

# Automatic Car Parking System Using Arduino

Nihal Deochand Chaudhari<sup>1</sup>, Ayushi Singh<sup>2</sup>

<sup>1,2</sup>Department of Electronics Engineering, Shri Ramdeobaba College of Engineering and Management, Nagpur, Maharashtra, India

\*\*\*

**Extract -** It is observed that in the past few years selling of vehicles is increased exponentially throughout India. This causes a lot of problems like traffic congestion, difficulty in finding parking spots, wastage of time and fuel et cetera. In this paper we are proposing a system that will help in overcoming this problem by pre -booking of parking slot sitting at home using a mobile application. Application will gather the data from the user in the form of date and time of reservation and check the availability and confirm the booking accordingly. The parking lot will have a microcontroller based system that will allow a vehicle by verifying an OTP provided previously. The vehicle will be allowed to exit on the successful payment of charges.

**Key Words:** GSM module, RF module, mobile application, pre-booking of slot, DC motor, Microcontroller.

## 1. INTRODUCTION

People in densely populated areas are usually facing issue of finding space for parking. Drivers have to personally search for empty parking space in absence of information of the parking status. As such, it takes more than usual time to find parking space by drivers[1] In this daily evolving technology world, man wants to live a comfortable life which is generally defied by a single moment of trouble due to absence of finding a parking slot. In the metropolitan cities especially car parking has become a big issue. [2] As we move through time, the manual car parking system in commercial complex is causing discomfort which in turn results in a waste of time as well as monetary loss. As such we need a solution that can control this problem. Is a smart car parking system is envisaged which will help in tackling the above mentioned obstacles. The system is fundamentally divided into two parts: the booking mechanism and the parking lot mechanism.

### 1.1 Issues with the Traditional car parking system:

Before Traditional or manual car parking system is being followed at most of the places or in any direction in our country. But as it is figured out in various studies that but this system is full of problems. Some of them are as mentioned below:-

1) We observe traffic jam in front of hospital, where parking lot is allotted for hospital but vehicle of nearby utilities are parked in the same. Also, the parking guard stops the every automobile and make a payment slip, causing traffic jams.

2) It is difficult and time consuming to locate the correct parking slot which results in consumption of extra fuel and waste of time. As well

3) Security of person is the other problem envisaged in manual car parking, where people can enter the parking slot and there is a chance of snatching, robbery, grabbing

4) In manual parking system more guard is required for the entire work resulting in increased cost. [3]



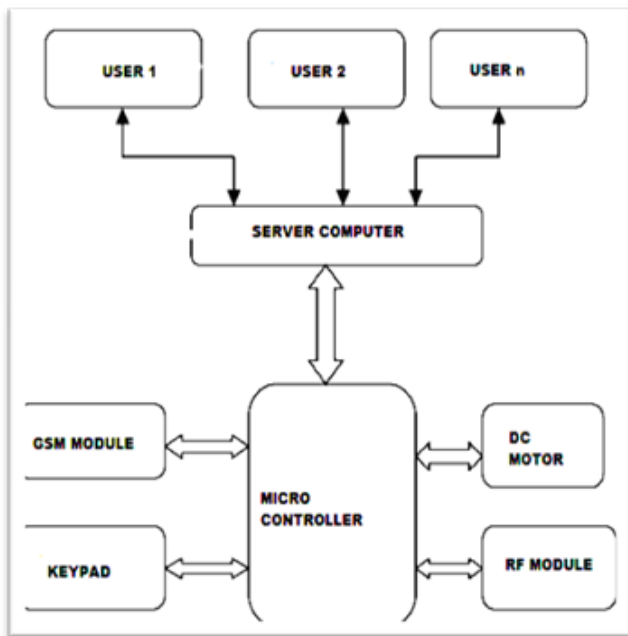
(Present parking scenario)

## 2. Motivation and Objectives:

- 1) Reduce traffic mess caused by an unplanned parking system.
- 2) Optimize available parking space.
- 3) To reduce harmful carbon emissions and save fuel.
- 4) Increase safety of vehicles and vehicle owners.
- 5) Time saving.

Solving such a problem or even an attempt to reduce it will surely provide many benefit viz., lack of drivers frustration and stress, saving time and fuel, reduce gas emissions thereby help in bad effects of the pollution levels. It is evident from the modern statistics that considerable fuel is being wasted during the time of searching a suitable space for parking slot.

