

Automated Car Parking Indicator System

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Abstract

To easily find an unoccupied parking space in the larger car park is a problem for many drivers. During the last four-decade, there are many parking models are developed. But, the models still cannot solve the parking problem. The Car parking indicator system could be used for residential buildings, hotels, offices, shopping center and show rooms, universities, government buildings, airports, hospitals, and stadium. The advantages of the car parking indicator system are efficient usage of spaces, slots, proper directioning, automatically allotment of slots, display of empty and filled parking slots. This proposed system is especially designed for private parking spaces and this system is not suitable for open parking spaces. The parking space will be monitored by AVM camera. Ultrasonic sensor are mounted in the road, to provide exact direction to the car on the lane. As soon as car enters, driver gets information of the filled slots and empty slots on big display board. As the driver moves further, he will get a message of allotted parking slot and navigation for that slot on small display board situated in the inner lane. When all slots are full, No slots available message displays on the display board.

Keywords: AVM Camera, Ultrasonic Sensor, Direction of the Slot, Allotment of Parking Slot

I. INTRODUCTION

The automatic car parking system could be used for residential buildings, hotels, offices, shopping center and show rooms, universities, government buildings, airports, hospitals, and stadium. The advantages of automated car parking are efficient usage of spaces; decreasing the land space and increasing the number of parked vehicles, saving time by taking and delivering car in a few seconds; providing security and safety for the car from theft and damages while parking.

As multinational cities is suffering from the lack of available parking spots and expensive land prices, especially in vital areas, we were inspired to create an automated car parking system that can counter such a daily basis problem to make life easier. The main objective of this report is to build a prototype of the automated car parking system to park and retrieve cars automatically in an easy and sufficient way. To easily find an unoccupied parking space in the large car park is a problem for drivers. It is because the car on the road increases every year especially in town. On the other hand, it is more difficult to find the parking space during peak time and holidays because this is the time people want to release their stress and to spend time with family. There are not many existing solutions attempting to address the problem. Thus, it is useful to have some technical solutions that can provide information on parking space occupancy. The efficient parking monitoring system must be designed to overcome the problem. [3] [4]

During the last four-decade, numerous parking search models have been developed. But, the models still cannot solve the parking problem. In many decision-making situations in transportation (modal split, choice of an air carrier, choice of airport, etc.) the competitive alternatives and their characteristics are reasonably well known in advance to the decision maker (passenger, driver). On the other hand, the drivers usually discover different parking alternatives one by one in a temporal sequence. Clearly, this temporal sequence has a very strong influence on the driver's final decision about the parking place.

Vehicle detection technology has evolved quite a bit in the last couple decades. From the air hoses to inductive loops embedded in roadways, most legacy detection methods were concentrated on getting vehicle presence information to a decision making set of control systems. Today we want so much more information, and such information is about the speed or direction of traffic, the quantity of the vehicle per time on a stretch of pavement and so on as an example. [1] [4]

When the driver has parked their car at car parking space, there are another problem will occur. The problem is about how to make sure the car is safe and these kinds of problem involve the security systems. All drivers want to have a comfortable parking place with security when park their car. Thus, we have to design a system that can help driver to find a parking space easily and at the same time the car that has been park is also safe. [8]

The objectives of proposed work are as follows:

- 1) Improve on the current parking management systems.
- 2) Enable drivers to locate and reserve empty parking slot at the entrance and remotely. This should be provided by a small display panel at the entrance of the parking and near to every parking slot. It should show the parking number and the state of the parking. For example 345: used, 346 open, and so on.
- 3) To allot automatically generated empty parking slot in the car parked for the ease of parking.
- 4) To show the exact location, parking slot with direction, when it is near to the allotted parking slot.

- 5) Monitor the state of a parking slot. The parking slot may be fully in use or free. This system seeks to constantly monitor what is happening in the slot to identify parking spaces that are available or occupied.
- 6) Collect the time and date of activities happening in a given parking slot. Every time the state of the parking slots changes, the date and time should be captured.

