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Car Tracker with Parking System Using Machine Learning by RFID(Radio Frequency Identification)

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Abstract: ***The problem of parking in big cities, especially mega-cities, has become one of the key causes of traffic congestion, driver frustration & air pollution. Locating parking spaces in central areas, especially during peak hours, is a thoroughly cumbersome process. The issuearises from not knowing where parking spaces may be available at any given point of time. Even if known, many vehicles may be competing for limited parking spaces causing severe traffic congestions.The developed system in this project monitors the availability of idle parking slots and guides the vehicle to the nearest such slot. The feature of pre-reservation of parking slots can also be incorporated in the system. The systems reservation-based parking policy has the potential to smoothen the operations of parking systems, as well as mitigate traffic congestion caused by parking search. As an added advantage it also saves the time required tocheck-in and get slots to park vehicles.This project deals with an effective way of checking into the parking space and easily finding empty parking slots. This system also helps in managing the number of vehicles moving in and out in complex parking structures such as dedicated parking lots/buildings by detecting a vehicle using IR sensors and providing feedback. The fully automated smart car parking system is rudimentary and does not require heavy lines of code nor expensive equipment. It is a simple circuit built for demonstration and to fulfil the exact need of purpose.***
Keywords: RFID, Arduino, Smart Parking, Sensors, Servo Motor.

I. INTRODUCTION

The rapid growth in vehicle ownership demands smarter parking solutions to reduce congestion, fuel consumption, and time wastage. RFID systems, known for their efficiency in object identification, have been increasingly incorporated into smart parking systems. With the advent of machine learning, RFID-based systems are now more adaptive, predictive, and capable of learning user behaviors to optimize parking operations.RFID based Car Parking System is a project that offers an efficient car parking management system using Arduino and RFID technology. As in the modern world everything is going automatic, we have built a system which will automatically sense the entry and exit of cars through the gate and then display the number of cars in the parking lot. Check-ins and check-outs will be handled in a fast manner without having to stop the cars so that traffic jam problem will be avoided during these processes. This developed technology can be used in any urban areas where the car parking is most. Some of the heavy traffic places where this project can be installed and used are shopping malls, hospitals, airports, cinema halls, apartments, etc.

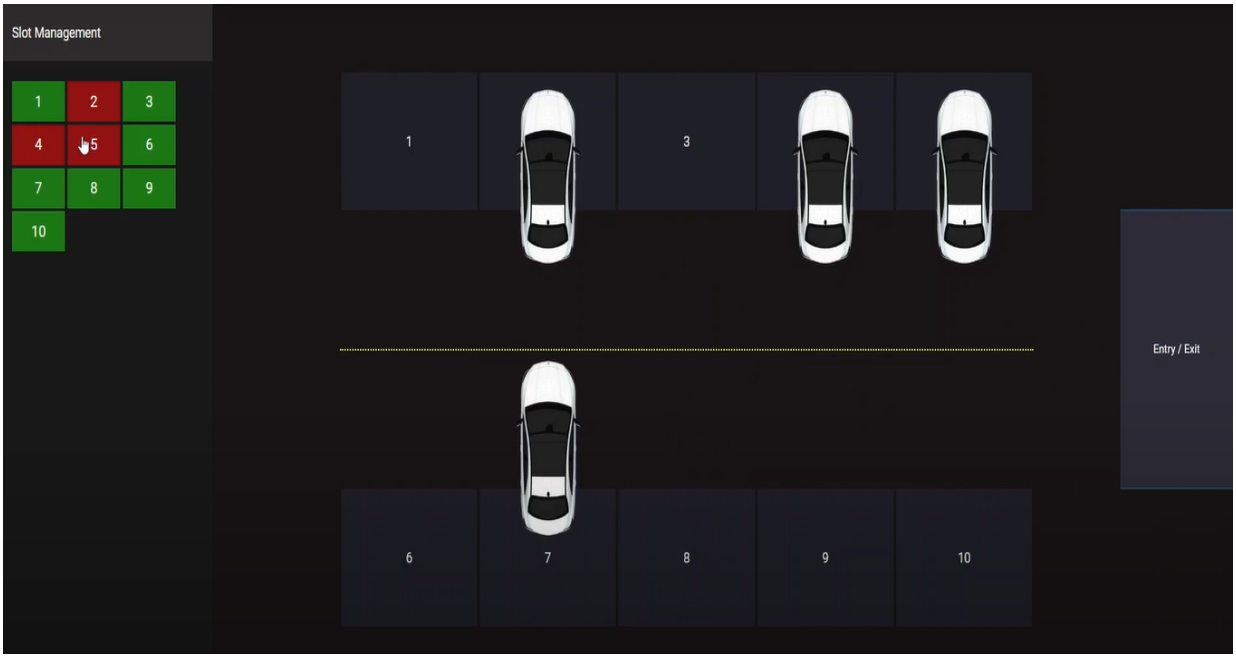
The cost of land has grown exponentially in cities, so it becomes essential that the parking solution requires the least possible space and can accommodate the maximum amount of vehicles. Therefore, by this project we develop a parking system for an organization to have automated parking system for making best use of space,decreasing the man power and providing authentication for the vehicles from avoiding the theft and other such mishaps.

