

## Density Based Parking Allotment System

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**Abstract**— The project is designed to develop a density-based parking allotment system. This system indicates no entry to a vehicle to park when the parking area is fully occupied. Parking congestion is a severe problem in many major cities across the world and it has become a nightmare for the commuters in these cities. Vehicle parking system is very good substitute for managing parking area. Since in modern world, where space has become a very big problem and in the era of miniaturization it's become a very crucial necessity to avoid the wastage of space in modern, big companies and apartments etc. In space where more than 100 cars need to be parked, it's a very difficult task to do and also to reduce the wastage of area, this system can be used. You see the number of parking slots and available parking slots at the entry gate. If parking is available, the gate is open for few seconds and that particular slot is marked as unavailable. When you exit from this same process is followed and particular slot is made available for next customer.

**Key words:** Intelligent parking Systems, Automatically sense technology, RFID module based Networks

### I. INTRODUCTION

Personal vehicles usage is increased with increasing population in India which creates serious problem of parking place at danded market areas, shopping malls, public places. As per as survey carried out in India, it is roughly estimated that out of 8760 hours in year the car runs for an average for only 400 hours rest 8360 hours in parked condition. Increasing concentration of human activity on limited land both in terms of residential activity and commercial activity causes the parking problem. Every car owner would wish to park the car as closely as possible to his destination so as to minimize his walking distance.

As such parking spaces optimization and control has become a real challenge for city transport planners and traffic authority. By comparing various automatic cars parking systems there are various characteristics required by an automatic car parking system suitable for Indian environment. These characteristics form the basis for designing Automatic car parking system for cinema theatres, malls, hotels and offices in India. These parking systems require proper management with context to traffic management, allotted parking lot direction indication etc.

The industrial growth of the world is reflected by the increase in the number of automobiles on the streets throughout the world, which has caused a lot of parking related problems. The slow paced city planning has increased the problem even more. The search for the parking space is a time consuming process which not only affects the economic activities' efficiency, but also the social interactions and cost. Network companies cannot provide updated information of the parking facilities on the internet as the parking facilities do not cooperate with the companies. Certain big cars are not able to fit into the normally available parking spaces. Hence there is a need for a system; which can

take all relevant information into consideration, for finding the parking vacancy.

The parking meters which rely on coins or tokens is an inefficient system as it requires man power for management of the parking and exact change for paying the parking charges. Parking control and enforcement systems provide efficient and effective monitoring of meter and it also keeps a check on any violations of the parking lot. This results in best possible use of the parking space for increasing the revenue. However, it requires man power which needs some capital. Currently used parking system is not an efficient one; as the drivers are allowed to park without any restriction, and the parking facility cannot be used to its full extent.

The Intelligent Parking service, a part of Intelligent Transportation System (ITS), gives rise to different parking facilities on the basis of new functions they provide. This service not only manages the internal operations of the parking facility, but it is also designed to work with different aspects related to the parking facility.

The services which the Intelligent Parking System should provide in the future are -

- The parking availability information system and parking reservation system should provide advanced navigation services.
- The mobile electric commerce system and a continuously working gate system should collect the toll charges electrically.
- An automated navigation system should assist in safe driving.
- An in-facility navigation system should provide the best possible traffic management.
- Provision of effective security for the safety of cars.
- Provision of strong functions for facilitating administrators and managers in management of the parking facility.

The rest of paper comprises of various methods used for designing an intelligent parking service and will provide an insight into the methodology of economic analysis for such system.

Vehicle traffic congestion is a worldwide problem. In recent years, efforts have been made to introduce a method to reduce parking problems such as congestion, accidents and hazards.

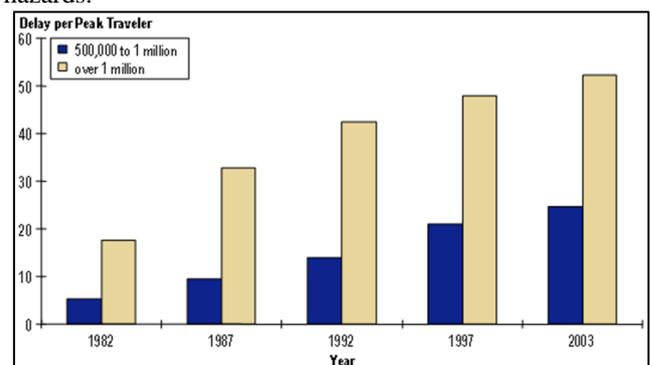


Fig. 1: Congestion Trends in Urban Area

As shown in figure 1 congestion has clearly grown year by year. It creates a number of problems. Congestion used to mean it took longer to get to/ from work in the "rush hour". Parking systems can also take advantage of innovative technologies in order to improve the ease and convenience of paying for parking. Now a day, Smart cards minimize transaction time by allowing a user to simply wave their card in front of a reader. Mobile devices can also be used in payment transactions. Public utilities need a parking system that can function efficiently and be integrated with the other urban city utilities. For allotment of parking slots there is no proper way thus parking management system fails in coordination and centralizing the information for an effective system. To avoid these problems, a design of a parking system is proposed, which will be implemented on density based to check its functionality.

