



# Review of Parking Management Structures & Tactics

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**Abstract:** Now a days parking is a very big challenge in our country and in world too. This challenges have been a part of our society for a long time and traditional parking management tactics have come a long way. This a most common problem associated with us in our day today life. These solutions address orthodox parking trials local to their region, in an eccentric way. This paper endeavours to review universally applied parking controlling tactics that influences innovative technologies. Further, by investigative a variation of parking controlling solutions from everywhere the world. This paper is comprise of examine of shift in attention towards the modern innovative and technology-driven parking management system. Finally, the paper performs a comparative analysis between traditional and current parking management strategies/systems, on that basis we are able to give our proposed system, which will more secure and automated system.

**Keywords:** Radio Frequency Identification (RFID), (Infrared) IR sensors, Microcontroller, Raspberry pi, Raspbian OS, Pressure Sensor, and Key Generation.

## I. INTRODUCTION

Parking is an important section of the transportation system. A usual automobile is parked 23 hours each day, and uses numerous parking spaces each week. Parking expediency affects the simplicity of reaching destinations and therefore affects overall convenience.

Parking amenities are a major cost to society, and parking conflicts are among the most familiar problems facing designers, operators, planners and other officials. Such problems can be generally defined either in terms of supply or in terms of management. Management solutions have a tendency to be better than expanding supply because they support more premeditated planning objectives:

- Reduced advancement costs and better affordability.
- More compact, multi-modal community scheduling.
- Embolden use of unconventional approaches and reduce motor vehicle use (thereby decreasing traffic jamming, accidents and pollution).
- Enhanced user alternatives and quality of facility, predominantly for non-drivers.
- Enriched design flexibility, creating more functional and striking societies.
- Capability to accommodate new uses and respond to new demands.
- Compact impermeable surface and related environmental and aesthetic benefits.

## II. LITERATURE SURVEY

In India and all around the world the parking system is changed very ferociously in past 20 years. With the speedy economic progress and continuous social progression in our country, people's production and routine are undergoing reflective changes, accordingly resulting in traffic congestions and increasingly severe challenges on the inadequate parking resources. How to enhance the utilization of parking spaces has been a significant problem persuading city image and the symphonic economic and social development.

### A. Outline of Usual Parking Management Approaches

Effective parking approach [1] relies on either a definite type that meets the needs of a system or permutation thereof. Studied below are several currently accomplished parking management approaches:

#### • Brick and Mortar Facility:

Most of the organizations use these customary parking facilities either investing in large spaces of land or constructing large buildings to accommodate vehicles. This approach has been the tried and true methodology. It addresses several parking management challenges effectively.

#### • Preferential Parking:

An exceptional example would be The Los Angeles Department of Transportation. They apply and impose Preferential Parking Districts in residential areas where employees and customers of nearby businesses and



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attractions mostly park for long periods of times making it complex for residents to locate parking. Preferential Parking Districts confine parking for all vehicle owners/drivers, but area residents and their guests are excused from the special parking limitations if they purchase and display Preferential Parking Permits.[2] Another example would include places reticent for people with two or more individuals in a vehicle, alike a HOV car pool track.

• Price Discounts:

This approach usually concerns to carpools and /or short-term parkers. This is privileged for change-mode parking services such as airports and subways, where commuters frequently park their vehicles before using public transportation services. [3] In accrual, carpool lanes on hectic highways offers timesaving.

• Change-mode Parking Facility:

This approach is ideal for institution such as airports, subways, park-and-ride transfer services. All of these institutions necessitate the serving to locate a parking space swiftly and continue commuting in a public transportation vehicle [3].

• Disincentives:

On those who contribute to traffic-clogging (illegal parking, parking nearan expired meter), the state and local governments may enforce records. For example, aperson is penalized for travelling alone in a car pool lane that requires two or more passengers.

• Satellite Parking:

This approach is also known as isolated parking or off-site parking. Thisapproach is applied when the place to park is distant away. Usually in this organization, a parking service is shared with further entities or there are other enticements implicated. Logan airport in Boston, for example, offers shuttle services to adjacent cities and towns. Another admired example is an open shuttle service to any discotheque is Las Vegas.

