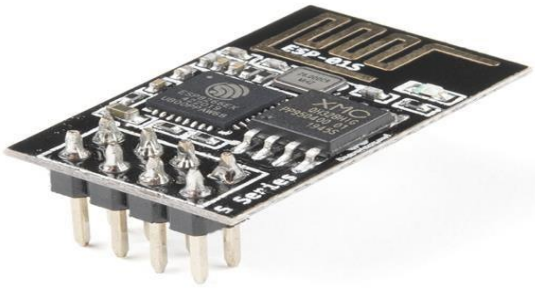
e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

have at least a few, a Raspberry Pi and an Arduino have a lot of General Purpose Input Output that we can design our circuits.



WIFI MODULE ESP8266

Using Arduino, Nodemcu esp8266. Wi-Fi module and Blynk application. With the help of Nodemcu esp8266 Wi-Fi module and Blynk application, the parking slots can be monitored from anywhere around the world.Where parking lot we have 3 slots and every slot has one infrared sensor. So we have in total 3 infrared sensors. Each sensor is used to detect the presence of Car in the Slot. These infrared sensors are connected with the Arduino. So when a Car is parked in the slot, the Arduino sends a command to the Nodemcu esp8266 Wi-Fi module, then Nodemcu sends the command to the Blynk application. Where parking slot 1 will be filled when the car is parked in the slot and if the remaining slots are empty then the status of the parking lot will be available in the blynk app so that the other user can park the vehicle in the available parking slot. Even while entering the parking area we have another display (LCD display) which display the status of slots that how many slots are filled and how many slots are empty.

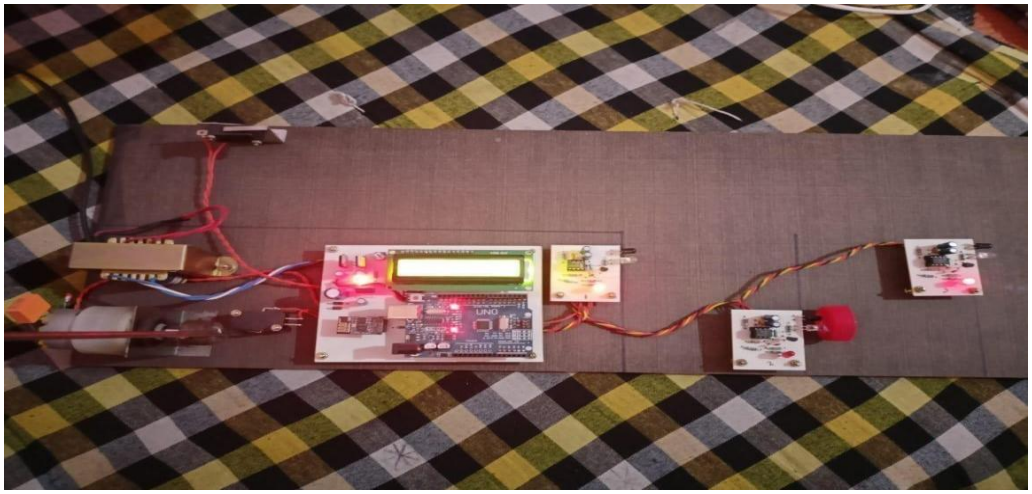


LCD

The LCD panel used in this project work interfaced with micro-controller through the output port. This is a 16 character x 3Line LCD module, depending up on the availability of LCD panel 4 lines or more panels can be used for the purpose, so that more information can be displayed simultaneously. These panels are capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user. Programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h is chosen.

