"IOT BASED SMART PARKING AND ADVANCE BOOKING SYSTEM"

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Abstract - Internet of Things (IOT) plays a key role in connecting the surrounding wireless things to the system and makes it easy to access information from any remote location[1]. The researches and implementations are currently on-board in all the respective areas. The study based on real time traffic congestion enables us to design a Smart Parking and Advanced Booking System(SPABS) to find the nearest parking area and gives the option of booking parking slots. It mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area and also reduces the fuel consumption.

The existing parking system which uses video sensors and cameras to collect the real-time information. But these parking system are expensive and utilizing more bandwidth. In consideration with cost and performance, our project embedded-wireless sensor based system called Smart Parking and Automatic Booking System(SPABS) is to detect the empty parking spaces and provide this data to users. In this system, user will send a request to the server, for the slot of their choice. The central database will send a request to embedded system, to confirm the availability of parking slot. The user will access the confirm request provided by the server. The information also includes the terms and condition where in, the booking will be cancelled, if the user did not turn up within the given time slot.

The user can access the allotted parking slot only through a smart card, to avoid unauthorized entry. When the smart card is swiped, the server will verify the user and user will be allowed into the parking lot.

I. INTRODUCTION

The use of IOT technology is growing in various fields but we are yet to find the boundary constraints of this technology[2]. Some smart applications in which IOT is implemented are smart grids, smart lighting, smart energy, smart city, smart health etc.

IOT is broadly classified into three departments. They are sensing, processing and connectivity. Sensing includes sensing the speed of vehicles and humans or any objects (accelerometer), sensing of temperature, pressure etc. And these can be processed by using some processors such as network processor, hybrid processor MCU/MPU etc. The devices are connected by using some technologies called GPS, Wi-Fi, BT/BTLE, RFID etc to connect it to the internet.

More than half of the world's people are living in the cities. The cities have reached their full occupancy. As all people use vehicles for transportation, there is large number of vehicles in use. Most of the time people spend their precious time on searching parking lots to park their vehicles. Thus congestion occurs in the traffic, leading to a

hectic job in finding a parking space to park their vehicles.

II. SYSTEM ARCHITECTURE

The SPABS has three main sub systems. Namely, the location controlled embedded system, the data based system, and the user end application. This is illustrated below in the block diagram shown below.

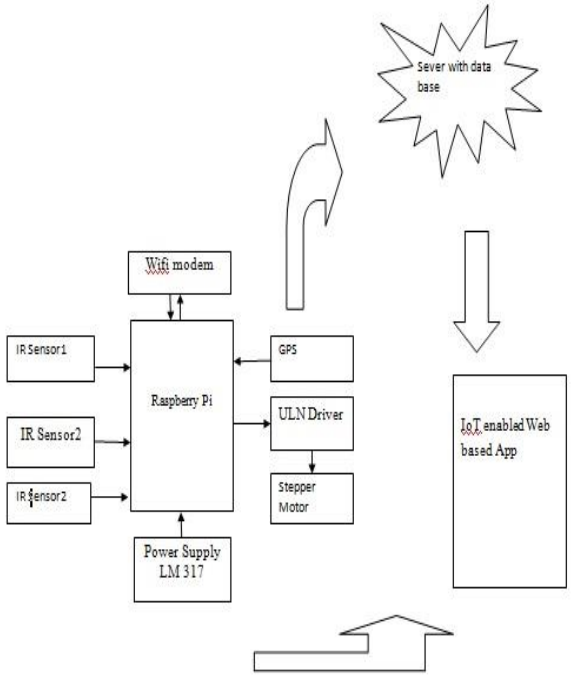

Fig 1. Block Diagram of SPABS

The location based embedded system consist of IR sensor which collect the status information of the parking slot whether it is occupied or vacant and forwards this data to Raspberry Pi. The Raspberry Pi process the received data and uploads it to the data base server. The embedded system provides security to the user by employing the gate open and close system which can be accessed only by authorized RFID cards, given to the verified users.

The data base server contains all the data related to SPABS. It includes the slot status data sent by the Raspberry Pi, data base of all the registered users. The parking status data sent by the Raspberry Pi is updated dynamically to know the exact current status of the slot. The user can access data via web application from any location.

Web application acts as a interface between the users and the embedded system. It displays the current status of the parking slot. The user can book any parking slot of his choice by paying applicable parking fee. The fee varies depending on time duration for which the slot is booked. This web application provides the user with an option to cancel the booking.

The primary components that interact in the SPABS are as follows:

- *Smart Sensors* : The smart sensors are used to obtain the status data of the parking slot. Various sensors like Infrared sensors, ultrasonic sensor and Passive Infrared sensors(PIR) can be used for this purpose. For our parking system we use Infrared sensors. The sensor determine whether the slot is vacant or not[6]. This is done by emitting the infrared rays, if the emitted rays are reflected back then it shows the presence of an obstacle i.e., indicating the slot being occupied. If there is no reflection of the IR rays then the slot is considered to be vacant. The sensors require 5V power which is supplied either by the Raspberry Pi or an external source[6].

- *Processing unit* : It comprises of Raspberry Pi which acts as an intermediate between sensors and the server. All the sensors are connected to Raspberry Pi[3]. It consists of 26 GPIO pins i.e., 26 different sensor can be connected to it. Data collected from the sensor from various GPIO pins are updated to the data based sever in regular time intervals(may be few seconds). There is a python script running on the chip that checks the status of the GPIO pins and updates the information.

- *Web application:* It is the interface between the end users and the system through which each user can interact with the SPABS. The application is connected to the server using MySQL script[4]. To ensure the proper communication both Raspberry Pi and web application must be subscribed to the particular channel on the server.

III. IMPLEMENTATION AND WORKING

In the previous section, we discussed the architecture related to SPABS. Here, we will discuss about the implementation and real time working of the system. This working process is explained with the help of the flow chart shown below.

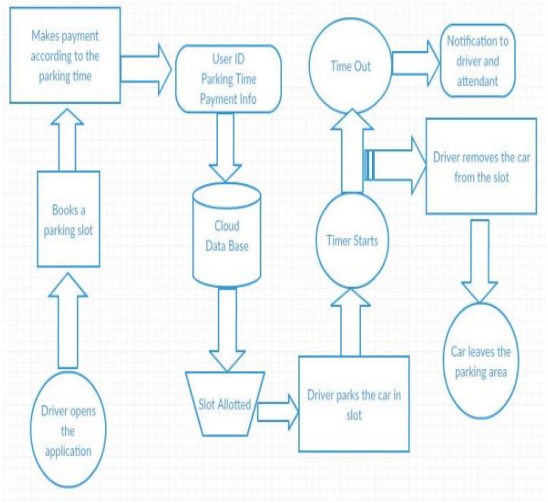

Fig 2. Flow chart

The process for the user to book a slot using the SPABS system is given below.

- The user first has to run the web application on their device.
- The web application enables the user to search the parking slot.
- The user can choose the desired parking slot and book it for a duration of time as required.
- The parking charges can be paid either with your e-wallet or credit cards.
- Once you have successfully parked your car in the selected parking slot your occupancy is confirmed.

IV. CONCLUSION

This designed automatic smart parking system which is simple, economic and provides effective solution to reduce carbon footprints in the atmosphere[5]. It is well managed to access and map the status of parking slots from any remote location through web browser. Thus it reduces the risk of finding the parking slots in

any parking area and also it eliminates unnecessary travelling of vehicles across the filled parking slots in a city. So it reduces time and it is cost effective also.

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