### 3. Block Diagram of proposed system:



### 4. Working of the system:

1) The introduced system consists of two parts: the first part deals with the user and the second part is at the parking lot. The user books a parking spot using the mobile application by providing details like date and time of reservation and tentative time period of booking for which he will be billed. After confirmation the user is provided with an OTP which he has to provide at the time of accessing the parking spot.

2) The microcontroller at the parking lot is interfaced with two DC motors controlling the entry and exit gates, a GSM module, RF modules and a keypad. RF Modulus, and radio frequency modulus which is an electronic device that is very small, and is used to transmit or receive radio signals in between two electronic devices. The utilization, RF Modulus helps in to communicate wirelessly with another device.

3) Each slot has an RF module which sends pulse to the microcontroller indicating the availability of a particular slot, if it is confirmed that the slot is free during that time period then a message containing the OTP is sent to the user using the GSM module. Which means Global system used for Mobile communication is an architecture used for mobile communication in most of the countries. A GSM-Gprs system and coputer use this module to establish communication, it consists of a GSM modem and communication interfaces (like RS-232, USB, etc.) and power supply circuit for computer.

4) This is an ultra-compact and reliable wireless module which is SIM900A complete Dual-band GSM/GPRS solution in a SMT module which can be applied in the users applications. The SIM900A is a complete a dual band GSM/GPRS 900/1800MHz works for voice, SMS, data and Fax in a small form factor and with low power consumption through which it can fit almost all space requirements in user applications, designed specially for slim and compact devices. [3]

5) exit time of a vehicle from a lot it is checked if the parking reservation is exceeded, if so the user has to make the remaining payment before checkout.



(Entrance and exit of proposed system)

Source: alibaba.com

### 5. Advantages of proposed system as compared to traditional system

1) Optimized parking – Drivers can able to search for the appropriate available spot thereby, which can be time saving and money saving. The parking lot fills up effectively and space can be utilized appropriately.

2) Lesser traffic –decreases in traffic conjection as lesser cars need to drive around in search for an empty parking space.

3) Lesser pollution – parking effectively ensures less stoppages and driving time thereby reducing fuel emission and subsequently reduce the global carbon footprint.

4) Smart User Experience – A parking solution will make sure of the smooth process and the entire user experience turns into a unified action viz. payment, spot identification, location search and time notifications and all of the driver gets effortless destination arrival process.

5) Exploring Revenue - Revenue generation is possible with smart parking technology. Many of the owners can enable payment options dependent on parking space location.

6) Increased Safety – Vandalism of public and private property can be avoided as the access to the slot is limited, and unauthorised entries are not permitted.

7) Real-Time Data and Trend Insight – In a few years' time a lot of significant data can be collected that will help to

predict a pattern and help the management to improvise the system accordingly.

8) Improved Management Costs – Efficient implementation of automation and thereby less manual activity can save on labour cost. [4]

### 6. Applications of proposed system:

1) Office Buildings: Implementation of proposed system in Official Complexes will help the staff to park their cars without any hurdles thereby avoiding waste of time. Also if someone is already late he wouldn't be late any further by having to search for the parking space and park his car. The security can be provided to their cars and can be prevented from stealing. [3]

2) Super bazar Complex: It is observed that during sales and festivals large crowd is attracted towards malls and the parking is very haphazard. Also the nearby roads are congested. To prevent the congestion and haphazard parking, the proposed system is an excellent choice.

3) Railway stations and Airports: A lot of people nowadays commute large distances by train daily to their workplace. Thus they leave their own vehicles at the railway station for the day. This creates a mess as sometimes people leave their vehicles several days at a stretch without paying the parking fees. Hence the proposed system can help to easily manage this problem easily.

4) Streets: It is observed everywhere India that while shopping from the local markets and shops people leave the vehicles unattended on the streets. This restricts the traffic flow. The proposed system will be very beneficial in regulating traffic flow on narrow roads and streets.

### 7. Ensuring effective accessibility:

1) Use for pre-booking: users that have pre booked by the mobile app, their slot will be messaged to them so that they can directly park in their slot which is automatically guided through the GPS.

2) Ensuring reserved parking for differently abled: reserved parking for differently abled which are close to their destination are provided for usual parking price.

3) Utilizing feature of mobile application: People who wish to reserve their slot before they arrive at destination can opt for booking through the mobile app. Using App facilitates to know the availability of slots and also the details of the discount.

4) Planning for reservation for loading and unloading of goods and construction materials: For any type of goods, users can pre book the slot which is closer to the business area.