II. PROBLEM DEFINITION

Users of automobiles spend a lot of time in the parking slot trying to locate where to park. In today's ever busy working environment, drivers hardly have time to spend in parking bays looking for where to park. In many places, especially around shopping complexes, universities, city centers, and many other busy working environments, finding parking have been noted as one of the major causes of stress in the lives of individuals who drive. The traditional method of finding parking by the naked eye has a number of irritating situations. In situations where a driver is walking towards a car or is in the car, the other drivers waiting to find parking often make signs, or whistle or try to do something intending to ask the other whether they are pulling out. Though this kind of asking might help most of the times, it leads to situations which are often inconveniencing to other drivers.

In busy towns and cities, parking management still poses a challenge that keeps growing more complex. The need for efficient parking management systems can't be emphasized enough for such cities. This study thus seeks to provide a solution to the issues above using the latest sensing and telecommunication technology.

III. PROPOSED WORK

This study seeks to develop an intelligent parking system that efficiently allows users to locate empty parking slot in the shortest possible time and keeps track of the activity of the parking slot. The system should be able to record, process, store and channel parking activity data.

The purpose of Automatic Car Parking Indicator system is to guide the driver to a suitable parking space if one is available. The system would only allow entry to the car park, when there is space available. The system would also display the amount of space available in the car park. The car park system will consist of a systematic entry and exit point, which would allow entry depends upon the availability of spaces. The design of the system would also involve the planning of a systematic lane system allowing the optimum amount of the parking slot to be allocated in order to avoid congestion as well as the difficulty in removing ones vehicle.

Automatic Car Parking Indicator system proposes systematic entry and exit paths to the car park. A barrier system is implemented at the entry and exit paths. The systematic entry and exit paths will only allow entry when parking spaces are available. There will be points of entry and points of exit and a defined path of motion for cars entering and exiting.

This system is aimed to guide a parking slot seeker to lanes with an empty parking slot. This will be possible with a large display located at the entry point that will be possible with a large display located at the entry point that will inform the parking slot seeker the number of available slots. Once entry is allowed, lanes that has empty parking slot will be displayed to the user and easily accessed. One will not have to dwell and find a parking slot. This will also help one from wasting precious time locating a parking slot.

One's car entered into the parking lot, sensor mounted in the road displays the information of direction on the inner display board. This is the most useful to the car parker. Once the slot is allotted, car parker parks the vehicle into the allotted slot. AVM camera is useful for the exact location of the car and displays if the slot is full.

IV. METHODOLOGY

The figure 4 is the car park for the implemented Automatic Car Parking Indicator System. The basic concept is, when a car enters the car park through the entry point, if there is an empty parking slot, the barrier will allow access to the car park. One big display is situated after entry which shows the remaining parking slots. As soon as the car enters through entry, sensor situated at entry gets activated and shows the empty parking slot. If there is no slots available for parking It shows the message that all slots are full and driver have to wait for some time. The original design required the use of sensors mounted in road. This system is usable for the parking slot seeker to know the exact empty parking slot.

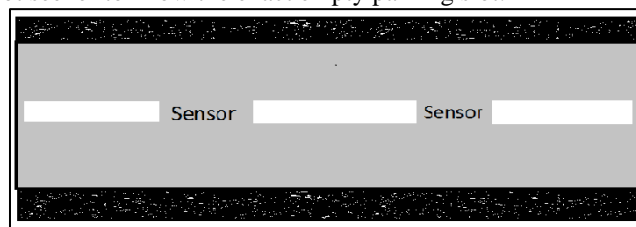


Fig. 1: Sensor Operation Principle and Parking Lane

Figure 1 shows the sensor operation principle and parking lane in the project. Sensors are mounted in the road and show the empty parking slot and allotted parking slot to the car parker. This sensor works like a Radar and Sonar. This sensor continuously transmitting and receiving waves. When one of the cars enters and goes through these sensor it shows the information of empty slots, direction to that slot, and blocks the slots.