• Shared Parking:

This is a popular approach to address a need for huge space requirements with extensively reduced investment. Emblematic examples include universities, business parks, and privately owned doctors' practices.

Where yellow colour represent the VERY HIGH, red colour represent the LOW, green colour represent the MODERATE, blue colour represent the HIGH, light colour represent the NOT AVAILABLE.

**B. Recent Parking Management Approaches**

The Smart Parking System [4] is planned by making use of a quantity of IOT endurable hardware's such as raspberry pi, auridino boards etc., here they focusing on a smaller amount power consumption and extra performance device so raspberry pi is the appropriate microcontroller for their realization. And NOOBS installer is loaded into the storage device of microcontroller. This installer consists of numerous hardware supportable operating systems such as Mac OS, tiny OS, Openelec, Raspbian OS etc. where these operating systems which basically consumes less power.

The smart parking system [5] applied mainly in the Europe, United States and Japan is developed with the incorporation of superior technologies and researches from various academic authority .Now-a-days, there is a hasty growth in parking system. Manpower is looked-for each car parking slot to choose a parking slot physically and give path to drive suitably into slot. So, there is a necessitate to build up an automatic parking system which will condense manual work as well as will be functional for vigilant parking of cars and other vehicles. Parking system characteristically experience parking related challenges, particularly in the urban and metropolitan areas. While doing an analysis they have found that automatic car parking system has been projected by various researchers using various technologies. In some paper some researchers have planned this system using Around View Monitor (AVM). In their paper they have argued combination of AVM and ultrasonic sensor, used to detect the unoccupied parking slot in the automatic car parking system. The AVM offers a virtually 360 degree outlook of the car in bird's eye vision. The AVM helps the driver to contrive into parking spots. Throughout the bird's eye view, a driver can check for hindrance around the vehicle. First, the parking slot marking perceived in the AVM image series. A tree structure-based method spot the parking slot marking via individual AVM image series and image register technique. Second, vacant slot is detected by means of ultrasonic sensors. The possibility of parking slot tenancy is calculated using ultrasonic sensor data obtained while the vehicle is fleeting by parking slots, and finally the chosen vacant slot is tracked and the vehicle is appropriately parked in selected parking slots. Some other researchers have discuss this system using a different technology i.e. GSM Technology. The functionality of the technology is that user sends a message to the GSM modem which is located at the parking end. The GSM modem will send a conformation message to the user whether the slot is available or not. If it is available then the user has to message the accurate time and interval he/she desires to park the vehicle in the parking slot.

TABLE I ANALYSIS OF DIFERENT SYSTEMS

Parameters \ Systems	Cost to Organization	Cost to End User	Time to Locate Parking	Staffing	Popularity
Bricks & Cement	Yellow	Red	Green	Blue	Green
Change-Mode	Green	Red	Green	Blue	Red
Preferential	Yellow	Blue	Red	Blue	Blue
Price Discounts	Red	Red	Green	Red	Green
Disincentives	Red	Green	Orange	Green	Red
Satellite	Blue	Green	Green	Blue	Green
Shared	Green	Green	Green	Green	Blue



Then the GSM modem will send a password and the parking lot number to entrée the reserved parking lot. Once the conformation message has been send, the counter for the reservation time will involuntarily start for sending message .Another paper attempts to discuss this system with the help of FPGA Technology .In their paper they have discuss how to execute an automatic car parking system using FPGA technology ,where the entrance in the parking which is made by barrier, if there are vacancies with the bracing of the barrier a ticket is provided with a client code and there starts a timer for calculating the time left in the parking. The analog signals transmitted by a digital analog converter as input signals in the FPGA .To toil with FPGA Xilinx software has to be used. Another paper discusses a system via a quantity of digital key along with some robotic technique. When a car arrives at the entry of the automated car parking system, an IR detection subsystem detects the occurrence. Then the driver is endorsed to enter a valid key and to choose the option of either parking or retrieving the car. Each key is checked for precision and assigned a selected parking slot .Upon entering the valid key, car is picked up along with the pallet from the stack system and sited in the designated spot .When drivers return to pick up the car he enters the designated key for which the system will check in its database and the car is return back to the drive way.

