



Smart Car Parking System

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Abstract- *IoT is a fast budding area. It allows us to connect dumb objects. Using this technology, we can greatly automatize our product by making hardware components to communicate. RFID is commonly used to trace items in near range. This radio communication uses readers and tags to exchange information. We have mainly used these two technologies which seem to have the potential to greatly automatize the manual systems and make them faster and error free. Our product, based on the idea of Internet of Things, aims at solving the chaos, confusion and long queues in parking spaces of public buildings like malls and business parks that is prevalent due to the increased use of automobiles. We aim to solve these problems and offer car drivers a hassle-free and swift car parking experience.*

Keywords: *Arduino Uno– A microcontroller, IoT-Internet of Things, RFID – Radio Frequency Identifier, SMS–short Message Service*

I. INTRODUCTION

Due to the surge in urbanization, the usage of automobiles has increased which in turn has led to traffic and parking difficulties. The most widespread solution used currently, is to increase manpower to handle such traffic. Even in malls, trade centres and business parks, parking of vehicles has become an issue. We have all experienced the chaos, confusion and time-consuming queues to find an appropriate parking space in such places. While leaving, we get stuck in queue to pay the parking charges. To recall where the car was parked after a three hour long interesting movie is also a headache.

In Smart Card Based Parking System, when a car arrives in parking lot, it is automatically allotted a parking space. Space is allotted considering the best spot with respect to least walking distance of the parking spot from the elevator, parking type (slash/perpendicular/ parallel parking), security (coverage of spot by a camera). A user can record his preference through a website/mobile app, otherwise, default preference is considered. Default considers all preference criterion and allocates the best available. As soon as the car is parked, a message is sent to the car owner about the parking location of the car, which helps a person to remember where he had parked his car.

RFID systems are already being used in toll collection and transport payments systems. Here we are using this technology to increase the safety, security, comfort, of drivers using public parking.

II. RELATED WORKS

Various methods have been proposed for development of autonomous parking systems. Reference [1] is a smart parking system which allots users nearest parking slot. It considers only minimum driving distance as allocation criterion. Another proposed model based on IoT [2] uses Raspberry-pi and pi camera to continuously capture images of the parking slot to find empty ones. Another system [3] has been proposed by making use of Android application. In this system the car traces the path to the gate of the parking using the app. On the gate, the microcontrollers of the parking unit and the car communicate and availability of free parking slot is checked for. If a free slot is found, it is allocated and the car traces the path to the slot and gets parked. This system fails to find the best available parking slot for the car. In another paper that tells about RFID based parking [4], check-in and checkout is RFID based but it has no provision to automatically deduct parking charges. Also, user cannot choose a parking slot based on his preference. Another RFID based work [5] controls opening and closing of doors, and buzzer in case a person is drunk. Another work based RFID [6] takes care of permitting vehicles in the parking lot when any parking slot is available. Available parking slots are automatically incremented or reduced when a car leaves or enters. Both these models don't consider automatic fee deduction or allocating best parking. In this paper [7], Automatic multilevel car parking, reduces time taken to find an empty slot using infra-red sensors. It again does not consider automatic fee-deduction.

III. PROPOSED WORK

The proposed system wirelessly transfers data. It restricts user entry, as only users with positive balance can enter the parking slot. It allows pre-booking. The system allows users to give individual parking preferences. The system checks if any parking slot is free and finds best available parking slot according to user's preference. It calculates individual parking charges according to parking time of each car and automatically deducts it from user's balance stored in the card. System displays allocated parking space during entry, fee deducted during exit, on an LCD panel. It deallocates the parking slot once the car leaves. System notifies user of allotted slot through SMS during entry, of the deducted charges and remaining balance during exit. It allows user to change preference, recharge the smart card through website/mobile application.

The major components of the system architecture are Arduino Uno board, GSM module, RFID card reader, RFID tags/cards, SIM card and a LCD. The Arduino Uno board is used as a micro controller. The RFID stores car's number, car owner's name, mobile number and amount. The card reader extracts the details stored in the card as car enters and exits. The LCD is used to display messages to user. Ethernet shield connects Arduino to the internet to access the website. GSM is used to send SMS to the car owners mobile.

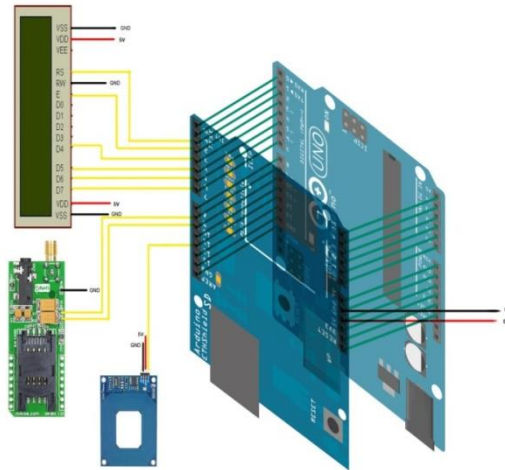


Figure1: Circuit diagram of the system

IV. EXPERIMENT

The RFID card is made to store information like the car's registration number, car owner's name. An online database is maintained containing car's registration number, owner details (name, phone, parking preference, username and password for website, available balance), time of entry and exit. The user is allowed to choose a parking slot based on his preference of least walking distance from the elevator, nearest parking slot (least driving distance), or security (total coverage/partial coverage of the slot by CCTV cameras).