The principles of operation of the sensors are as follows:

- 1) At each lane, the sensor is mounted in the Slot. These sensors were the most suitable and reliable for the vehicle detection.
- 2) When a vehicle passes through entry sensor, the processing unit will register it as an ENTRY into the lane. In reality, each ENTRY is an addition of 1 count into the counter at the processing unit. The counter will be limited to the amount of parking slot in each lane and when it reaches its limit, a signal will be sent to the processing unit and FULL sign will be display unit at the main entry point.

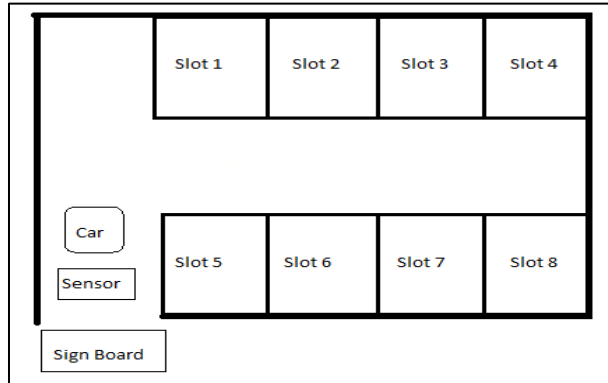


Fig. 2: Car parking Operation Principle

- 1) When a vehicle passes through entry sensor, the processing unit will register it as an ENTRY into the lane. In reality, each ENTRY is an addition of 1 count into the counter at the processing unit. The counter will be limited to the amount of parking slot in each lane and when it reaches its limit, a signal will be sent to the processing unit and FULL sign will be display unit at the main entry point.
- 2) When all slots are full and one of the slots gets Empty. This will then reduce the counter by 1 and signaling the availability of spaces in that lane.
- 3) The display unit will display the amount of spaces available in the car park based on the counter.
- 4) After entry of the vehicle into the parking lot, sensor senses the car and displays the turning indication and an exact allotted slot on the inner display board which is situated on some distance from allotment sensor.
- 5) As soon as Vehicle goes through the proper path and enters into the allotted slot, the sensor under neath is activated.
- 6) This process will continue until the last empty Slot.
- 7) When all the slots are full, it will display the message “No Space available for Parking, Kindly wait till the parking slot gets empty”.
- 8) This is most convenient to the parker that they can easily find a slot and park in appropriate way.

V. RESULT ANALYSIS

The Automatic Car parking indicator system shows following results on MATLAB:

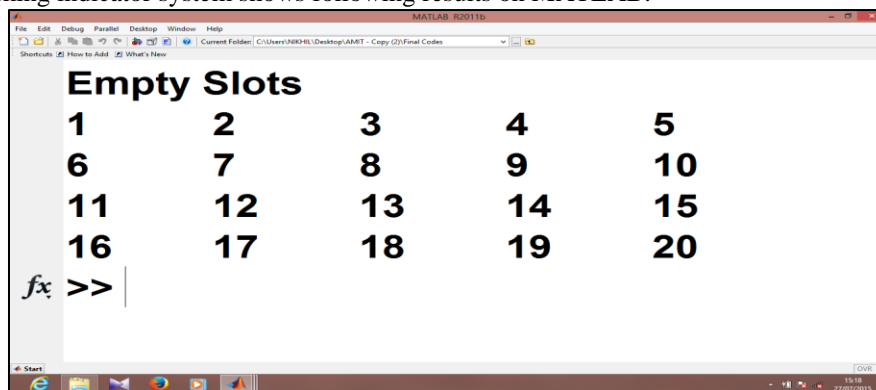


Fig. 3: When All Slots Are Empty

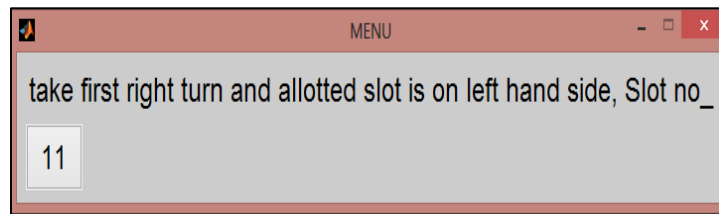


Fig. 4: When Slot11 Is Allotted Through the Sensor

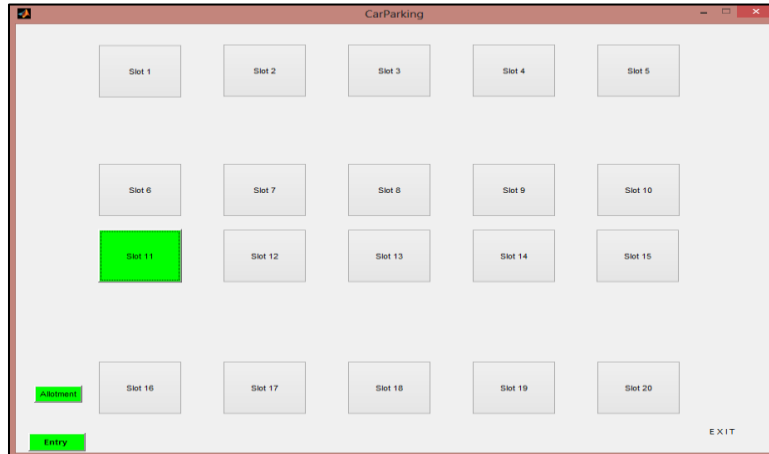


Fig. 5: When Slot11 Gets Full

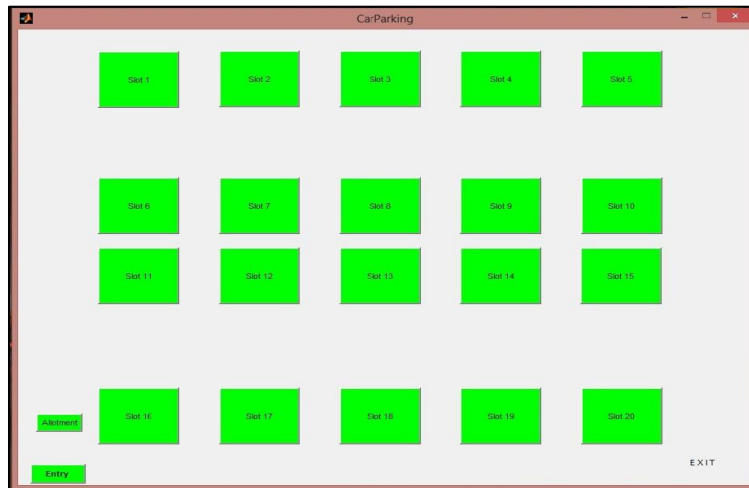


Fig. 6: When All Slots Are Full

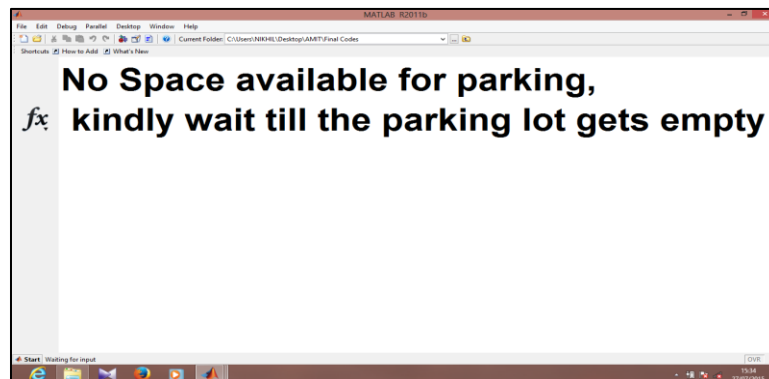


Fig. 7: Message on Display Board When All Slots Are Full