The stack system will drag down the pallets to make space for incoming pallet. The system comprises robotic lift with motors for picking the car and placing it in the designating place.

Some other researchers had a discussion on this method using RFID [5]. According to their procedure, the vehicle owner has to first record the vehicle with the parking owner and get the RFID tag. When the car has to be parked, the RFID tag is established near the RFID reader, which is mounted near the entrance gate of the parking lot. As soon as the RFID tag is skimmed by the reader, the system inevitably abstracts the accurate amount from the RFID tag and the entrance gate boomer releases to allow the car privileged the parking lot .Similarly, the door is released at the departure gate and the parking counter decrements.

A computerized parking system [6] which includes a first camera for scanning the license plate of a vehicle entering a parking spot, and a second camera for scanning the license plate of the vehicle as it leaves the parking spot. In each case, the letters and numbers on the license plate of each vehicle are transformed into digital signals. The method retort to the digital signals from the cameras to verify the time of entry and time of exit of the vehicle, and the time vehicle remained in the parking area is then resolute. The parking fee due for each vehicle is calculated on the basis of a predestined rate or rates and on the time in which the particular vehicle remained in the parking region. The system then produces a ticket, or a visual display, at a cashier's location at the exit on which the sum to be paid is recorded, and when that amount is paid the

cashier opens the gate. In the case of a monthly customer, the gate may be opened automatically as the particular vehicle arrive at the exit gate, and the amount due for that vehicle is accrued within the computer for monthly billing. The method may also be automatic for the daily customer, with a currency machine being granted which opens the exit gate when the appropriate parking fee has been inserted into the machine.

### III. PROPOSED SYSTEM

The proposed system integrates embedded devices and wireless data transfer to connect and operate. The system depends on RFID Tags as authentication and information input parameter.

That is divided into two sections such as:

- Entrance Wing
- Exit Wing

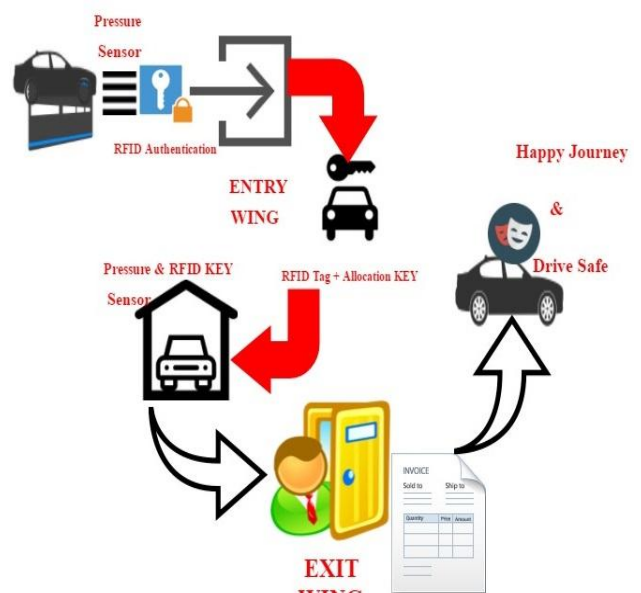


Fig. 1. Proposed System Architecture

The proposed system, in execution not only diminishes but also cuts the annoyances of a safe vehicle parking numerous fold. The system completely mends any probable human error by complete automation and computerised mechanisms. Right from inflowing the Parking Gate to Departing.

### IV. CONCLUSION

The adaptability of the innovative parking solutions allows marvelous flexibility when realizing the various parking management solutions. The proposed system will improve the parking approach by developing hardware and software, which is cost-effective, would be a major improvement. Due to the current high investment, costs related with real-time parking related hardware such as sensors, RFID chips, Encryption and Decryption.



The innovative parking solutions approach has an extensive range of applications. This approach may be realistic in various types of scenarios such as university parking lots, street parking, airport parking, commercial car parks, etc. Of course, minor alterations to the required hardware are needed but the core functionality remains the same. Many would help from the use of this tactic, local governments, universities, medical institutions and in conclusion the public.

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