

PARKING MANAGEMENT SYSTEM

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Abstract—Parking space has become a serious problem to all of us as the number of vehicles are increasing day-by-day on the road and it has been a very big struggle and a major problem for all of us to find one perfect parking spot without any restrictions. Particularly, in cities with a large population, or in places where there is an event going on, looking for a parking space can be a frustrating experience. In order to combat this problem, we present a prototype of a parking management system using sensor technology and networks. Using sensors, parking spot statuses (total number of spots idle & occupancy of individual spots) are detected. This will alert the drivers if the parking spots are empty or full. With the successful implementation of this parking management system, the economical and time costs associated with traffic jams, cost associated with wasted fuel, and time looking for an empty parking space that are caused by inefficient parking will be significantly reduced.

Key Words—Arduino Uno, IR Sensors, Servo Motor, LCD Display, LEDs, Economic/Time/Fuel efficient.

I. INTRODUCTION

With the growth of population and economic development, parking is becoming one of the major problems for cities, and is becoming very costly. Because of this, parking is limited in major cities including universities and major

attractions all around the world. For instance, finding parking space in malls, stadiums and other major events is challenging. This frustration can occur either due to the parking spots being difficult to find or because the parking space is full but there is no indication so. Thus, intelligent, innovative and efficient ways for parking will have to be built to accommodate the parking demands efficiently.

Most of the parking lots are not supervised properly even though they have a watchman/parking staff to conduct the job and help. It is still not as efficient as it can be as technology has developed a great deal and purpose of technology is to reduce/make it easy for human work.

Therefore, to help out with such problems faced by all, few specific technical systems which include specific sensors are used so as to reduce the problem as much as possible.

So, with the help of this parking system, when drivers appears at a parking lot in their vehicles, they can see the total number of empty spots available and if there are spots available, they enter the parking lot and based on the colour displayed at each slot (green if idle/red if occupied), they can identify the empty slots and park there, hence saving time and fuel by driving around the whole lot and searching for an empty slot.

II. METHODOLOGY

It is a simple method using certain sensors, an Arduino uno, and more as mentioned below:

- Arduino Uno: It is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of Digital and Analog input/output pins that may be interfaced to various expansion boards and other circuits. (Takes input from sensor and gives output to LED/motor/LCD)
- Infrared (IR) Sensors: An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment (hence can detect vehicles in its vicinity).
- Servo Motor: A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. (Opens and closes based on input from IR sensors)

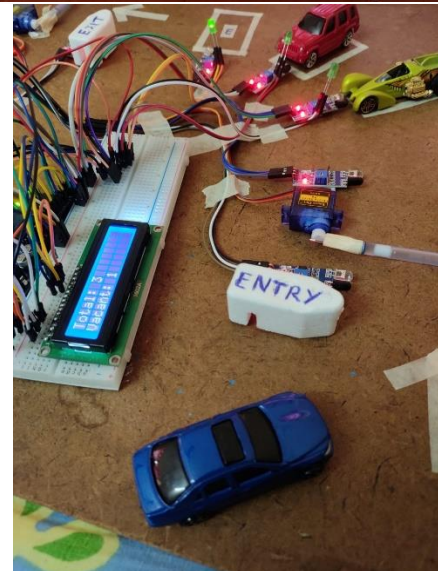
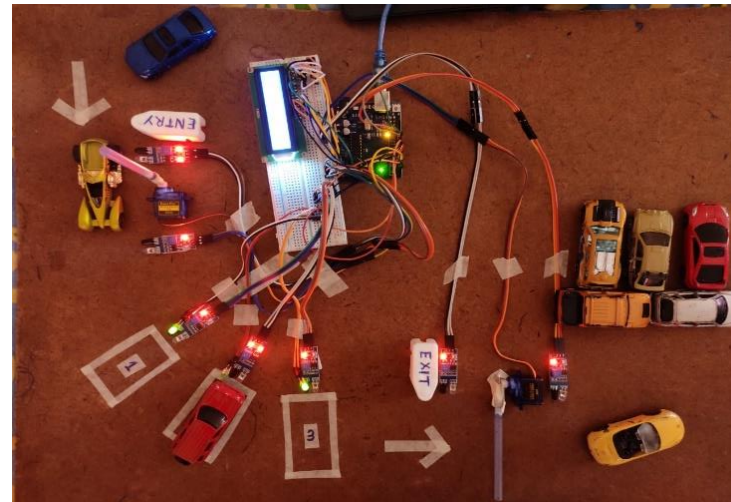
III. WORKING

