

Smart Car Parking

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Abstract

Parking areas are not as harmless as they seem. By not only occupying area in the major places in the city, the human habitable areas are reduced and moreover they also cause lots of harm to the ecosystem. Increase in car numbers poses a very problematic situation for road management but also the infrastructure management. We need a reliable infrastructure management system for maximizing the use of urban areas and minimizing road congestion in major urban hubs. The major cause is loitering car in the search of parking spaces which when done by many people leads to road blocks in important urban hubs and pollution. The parking area annually leaks many liters of oil, diesel or petrol. Mixing of these leaks with water during washing or rains seeps into sewage and then to seas or oceans causing pollution. Moreover, when searching for parking spaces the drivers tend to drive slowly which decreases the fuel efficiency of the vehicle and causing traffic congestions as traffic management is a severe problem today. Since the population is moving towards urbanization globally, convenient way of driving and parking is required. We have proposed a system which uses an Arduino Mega 2560 Microcontroller, barrier gate controller along with different lighting system to approach the problem.

Keywords: Barrier Gate Control, Microcontroller (Arduino Mega 2560), Proximity Sensors, Smart Car Parking

1. Introduction

The problems facing the people in cities is the lack of space and the time needed to search for it. The space concerns occupy major time for the people. With the increase in population and increase in number of cars and hence, the reduction in parking spaces. There is a dire need to have a very effective and time –saving method for the parking. With 80% of fuel wasted in the search of parking space, prevention of this may save fuel at large quantities. Moreover, we know that when a vehicle travels at lower speeds which happens during parking, the fuel coming out from exhaust is not fully burnt hence polluting the environment nearby. According to the survey, fuel saving can be done in large manner by implementing smart parking

To overcome these problems we have devised a process to overcome the majority of the problems. This

method includes barriers, alarm systems, slots and their priorities.

When the car enters the parking area, this is stopped by a barrier, this barrier works as the major part in controlling the cars entering the space. As the car enters the parking, parking slot will be allotted based on priority automatically. Priority is allotted nearest from the entry barrier. Based on LEDs display, the car will occupy the slot. The barrier has a pair proximity sensor which senses the presence of car opens the barrier and closes it as soon as it passes it .when the car enters the parking space the barrier closes and LED starts glowing, which can be seen irrespective of the sunlight.

There is also proximity sensors present in each parking slot which tells the microcontroller the presence of a car i.e. whether slot is occupied or not.

If it is occupied, the slot is removed from the priority list. Then other slots are allotted accordingly to the prior-

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ity and this continues until all the slots occupied .Then the barricade will not open showing the parking is fully occupied and hence saving time to search parking slot in a full parking.

1.1 Advantages

1. Prediction and spotting of vehicle is precise and time consuming.
2. It provides guidance for mankind for parking of their vehicles.
3. Optimal usage of Parking Space.
4. It simplifies and makes comfortable parking for drivers and merchants.
5. Based on real time applications and analytical report, decisions can be made in excellent way.
6. Environmental hazards can be minimized by the method of smart car parking.
7. Managing the parking space with availability provides better way for Smart Parking in real time and leads to revenue generation.

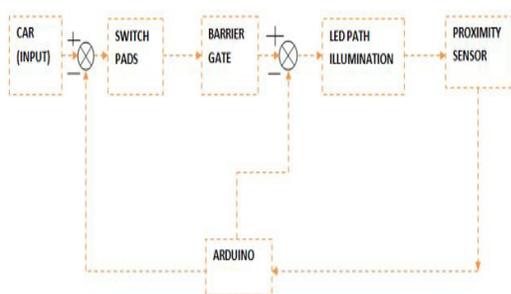


Figure 1.

2. System Overview

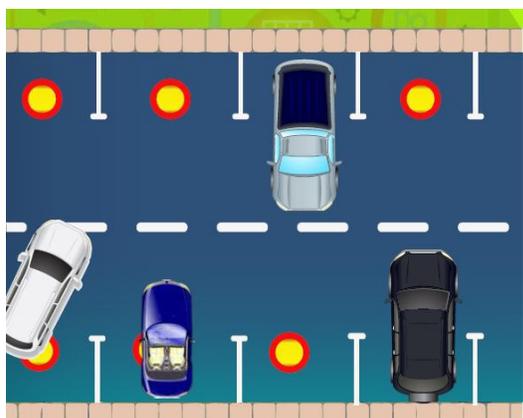


Figure 2.

2.1 Central Processing

We have used Arduino Mega 2560 to control the process. These can be replaced by any microcontroller with good processing speed and has many analog and digital pins. The proximity sensors send signal from the barrier is sent to the microcontroller, which when a car is sensed, opens the barrier if empty slots are present and if it is full then open command is overridden.

The pair of barrier is used to sense cars only as they are placed at defined positions to prevent the error of detecting of any other object. So, when these two proximity sensor are on then only barrier opens. The car from the barricade is then allotted a slot and is led to the slot through LEDs.