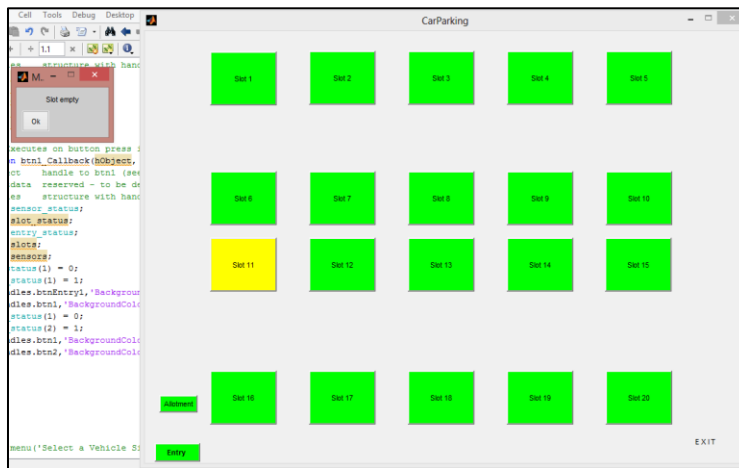


Fig. 8: When One Of The Slot Gets Empty

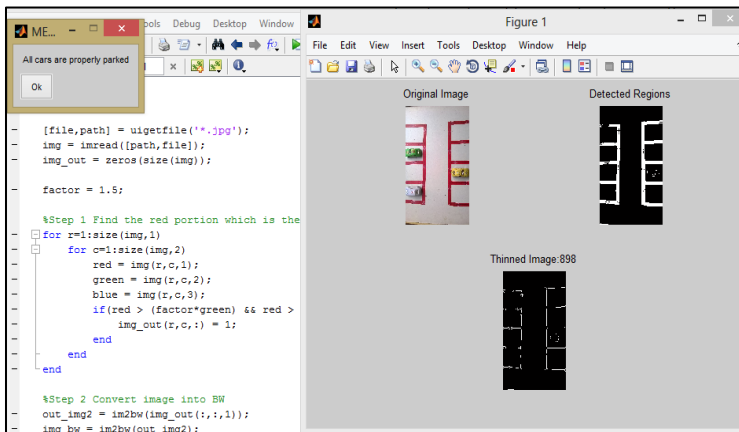


Fig. 9: When All Cars Parked Properly, Result By The Camera For The System

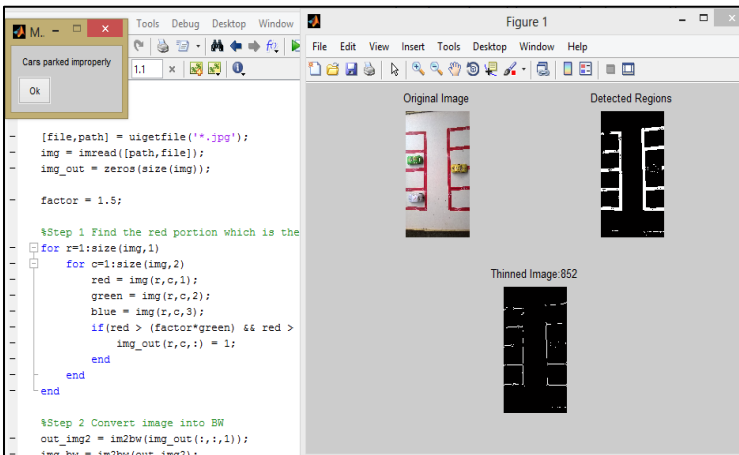


Fig. 10: When One of the Cars Parked Improperly, Result by the Camera for the System

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