### 8. Future Scope:

Scope of improvement is always there in any project and same goes true for this project that requires some improvement as mentioned below. We discussed few aspects that can be taken into consideration to improve in future.

1) Wireless data transfer can be very beneficial.

Suppose parking is at minus2 and minus3 floors below ground level and security cabin is at the ground or second floor then it will be difficult to connect the project in parking through wires. So, we can connect a transmitter to the project in parking and then we can connect a receiver to the computer in the security cabin on second floor.

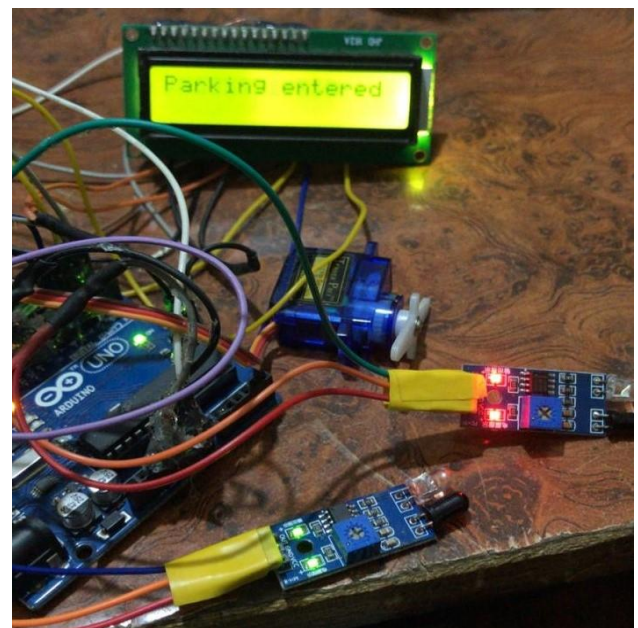
2) Temperature and fire can also be monitored at the same time. This project monitors the Parking slots. If we detect fire in the parking area then we can connect these sensors to our project and at the output side so that we can connect water sprinkler to control the fire.

3) We can send this data using internet data to remote locations. SMS services can also be provided.

4) We can plot graphs of variations; with computer technology how many parking slots were available and occupied at what interval of time in a day.

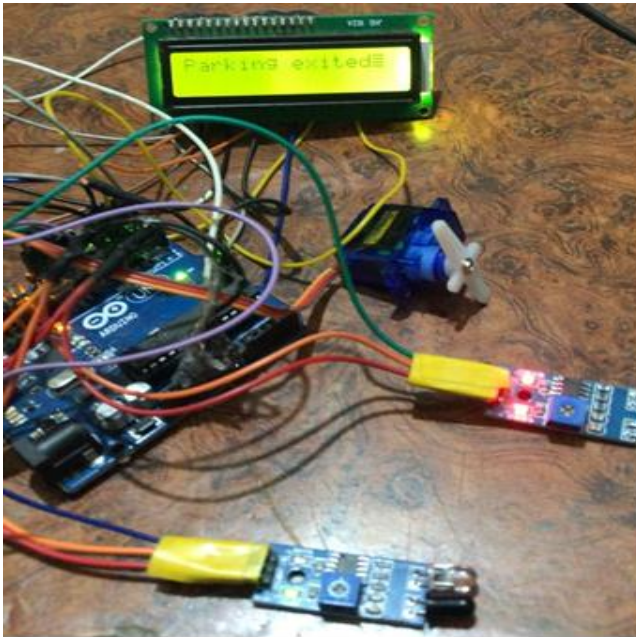
### 9. Hardware Output:

1) Parking entered





## 2) Parking exited



University, Chennai, India. In: International Journal of Pure and Applied Mathematics. Volume: 117, No: 21, 2017, 81-86