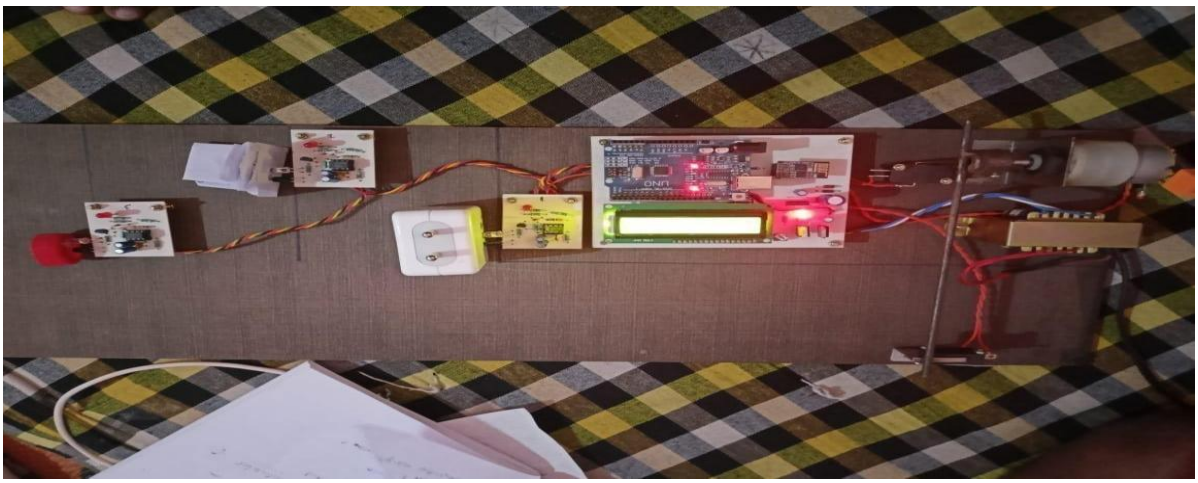
e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com

IV. RESULTS



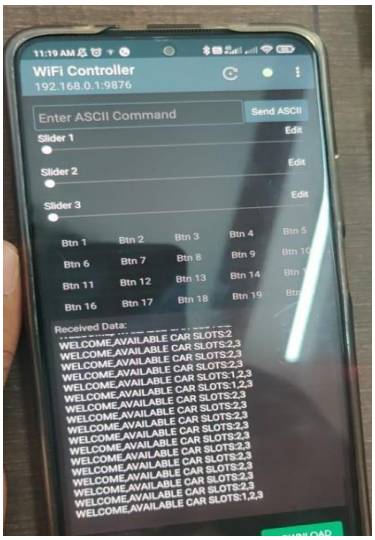
SLOT 2 is occupied and SLOT 1 and SLOT3 are Empty,Gate is open

SLOT 3 is occupied and Gate stays open when SLOT 1, SLOT 2 are vacant viceversa for SLOT 1 AND SLOT 2



Gate is closed when all the slots are full and LCD will show the status of Slots which are full.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:07/July-2022 Impact Factor- 6.752 www.irjmets.com



When SLOTS 1,2,3 are Empty WiFi Controller App shows available slots are 1,2,3 in the parking area . It reduces the risk of finding the slots

V. CONCLUSION

The project work **"IoT Based Smart Parking Control System Designed with Microcontroller"** is designed and developed successfully, for the demonstration purpose prototype module is constructed and results are found to be satisfactory. Since it is a demo module, we have consider for three parking places and according to that LCD panel is selected for displaying the parking status, but when the system is utilized for real applications it should able to display the entire parking lot. The entire parking lot may provide facility for parking hundreds of vehicles, there by the technology has to be enhanced and instead of using LCD panel computer can be used, so that lot of information can be displayed. The computer monitor can be arranged at the entrance of main gate, in which empty places can be displayed for in coming vehicles. This helps the driver to locate his parking place and without any confusion within less time he can park his vehicle. When the system utilizes computer, many more features can be added for the convenience of parking place owner as well as for the convenience of vehicle owner. For example the vehicle, which is parked at a particular parking place, can be identified very easily when the driver recollects his vehicle, feeding the vehicle number in to the computer while parking itself can do this. At the time of recollecting the vehicle, simply the driver has tell his vehicle number to the operator and by entering the number, the computer can display the parking place number. Similarly entry time and exit time of each and every vehicle also can be recorded, if required computerized print out can be taken out . Like wise endless features can be added to the system when it is converted as computer based monitoring cum control system. The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have give rise to new possibilities in terms of smart cities.

VI. REFERENCES

[1] Abhirup Khanna, R. A. (2016). IoT based Smart Parking System. International Conference on Internet of Things and Applications (IOTA) (p. 5). Pune: IEEE.

[2] Deng, D. (2015). A Cloud-Based Smart-Parking System Based on Internet-of-Things Technologies. IEEE , 11.

[3] O. Orrie, B. S. (2015). A Wireless Smart Parking System. IECON (p. 5). Yokohama: IEEE.

[4] Khaoula Hassoune, W. D. (2016). Smart parking Systems:A Survey . IEEE , 6.

[5] Wael Alsafery, B. A. (2018). Smart Car Parking System Solution for the Internet of Things in Smart Cities. IEEE , 5.

[6] Rachapol Lookmuang, K. N. (2018). Smart Parking Using IoT Technology . IEEE ,6.