A. Entry in the Parking Lot

As the car enters the parking area, the RFID card installed in the car is scanned through the RFID card reader at the gate. The card reader will extract the cars registration number. The System then checks if the owner of the car has any special parking space preference. The best parking space available is allocated to the car and the same is displayed on an LCD panel. A similar SMS is sent to the owner's number using GSM. Time of entry is recorded into the system.

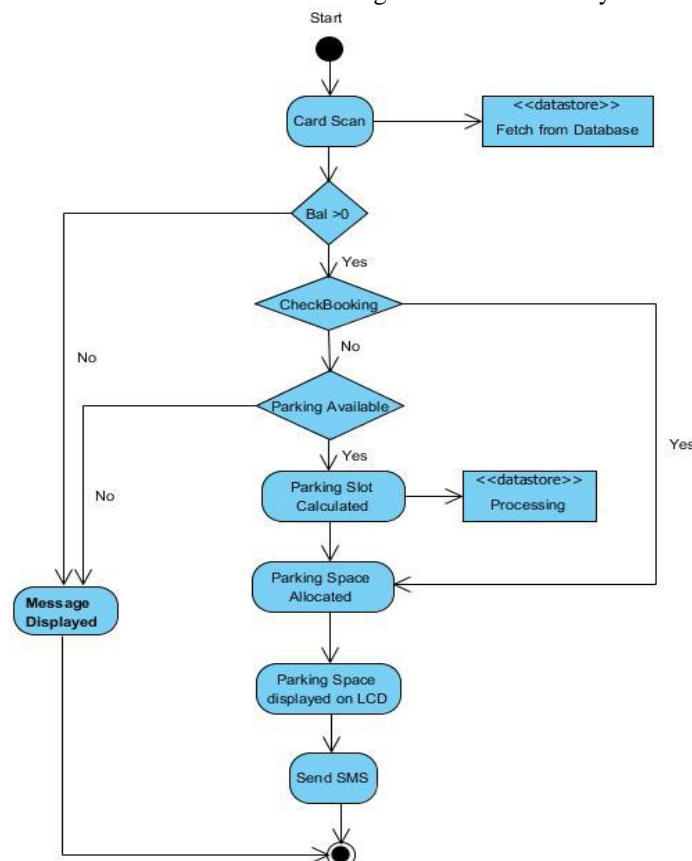


Figure2: Flow Chart of the process

B. Exit from Parking Lot

During exit, as the car leaves the parking lot, the card is scanned again. Exit time is recorded and parking charges are calculated based on duration of parking. The parking cost is displayed on the LCD panel. Cost is deducted from the carowner's balance and the database is updated. A SMS will be sent giving information about the amount deducted and the remaining balance in the card. System then de-allocates the parking space.

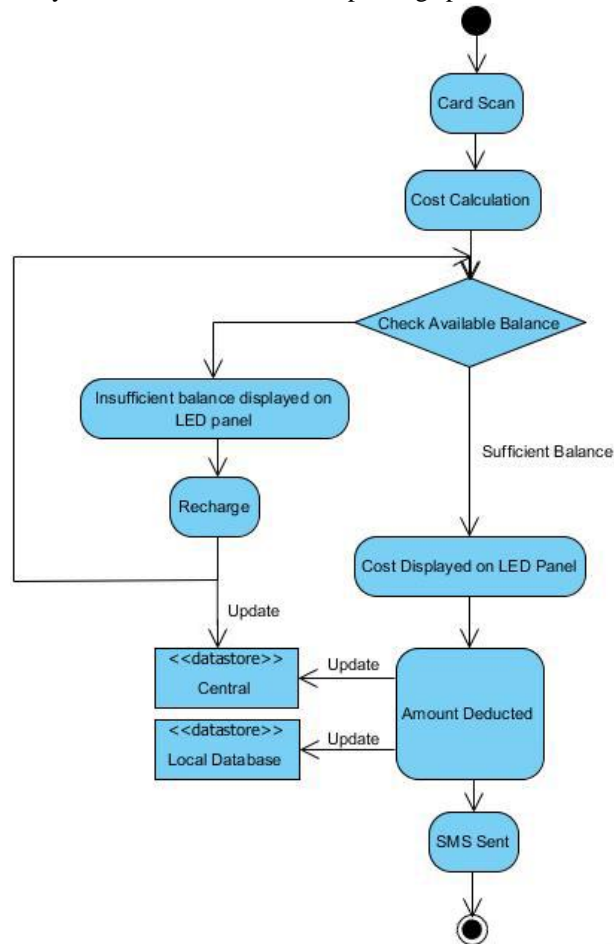


Figure 3: Flowchart for exit

V. CONCLUSION AND FUTURE SCOPE

A successful implementation of this project would result in less traffic and chaos in crowded parking spaces like malls and business buildings where many people share a parking area. The automated parking fee system would allow people to travel without cash. It provides drivers with Also, as it would reduce the waiting time, long queues, tension, stress and increase the efficiency of the parking system. As the Smart Car Parking System Requires minimal manpower, there are minimum chances for human errors, increased security in addition to a swift and friendly car parking experience for drivers.

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