## REFERENCES

- [1] Jermsurawong, M. U. Ahsan, A. Haidar, H. Dong and N. Mavridis, "Car Parking Vacancy Detection and Its Application in 24-Hour Statistical Analysis," In: 10th International Conference on Frontiers of Information Technology, Islamabad, (2012), pp. 84-90.
- [2] S. lokhande, S. morade, M. joshi, "Smart Car Parking System using FPGA and E-Application", In: International Research Journal of Engineering and Technology, (2016), Vol. 03, Issue: 01, pp.639-642.
- [3] Mubashirin, M. and Mahmud, S. (2017). Automated Car Parking System. Thesis submitted to Department of Electrical and Electronic Engineering, BRAC University, Dhaka, Bangladesh (2017).
- [4] Available at, <https://www.plasmacomp.com/blogs/benefits-of-smart-parking-solution/>, access on 08 April 2020,
- [5] Sanam Kazi, Shirgaonkar Nuzhat, Ansari Nashrah, Qureshi Rameeza, "Smart Parking System to Reduce Traffic Congestion" 1-4. 10.1109/ICSCET.2018.8537367.
- [6] Jayakshei Dadaji Bachhav, Mechkul M. A." Smart Car Parking System". Thesis submitted to Dept. Of Electronics and Telecommunication, SNJB' COE, Chandwad, Maharashtra, India. In: International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395 -0056, Volume. 04 Issue: 06 , June -2017 ,www.irjet.net, p-ISSN: 2395-0072
- [7] Dr.S.Karthikeyan, Merin Mary Koshy, Dr.V.G.Siva Kumar,Sathyabama. "Smart & Automated Robotic Circular Car Parking Using GSM", University, Chennai, India. In: International Journal of Pure and Applied Mathematics. Volume: 117, No: 21, 2017, 81-86
- [8] ISSN: 1311-8080 (printed version), ISSN: 1314-3395 (on-line version). Mahendra, Dr Savita Sonoli, Raju, Raghu. "IoT Based Sensor Enabled Smart Car Parking for Advanced Driver Assistance System". RV Collage of Engineering, Bengaluru. In: 2nd IEEE International Conference On Recent Trends in Electronics Information & Communication Technology (RTEICT), India (May 19-20 2017).
- [9] M.Swatha, K. Pooja. "Smart Car Parking with Monitoring System". Thesis submitted to Department of Computer Science and Engineering Sri Manakula Vinayagar Engineering College, Puducherry India.
- [10] Tejal Lotlikar, Minla Chandrahasan, Ankita Mahadik, Madhusmita Oke, Anjali Yeole, (September 2016). "Smart Parking Application". Thesis submitted to Department Computer Engineering, Vivekanand Education Society's Institute of Technology Mumbai, India. In: International Journal of Computer Applications (0975 - 8887), Volume 149. No.9.
- [11] Abhirup Khanna, Rishi Anand. "IoT based Smart Parking System" University of Petroleum and Energy Studies (UPES) Dehradun, Uttarakhand .In: International Conference on Internet of Things and Applications (IOTA). Maharashtra Institute of Technology, Pune, India 22 Jan - 24 Jan, 2016.
- [12] J. Cynthia, C. Bharathi Priya, P. A. Gopinath , (November 2018). "IOT based Smart Parking Management System". In: International Journal of Recent Technology and Engineering (IJRTE). ISSN: 2277-3878, Volume.7, Issue:45, November 2018.
- [13] Basavaraju (2015). "Automatic Smart Parking System using Internet of Things". Thesis submitted to Department of Information Science and College of engineering Bangalore, Karnataka, India. In: International Journal of Scientific and Research Publications, Volume 5, Issue 12, December 2015, ISSN 2250-3153.
- [14] Apeksha P. Bari, Manali A. Parab, Amey U. Kokate, Nida Parkar (March-2018). "IOT Based Smart Parking System". Thesis submitted to Computer Engineering, Atharva College Of Engineering, India. IOSR Journal of Engineering (IOSRJEN) .www.iosrjen.org, ISSN (e): 2250-3021, ISSN (p): 2278-8719, Volume :15, PP 28-31. In: International Conference on Innovative and Advanced Technologies in Engineering (March-2018).
- [15] Ahteshamul huq osmani, Ashwini Gawade, Minal Nikam, Swati Wavare. Research paper on "Smart City Parking System". Thesis submitted to Department of Computer Engineering, Savitribai phule University Lonavala Maharashtra India. Vol:2, Issue-3, 2016, IJARIE-ISSN(O)-2395-439

Dharmini Kanteti, D. V. S Srikar "Smart Parking System For Commercial Stretch In Cities" .In:International Conference on Communication and Signal Processing, April 6-7, 2017, India.

- [16] Dr.sasikumar gurumoorthy, Kranthi kumar pathem."Interface GSM Modem with AT Commands", Aurdino departement of computer science and systems engineering, Shree Vidyanikethan Engineering College, Rangampet, Tirupathi. In: International Conference on Recent Challenges in Engineering and Technology (ICRCET-17), At Tirupati, India.