II. METHODOLOGY

The circuit diagramn above shows the design of an RFID based smart car parking system using Arduino Uno, in which only authorized personal with valid RFID card will have access to the Parking Lot. When the circuit is switched ON,information about the availability of slots is displayed on the LCD display. If the card number is matched with saved number in the database, the Arduino will allow the car to park in the secured area. With the help of IR sensors placed in each slotthe information about the occupancy of slots is displayed on the LCD display. A welcome messagewith the name of the card holder is also displayed on the LCD display. As the car enters, informationabout the free slots i.e., the free slot number is displayed on the LCD display. As the car exits theparking lot, there would be another RFID reader and the exit gate, to prevent multiple entries using a single card. This also prevents the entry of vehicles from the exit side.

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As the car leaves the parking lot through the exit, the number of available slots is updated and it displays the same on the LCD display.



III. PROBLEM STATEMENT

Improper parking often leads to inappropriate space that causes vehicles to damage each other. Insufficient parking spaces result in traffic congestion and driver frustration. There arises a situation which is called tailgating in which one vehicle follows the other vehicle blindly without proper identification. Most of the time gates are open which leads to entry of all kinds of vehicles inside the premises. Security guards are ineffectiveto allow selective vehicles inside the premises dueto lack of proper identification system. The systemof opening the gate is manual and dependent on the availability of the guard. In a large parking lot where there are hundreds of slots available for parking, finding an empty slot manually is a very tedious task. It is really time consuming and frustrating. The manual parking system consists ofmany tasks like issuing tokens, noting the check-in and check-out time, calculating fare and finally collecting the amount. The cost of land has grown exponentially in cities, so it becomes essential that the parking solution requires the least possible space and can accommodate the maximum amount of vehicles. An average person spends 10 to 15 % of his travel time looking for a suitable parking spotin metropolitan cities.

This project is designed in such a way that only authorized personnel with a valid RFID card have access to park. The proposed car parking system uses RFID reader at the entrance to sense the authorized vehicle and allocates the available parking slots to the vehicle. This system clearly displays the total parking slots available and indicates the occupied slots and non-occupied slotsin display board so that user can check the slots before entering the parking area and can park his car in that slot without wasting his/her time. The parking slots are continuously monitored and data is continuously updated in the display board. Unauthorized entry will be denied access to the parking system.

IV. LITERATURE REVIEW

Hisamitsu Kurogo [5] proposed a parking system for practical simplification of traffic management and improvement in transport efficiency based on a study of the parking management system. In [6], a system to detect places of present congestion and predict places of future traffic congestion was proposed to avoid traffic jams by providing prior information to the drivers. Present day Google Maps does the same interpretation work. An automated check in and check out based parking system was presented in [7]. This was based on RFID and RFID reader. Many wireless sensor networks (WSNs) based prototypes for parking system were also proposed with the main focus on the establishment of the sensor nodes at parking lots to detect and update the parking spaces status [8]. A more advanced version Vehicular Adhoc Network (VANET) was proposed in [9] helping drivers with the information of real-time navigation, anti-theft protection, and prediction of driver-friendly parking spaces. Bluetooth and Wi-Fi along with webcams in the parking lot to provide information about availability via an SMS was also used to create parking systems [10].

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The parking system proposed in [11] provides an energy efficient model that helps in reducing parking time by providing the information of nearest parking availability enabling easy and quick parking. It also has an add-on feature that turns the parking lights on as soon as any car comes in motion in the parking lot. Another parking system based on linear programming is generated based on availability, allocation, and charges applied. Thissystem cuts down the time for searching the most relevant parking space for the user [12]. In [13], Heterogeneous Smart WSNs, a series of WSNs connected were used in the parking system.

Reference Number	Year	Model
5	1995	Simplification of traffic management and improvement in transport efficiency
6	2001	System to detect places of present congestion and predict places of future traffic congestion
8	2006	WSNs based prototypes
9	2009	Vehicular Ad Hoc Network (VANET)
10	2013	SMS based parking system
11	2013	Energy efficient parking model
12	2016	Parking system based on time saving
13	2018	Heterogeneous WSNs based smart parking system

Overview of Models for Traffic Management

V. RESULT

1) Parking is not available

When all the available parking slots are occupied, the LCD displays a message such as Slots Full along with the name of the card owner. The gate of the parking lot does not open.

2) Parking is available

When a vehicle with authorized car (here for example: Srikanth) wants to enter and park in the parking lot, the RFID reader reads the tag on the vehicle and displays the message on the LCD " Welcome Srikanth". After this Srikanth will get tosee the available slots in the parking lot. He can choose any available empty slot to park his car.

