SMART CAR PARKING SYSTEM USING ARM 9 AND E-APPLICATION

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Abstract - **This smart car parking system using ARM 9 and e-application paper proposes an advanced android application for parking services and the hardware module for the showing actual interfacing between software and hardware. Smart car parking system is the embedded system which allows user to reserve or book the parking slot in advance from home itself and hardware module shows the real time processing at the parking area. For security purpose an RFID tag for Number Plate Recognition is used which identify the vehicle from number (license) plate and compare it with the previously saved data if match found then only allow driver to park their car so that security will be maintain.**

Keywords- android application, number plate detection, ARM 9 based Parking slot detection.

I. INTRODUCTION

In densely populated areas Finding empty parking spaces are common problem. Drivers individually find empty parking spaces, searching without information of a parking status. These drivers take an unnecessarily long time to find the parking spot.[1] Due to the technological improvement in day to day life human is having a easeful life. But during that time these advantages have become troublesome. As in the last few years the near about all people using their own vehicle. The car parking has become an immense issue in big cities. Two main reasons are there for this. first reason is the exponential increases in population and the other is the security or safety. Car robbery has become an daily crime currently. So a challenge arises, will it workable to produce or design such a system that would solve all these issues and will be intelligent too.[2] The count of parking area are limited in almost every urban and rural area all over the world, driver frustration , congestion, and air pollution due to wasted time searching for a parking space and / or penalties paid for illegal parking and to recover cars from companies specializing in seizing vehicles that are not parked legally are the problem. However, parking areas are wasted due to not having complete information about the all slots of parking area. In big parking a car driver may exit the parking area without having idea about new slot that has become empty recently. This problem is all over the world and many solutions were implemented over the world.

To remove these problems or inconvenience of drivers, a design of a smart car/ vehicle parking system is proposed or explained here, which will be design on ARM 9 to check its functionality and working. A microcontroller ARM 9 is efficient controller to implement a design, because ARM 9 provides a compromise between general-purpose processors and ASIC. The ARM 9 based design is also more flexible, programmable and can be re-programmed. ARM 9 based design can easily modified by modifying design's software part or interfaces. Proposed system is basically divided into three parts:

- e-parking – allows user to book parking slot in advance
- RFID – check number of vehicle for the security
- parking area- area where user will park car

II. SYSTEM DISCRIPTION

We have divided the proposed smart car parking system into following different modules.

A. e-parking
B. RFID
C. parking area

2.1 E-parking

First, the data that will be sending is the vehicle type (TY). Selection of the type of vehicle is required for the charging purpose so every vehicle will be charged as per the space occupied by it. We have considered cars only. Second, user/ driver information like name and surname (NS) will be send to keep record of each user separately. This information will belongs to the personal details of

the car driver for security purpose. The third and last data is the registration number or simply number of the car (NC). The registration number is the very necessary criteria, on basis of which the driver will be allowed access into the parking area. [3]

To use this e-parking application we can use login id and password so that it will be easy to keep record for the users those are doing reservation frequently.

Reservation will be set by three parameters:

1. Date (D), day or date of the reservation. This will be shown as a calendar; first the user will select the month then year and then the day. Date can also be entered directly from the keypad
2. Starting time (TI), indicates the time for which the reservation is to be done
3. Parking time (PT). Reservations can be made for hour only a number of hours (hours are not divisible). If the car driver leaves the parking area before desired period, it will be charged for the total time period that the reservation was made. [3]

This total data will be sent to the client computer through internet and that computer will check whether there parking slot is available or not, If slot is available then that slot number will be sent to the respective account from where reservation will be made with one time password, which will be used at the time of parking in the parking area.

2.2 RFID Technology:

Radio-frequency identification (RFID) is also known as interrogators. Which is easy way for getting response, it requires less time for processing i.e. quick response and automatic identification method in which RFID tag stores the data. The RFID tag is work as a device that can be stick on to or combined into a things, living animal or person for recognition and tracing using radio waves. Tag can be read from certain predefined range which is in several meters for all RFID modules. Some specially designed RFID module can read those tags beyond its line of sight. Data is transferred from the tag to the receiver through radio frequency electromagnetic field. It is totally wireless communication. Tags are of two types first type is active tag which works on external battery connected to it and second type is passive tag which does not require any power supply , electromagnetic field provide power to those tags .information stored in the tags are in the form of electronic which will be read by receiver.

RFID system has three major Components:

1. An RFID tag – transponder.
2. An RFID reader – transceiver.
3. A predefined protocol for the information transferred.

2.3 PARKING AREA

At the parking area when vehicle will entered in the parking area then it will be sensed by the sensor after number plate recognition system will check for the is reservation is already done or not if not then simply shows message that "invalid reservation number" and if number will get match then ask to user to enter password given at the time of reservation. If that matches then open the gate and allow vehicle to park at the given slot.