In this parking management system, there is one Infrared Sensor and one Servo Motor SG-90 at each of the entry and exit gates and there is also one IR sensor at each parking slot. Each of these are connected to the Arduino Uno.

The IR sensors used at the entry and exit gates can detect the vehicles at the gate (input to Arduino) and automatically open and close the gate with the help of a servo motor (output from Arduino). So, whenever the IR sensor detects a vehicle, the servo motor automatically rotates from 45° to 140° (opens), and after a delay, it returns to its initial position (closes). Also, every time the entry gate opens and closes, the total number of available slots displayed on the LCD screen decreases by one and every time the exit gate opens and closes, the total number of available slots displayed on the LCD screen increases by one.

The IR sensors used at each parking slot detects whether a vehicle is present at the spot (occupied) or not (idle) -> (input to Arduino). If

occupied, a red LED glows at that spot and if idle, a green LED glows (output from Arduino).



IV. CONCLUSION

This project detects the empty slots and helps the drivers to find parking space in an unfamiliar city. The average waiting time of users for parking their vehicles is effectively reduced in this system. The optimal solution is provided by the proposed system, where most of the vehicles find a free parking space successfully. The prototype shows that the performance of the Arduino UNO based system can effectively satisfy the needs and requirements of existing car parking hassles thereby minimizing the time consumed to find vacant parking lot and real time information

rendering. This smart parking system provides better performance, low cost and efficient large scale parking system. When vehicles enter the parking area, the drivers can park them in the nearest empty slot.

V. FUTURE SCOPE

This parking management system is very efficient and useful in the future as the economical and time costs associated with traffic jams, cost associated with wasted fuel, time looking for an empty parking space and even arguments/fights between citizens that are caused by inefficient parking will be significantly reduced. This work can be expanded in the future to include all parking (like parking on streets) and not just parking lots.

Also, in future works, this framework can be enhanced in many ways by including different advanced applications. For example, internet booking by utilizing GSM. The driver or client can book their parking area at home or while in transit to the parking lot.

VI. REFERENCES

1. G. Yan, W. Yang, D. B. Rawat and S. Olariu, "SmartParking: A secure and intelligent parking system", *Intelligent Transportation Systems Magazine IEEE*, vol. 3, no. 1, pp. 18-30, 2011.
2. A. Kianpisheh, N. Mustaffa, P. Limtrairut and P. Keikhosrokiani, "Smart Parking System (SPS) Architecture Using Ultrasonic Detector", *International Journal of Software Engineering and Its Applications*, vol. 6, no. 3, pp. 55-58, 2012.
3. H. Chaudhary, P. Bansal and B. Valarmathi, "Advanced CAR parking system using Arduino", *2017 4th International Conference on Advanced Computing and Communication Systems (ICACCS)*, pp. 1-5, 2017.
4. J. Propst, K. Poole and J. Hallstrom, "An Embedded Sensing Approach to Monitoring Parking Lot Occupancy", *Proceedings of the 50th Annual Southeast Regional Conference (ACM-SE '12)*, pp. 309-314, 2012.
5. Jin Xin et al., "Target detection and classification using seismic and PIR sensors", *IEEE Sensors Journal*, vol. 12, no. 6, pp. 1709-1718, 2012.
6. R. Stiawan, A. Kusumadjati, N. Aminah, M. Djamal and S. Viridi, "An Ultrasonic Sensor System for Vehicle Detection Application", *Journal of Physics: Conference Series*, vol. 1204, p. 012017, 2019.