VI. ACKNOWLEDGEMENT

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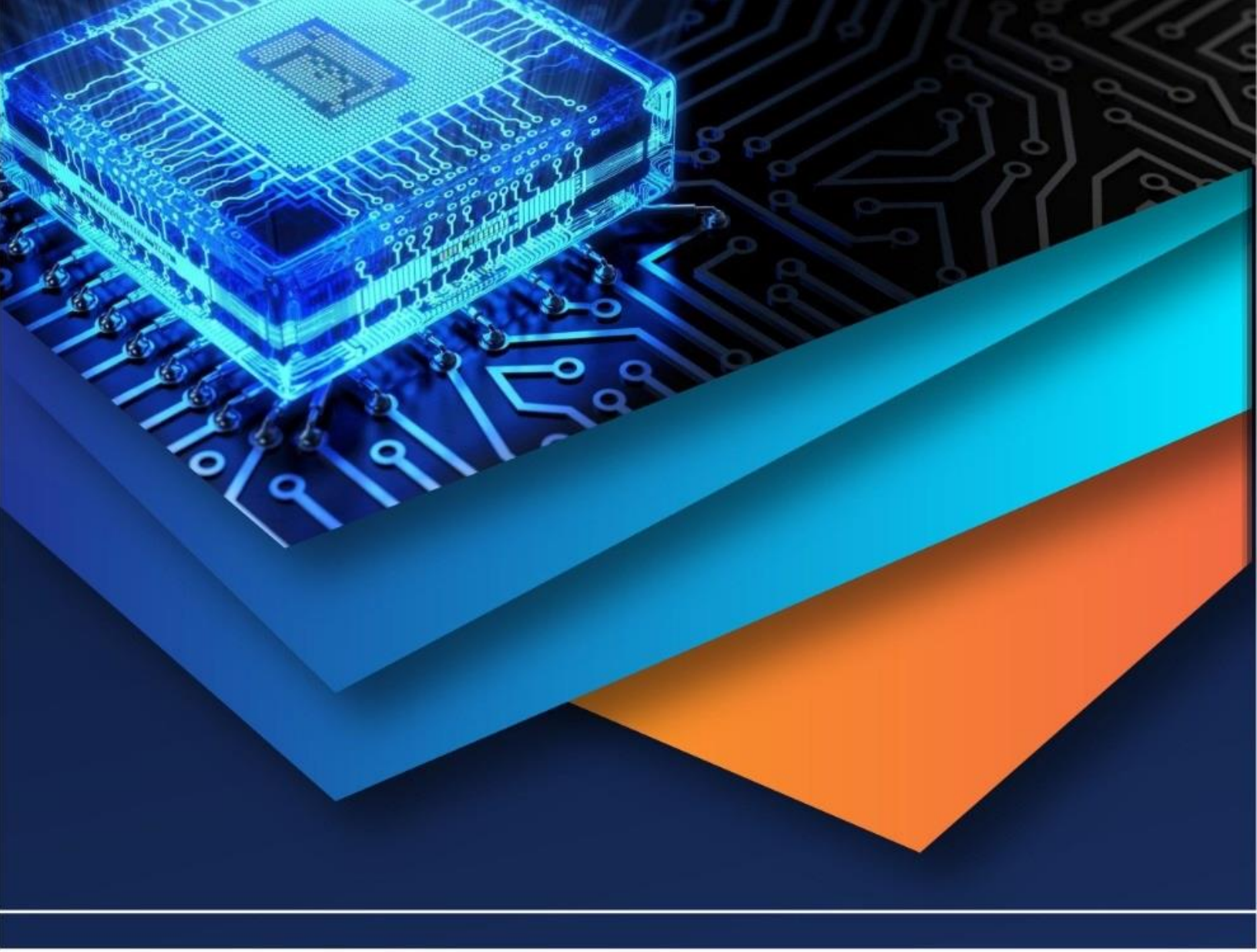
VII. CONCLUSION AND FUTURE WORK

This project has basically addressed the problems of efficient streamlined management of parkingspaces. This system displays a welcome message and provides information about the availability of parking space. By using of this system, there wouldbe a significant reduction of the cost incurred to hire personnel in order to control the traffic in the parking lot and traffic congestion problem will be solved by faster check in and check out. A successful implementation of this project would result in less traffic and chaos in crowded parking spaces like in malls and business buildings where many people share a parking space. As the Smart Car Parking System Requires minimal manpower, there are minimum chances for human error, increased security in addition to a swift and friendlycar parking experience for drivers. Developing a smart parking solution in various buildings within a city would also solve the problem of air pollutionby vehicles.The future of smart parking system is expected to be significantly influenced by the arrival of automated vehicles (AVs). Several cities around the world are already beginnin to trial self-parkingvehicles, specialized AV parking lots, and robotic parking valets. The automated parking fee system would allow people to travel without cash. Also, as it would reduce the waiting time, long queues, tension, stress and increase the efficiency of the parking system. The smart parking management system can be applied for plane, ship and fleet management. For residential and domestic parking system the device can be interfaced with Home Automations which can control the various home appliances by sensing whether the user is arriving or departing from the parking space.

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