

# Automated Parking Lot

Yashodhan Naik, Mantasha Momin, Siddesh Wakade, Ruksar Aldar

**Abstract**— The purpose of this project is to present the concept and the implementation of a fully automated and intelligent parking system, based on prediction through probability algorithms. The work consists in a complete mechatronic structure conceived to find the most suitable parking place for each customer and automatically place its car in the corresponding position.

**Keywords**— Automated Parking Lot, Parking Sector, Slots, Parking Infrastructure.



## 1 INTRODUCTION

All over the world, parking systems are required, limited and expensive. There is a great need of innovating parking systems that will acquire all demands with maximum of advantages and minimum of disadvantages. The paper proposes a parking system that is efficient both regarding time and proper scheduling (getting the car from the customer and finding a suitable parking slot, providing automatically the car to an output position, respectively predicting the status of the parking system), respectively regarding the space (proper mechatronic structure). The parking system can be built underground (placed under large buildings, malls, block of flats, companies).

## 2 CONTROLLER



Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of

digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

## 3 MARKET SURVEY

### 3.1 Demand of Parking Infrastructure

Presently demand of cars are going up the rate of 15% per annum. Approximately 15 to 18 lakhs cars are sold every year. Making roads more expensive than parking infrastructure. Cars being parked in roads causing traffic congestion and pollution. Besides the problem of space for car moving on the road, greater is the problem of space for a parked vehicle considering that private vehicles remain parked for the most times. State government would be required to amend building bye laws in all cities so that adequate parking space is available for all residents. Land is valuable in all urban areas. Parking places occupies large portions of such land. This fact should be recognized in determining the principles for allocation of parking space. Automated parking lot complexes should be mandatory requirement in city centers that have high rise commercial complexes.

### 3.2 Study of pollution in ramp based parking structures

Taking into consideration the number of cars and lot size for conventional garage on a site for 924 cars.

- Footprint=150'\*270'(8levels).

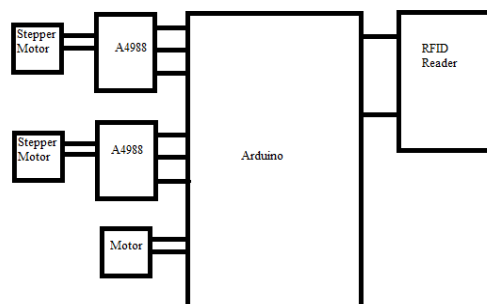
- Use of express ramps, assuming one turn per day per stall.
- Average Vehicle Miles Traveled (VMT) per car per day to park and exit to exit =5280': ( [2240'+2\*90']\*4 levels)\*2 for entry and exit.
- The total average number of the vehicle the total average number of vehicles miles traveled(VMT)/YR=254100 miles/year.

13	Maintenance cost	3-4% of capital cost	3-4% of capital cost	2-3 % of capital cost	2-3 % of capital cost
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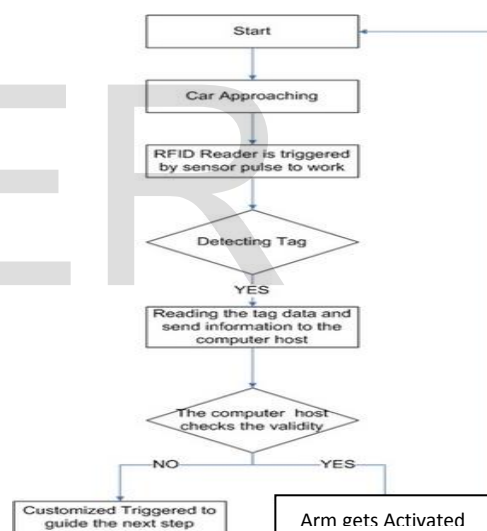
**TABLE I  
COMPARISON MATRIX**

Sr No	Criteria	Stack Park	Puzzle	Multi Floor	Rotary
1	Space optimization	Poor	Poor	Max Space Optimization	Max Space Optimization
2	Capital Investment	Low as compared	Low as compared	Very High	Low
3	Operating and maintenance expenses	Low	Very High	Very High	Low
4	Ease of installation	Simple	Simple	Complex	Simple
5	Construction Time	Low	Low	High	Low
6	Retrieval Time	High	Very High	High	Low
7	Technology	Simple	Outdated	Better than puzzle	Superior
8	Noise	Low	Very High	Very High	Low
9	Manual Override	Not there	Facility	Not there	Facility available
10	Reliability	Medium	Poor	Reasonable	Good
11	Security	Less secure	Reasonable secured	Highly secured	Highly secured
12	Life cycle	10-15 years	10-15 years	15-20 years	20-25 years

**4 BLOCK DIAGRAM**



**5 FLOW CHART**



**6 ADVANTAGES AND LIMITATIONS**

**6.1 Advantages**

- A fast parking process in which the driver does not have to maneuver his car or drive backwards, guarantees highest comfort and security.
- A single lift serves 6 to 18 parking spaces and taking a minute to drop and retrieval of a car.

- Time saving, vertical and horizontal movement take places simultaneously ensuring fast parking and retrieval times.
- Less space is required compare to another parking which lowers the cost of parking.
- Cost are usually lower, because of there is no need for an energy intensive ventilating system, since cars are not driven inside by humans.

## 6.2 Limitations

- Parking lots also tend to be subject to contamination with concentrated spots of pollutants such as motor oil.
- Virtually all of the rain that falls becomes runoff. The parking lot must be built to effectively channel and collect runoff. Traditionally, the runoff has been shunted directly into storms sewers, streams or even sanitary sewers.
- Flood chocking during flood storms.

## 7 APPLICATION OF PROJECT

- Automated parking lot system is a user friendly approach for parking.
- APL has been developing by noting future precautions for parking scarcity.
- APL can be easily implemented in real life scenario, because it being an underground construction.
- APL is practical as per space available in metropolitan cities of India.

## 8 CONCLUSION

Nowadays, parking is a major problem regarding space and necessary time for finding a parking slot. By creating automated parking systems, there can be provided the possibility to save the time used in looking for parking slots and offer parking places in the near of their destination. As already mentioned, this type of parking systems can be provided as an underground parking under malls, large buildings or companies, or even a stand-alone building. Another advantage for this type of parking system is the offered security, so that the customer won't be worried

about there car can be broken or stolen or scratched in the parking process.

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