The proximity sensors used in parking slots also give the signal to microcontroller. The sensor on indicates the occupation of a particular slot by a car and that slot will not be shown to other car.

The sensor low condition indicates the exit of a car and an alarm will be given to the next car in the slot to warn them of other car, preventing chances of the collision.

2.2 User Interface

This system is not shown to the drivers, the driver will see a barrier, and it opens, if it has empty slots and not if it is full. When barrier opens, he is led to the slot with LEDs pointing the direction, once he reaches the slot, LEDs turns off.

During the exit, when he pulls out, alarm is on pointing nearby cars of the exit. So there is no collision.

3. System Working

3.1 Barrier Working

The proximity sensors send signal from the barrier is sent to microcontroller, which when a car is sensed opens the barrier, if empty slots are present and if it is full then open command is overridden. The pair of barrier is used to sense cars only as they are placed at defined positions to prevent the error of detecting of any other object. So, when these two Proximity sensors are ON, then only barrier opens. The car from the barricade is then allotted a slot and is led to the slot through LEDs.

3.2 Working

A smart car parking allows a car to enter the parking slot through a barrier gate. At the entry, a car is sensed through two sensors which send a signal to the barrier to open for the car to park. Once the barrier gate opens, a path is generated by the LEDs for the car to be parked at an empty slot. Priority is allotted nearest from the entry barrier. Based on LEDs display, the car will occupy the slot. The barrier has pair proximity sensors which sense the presence of car opens the barrier and close it as soon as it passes it. When the car enters the parking space, the barrier closes and LED starts glowing, which can be seen irrespective of the sunlight. There is proximity sensors present in each parking slot which tells the Microcontroller (Arduino Mega 2560) the presence of a car i.e. whether slot is occupied or not. If it is occupied, the slot is removed from the priority list. Then other slots are allotted accordingly to the priority and this continues until all the slots occupied. The barrier will not open for the car, if all the slots are occupied. An exit gate with similar mechanism as the entry is utilized for the car to leave the parking area.

3.3 Exiting the Parking Space

The sensor low condition indicates the exit of a car and an alarm will be given to the next car in the slot to warn them of other car, preventing chances of the collision. When it reaches the exit gateway, the barrier opens with the similar operation method as entry and opens the barrier.

3.4 How the Driver Sees It!!

This system cannot be seen by the drivers, the driver will see a barrier, and it opens, if it has empty slots and not if it is full. When barrier opens, he is led to the slot with LEDs pointing the direction, once he reaches the slot, LEDs turns off. During the exit, when he pulls out, alarm is on pointing nearby cars of the exit. So there is no collision.

4. Conclusion

We have introduced a system which uses an Arduino Mega 2560 Microcontroller, barrier gate controller along with different lighting system to approach the car parking problem. Designing of this system leads the mankind to time management and based on sensors, this system

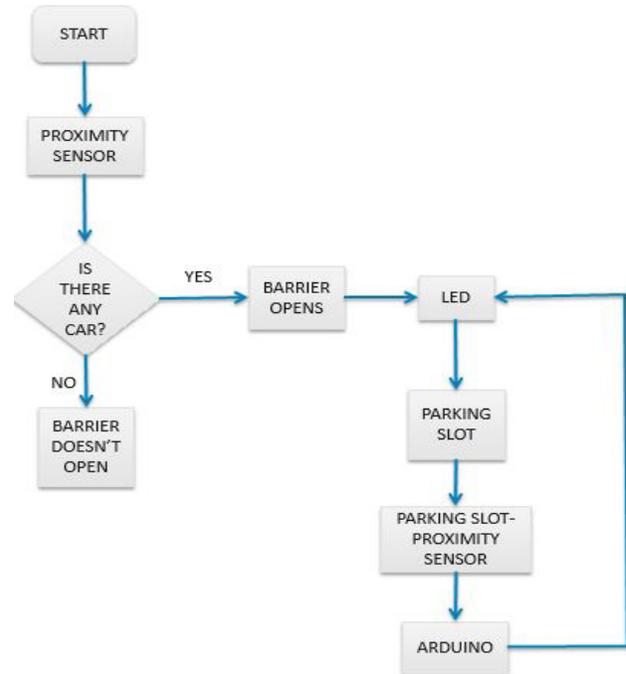


Figure 3.

provides sufficient details about the vacancies in the slot. By the way of Smart Car Parking, 80% of wastage of fuel can be saved. Smart Car Parking provides reliable infrastructure management system for maximizing the use of urban areas and minimizing road congestion in major urban hubs.

5. Future Enhancement

The work can be developed further to make the system more comfortable to both the driver and the parking slot management.

In future,

- (i) the Smart Car Parking system may be designed with a LCD type of visual display which may enable the can parking person to understand more about the availability of parking slot.
- (ii) Smart Car parking with Vehicle locking system against vehicle theft¹ can be implemented.
- (iii) An online RFID tag system can be added which can give the driver security and cash transaction system also can be added to that system.
- (iv) It may be added with alarm buzzer or lights which alerts other nearby driver, when a given car exits, thus preventing the collision.

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