## II. PROPOSED SYSTEM OR TECHNOLOGIES

It can solve the problems associated with distributed and complex traffic environment. They are also considered to be the main weapon for laying the foundation of automation mechanism for the Parking Negotiation and Guidance System.

- Fuzzy logic based systems

If there is a process resulting from the human error, a system which supports the operator; safely and efficiently is presented in. The system works by

- Detecting
- Motion Planning, and
- Supplying information

- Wireless sensor based systems

A number of low cost sensor nodes make up a Wireless Sensor Network (WSN). They arrange themselves for making an ad hoc network through the wireless communication module present on nodes. Different types of sensors, computation units and storage devices are present on each node. For collecting, processing and transmitting information, the functional parts let the sensors to be installed quickly and easily.

- Vehicular communication systems

Proposes a new smart parking technique based on vehicular communication for large parking lots. This scheme provides the real-time parking.

- GPS based systems

The information about the location and availability of a parking space near the destination is provided to the drivers by the current GPS-based vehicle navigation system. The information of the current state of the parking facility is provided.

- Vision based systems

The parking control and revenue system in big cities are relying on devices such as coins or token based parking meters, which requires exact change and man power for monitoring the parking lots, making it unfavorable. So a more efficient design for automated parking meter and driver assistance is presented in. It is linked to a centralized traffic control authority, which collects all the charges, and also maintains the implementation of parking rules.

S. No.	Different Technologies	Features	Services Provided
1.	Agent Based	Dynamic Distribution and Complex Traffic Environments	Bargaining, parking guidance and route negotiation etc.
2.	Fuzzy Based	Human-like intelligence and expertise	Intelligent parking methods e.g. parallel parking and perpendicular parking etc.
3.	Wireless Sensor Based	Low cost implementation with lower power consumption	Detection and monitoring of the parking facility etc.
4.	GPS Based	Real time location based information and guidance towards destination	Provides information about the locality and availability of parking facility
5.	Vehicular Communication	Provision of parking information distribution service for mobile vehicles	Anti theft protection, real time parking navigation service etc.
6.	Vision Based	Good for car searching in large parking lots	Lot occupancy detection, parking space recognition, parking charges collection etc.

Table 1: Summary of relevant techniques for parking systems

## III. PROPOSED PARKING SYSTEM

The proposed system uses a microcontroller of one8051 family duly interfaced with sensors to detect the parked vehicle with Red, orange and green LEDs for display purpose. The sensors used in this project are IR and photodiodes pair which are in line of sight position across a parking lot entry point to detect vehicle density at any particular time. The density of the vehicle is measured in three zones based on which vehicles are allotted with indications for parking.

The power supply consists of a step-down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to DC using a Bridge rectifier. The ripples are removed using a capacitive filter, and it is then regulated to +5V using a voltage regulator 7805, which is required for the operation of different ICs and components.

Furthermore, the project can be enhanced by adding a motor to stop and allow the vehicle as barricade.

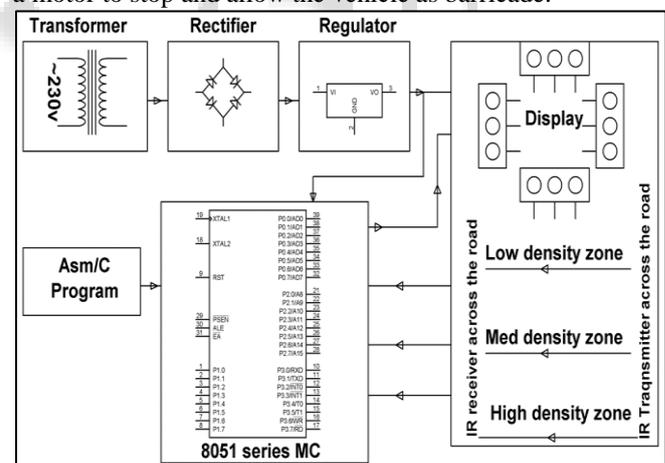


Fig. 2: Block diagram of the parking system

## IV. SOFTWARE REQUIREMENTS

- 1Keil compiler:

Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.

- EMBEDDED C:

C programming is required to interface the microcontroller.

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