Parking area is divided into two modules:

1. Entering Module
2. Exiting Module

2.3.1 Entering Module

In Entering Module, as the car enters the parking area, it will sensed by the IR Sensors. The IR Sensors provide the pulse or signal to the ARM 9 which assumes that an object is detected and it will start processing thus the vehicle is entered into the parking lot. Now as the car enters the parking area, time of arrival will be note down and scan its RFID tag and ask for the OTP given at the time of reservation if it matched with the previously stored data then and then only allow the car is directed to park in the slot which is allotted. This is a very useful feature because of which driver doesn't need to spend time for the searching empty slot rather it is directed to park in the allotted slot number. Thus time and fuel both will be saved. [2]

2.3.2 Exiting Module

Exiting Module, works when the vehicle leaves the parking area, again presence of car at the exit door will be sensed by the IR sensor. The IR Sensors provide response to the ARM 9 which assumes that a presence of is detected. A main task here is to keep track of time period which will be used by car in parking area so that at exit we can display the right invoice [2]. Here at the exit system again ask for the enter password if the password is correct it will note the current time and from that gives invoice for the time utilized by that car in the parking area. If time utilizes is more than the reserved period at the time of online reservation then shows the penalty amount and after payment simply open the gate and allow user to go.

III. BLOCK DIAGRAM OF PROPOSED MODEL

In the proposed system we will based as shown in the fig 1 .server 1 , server2 to server n will be the n numbers of server which will be control from one client computer which is at the parking side. Here we will use ARM 9 for all processing part. A microcontroller ARM 9 LPC1768 is of cortex m3 series and efficient method to implement a design. The ARM 9 based design is also more flexible, programmable and can be re-programmed. ARM 9 based designs can easily be modified by modifying design's software part.
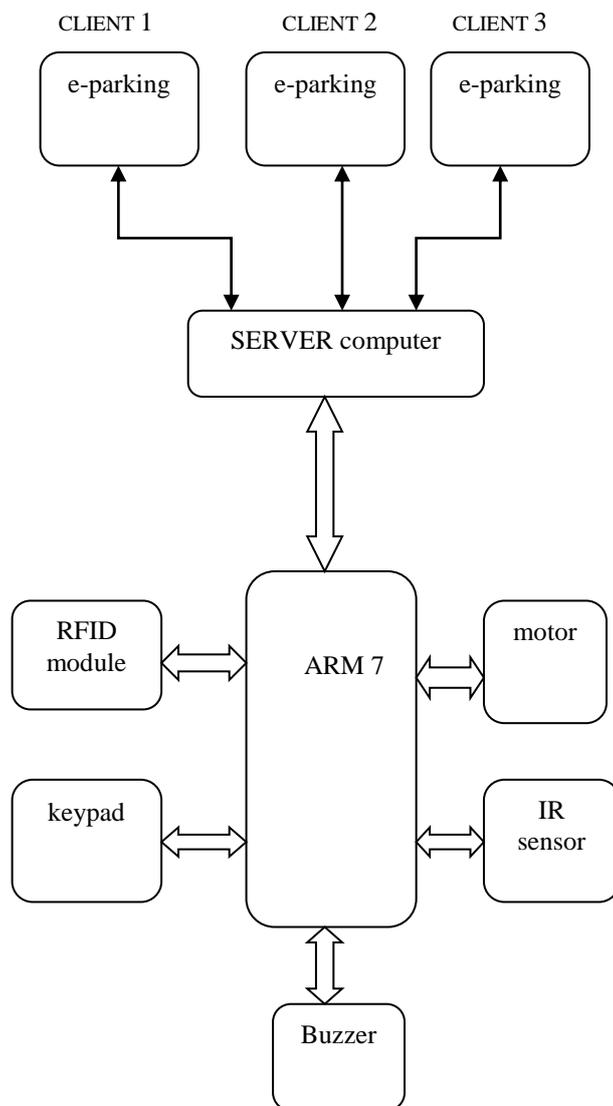

FIG1. OVERVIEW OF PROPOSED SYSTEM

IV. CONCLUSION

Through this paper our aim is to find the free parking slot through android application is fulfilled. The idea of this project is explained using two modules: hardware and software. IR sensors are used for the checking of presence of car's arrival and for the car's departure, avoiding the expensive wireless sensors. As we have explained android application for booking purpose it automatically reduce the time requirement for the searching empty slot. This will indirectly help to improve the quality of atmosphere which is got damaged due to pollution. The idea is to keep it easy and interesting feature so that the parking system become cheap, easy and less time consuming.

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