

Smart Car Parking System

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Abstract - In today's technological world the concept of smart city has become an area of interest. Concern to parking became impending in an urban area. The parking space problem can be turn into a new opportunity brought by the recent trends to meet the world's connected continuum. In this paper, I am presenting the IoT based Smart Car Parking System. This paper makes easy for the user to find automatically a free space at the low cost and without consuming time and fuel. The whole system is based on Wi-fi network. The android application in mobile is also provided to the user to check the availability of free space for parking and book that slot accordingly.

Key Words: (Android Application in mobile, Internet Of Things, Infrared Sensors, Smart Parking System, Wi-Fi)...

1. INTRODUCTION

The concept of Internet of thing (IoT)[4] started with the identity communication devices. The devices could be tracked, controlled or monitor using remote computers connected through Internet. The two words in IoT are 'Internet' and 'Things' in which Internet means the vast world's network of connected servers, computers, tablets, mobiles using an internationally used protocols and connecting the systems enabling sending, receiving and communication of information. It provides a vision where things become smart and behave like alive through sensing computing and communication by embedding small devices which has an interaction with the remote objects and persons through connectivity.

Physical object + Controller, sensor and Actuators + Internet = Internet Of Things

The idea of creating smart city is now possible with an emergence of IoT[4]. Smart cities related to car parking facility and traffic control management has become the major issue. In big cities chasing for an available parking slot is always is not easy for drivers and it tends to become difficult with increasing number of user having their own cars. This situation could be taken as an opportunity in order to make advancement in the efficiency of parking resources which will reduce the searching time, traffic congestion and road accidents. The drivers can be informed in advance about the availability of to their destination. Followed by the development in sensor technology, many modern cities have adopted for deploying different IoT based system around the city for the monitoring. Parking is an expensive process in terms of money, time and efforts made for searching free

spot. A recent survey has reflected an increase in number of innovative ideas related to parking system. The smart Parking System proposed by me is worked out using mobile application connected to Wi-Fi.[1] The Wi-Fi network has various advantages like flexibility, inherent intelligence, low cost, rapid deployment and more sensing point, specially in an area where wired communication is not possible. Due to these benefits, largely used in different application such as health monitoring, facility management, environment monitoring, intelligent buildings, disaster relief applications etc. In this work I have developed a Smart Parking System that can monitor an available empty slots economical and reliable and considerably contributing to fuel and time consuming. In this work the most widely used sensors are Infra-Red (IR) sensors.[3] These sensors are used for monitoring the vacancy of parking slot. The reason for using these sensors is they are cheap and use less memory as compared to camera if used as sensors. The sensor will monitor that whether the car is parked or the slot is empty. If the slot is empty, then the sensor would sense it and give the notice to controller and controller will activate the LEDs as per the notification. If the car is parked in any slot then the LED would glow as RED showing that slot is not empty, otherwise when the slot would be empty or available it will glow GREEN.[4] The mobile application used by the user acts like the interface for the end users to interact with the whole system. The Android Application is simply design to see and choose the slot for parking before arrival to the destination. It would be for the user to decide which slot is convenient for exit during departure. Doing this will save time, as well as the fuel and also it would not arise the traffic congestion problem.[4].

The rest of the paper is organized as follows: Section II presents the Proposed Architecture, Section III describes the Building Blocks with its implementation and working, Section IV consist of various figures related to the system which shows how the smart parking system is user efficient and beneficial, Section V concludes the paper.

2. PROPOSED ARCHITECTURE

[2.1] System Overview

The Smart Parking System is a concept to combine real time reservation with share time reservation, in which a driver can book a slot few minutes ago or any time before arrival at the destination. The system consist of Wi-Fi technology and the IR sensors to monitor the empty space for parking Fig.1. In this system, the user will look on android application

installed in his mobile for the convenient space accordingly. After logging into the system, the user will choose the space book the slot which will be suitable for him. Information regarding parking location will be given to the user via notification. After that the system updates the status of parking slots and the slot will be booked for the time being.

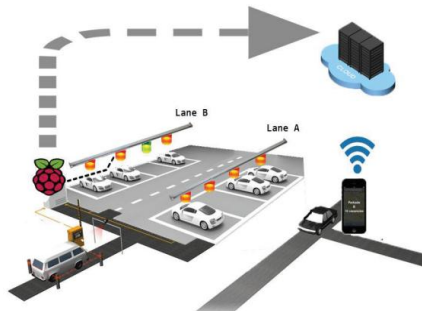


Figure-1. Smart Car Parking System

[2.2] System Architecture

The architecture of the Smart parking system consist of various elements. Internet through Wi-fi, Android mobile for the app, IR Sensors, LED Lights (Green and Red) for indication of space empty or full, PIC microcontroller 18F4550, Personal computer.

3. ARCHITECTURAL BUILDING BLOCKS

The below shown is the block diagram of the whole system. The whole system can be explained using the following block diagram.

Elements of the block diagram are as follows:

3.1 Android Mobile App

The Android App is developed and installed in the users mobile. The user will follow the following steps for booking the particular slot of that system. Install the Smart Parking Application in the mobile device. With the help of the App search for a parking area nearby to the destination. Browse through the different parking slots available in the parking area. Select a particular or convenient slot. Message or notification of booking will be given to the user after booking and when the car is parked.

3.2 Wi-Fi

In the proposed system, the Wi-Fi internet connection is used. The communication link needs more security. An Android Application has two methods to create a link. The first one is using IP address of the Wi-Fi module directly coded into the app for initial testing. The second is, it allows the user to search for the space for parking. Then the user can decide the parking slot and park the vehicle.

3.3 Infra Red Sensor

Infra- Red (IR) sensors are used to detect the objects and obstacles in front of sensors. In this system, when the vehicle comes in the parking slot , sensor keeps transmitting modulated infrared light and detect the vehicle.

3.4 LED Lights

The system is provided with the LEDs for indication of Empty or full parking space. When there will be no car parked in the slot, the LED will glow GREEN i.e the parking slot is available for booking. When the car is parked or the slot is already booked

3.5 Personal Computer

The computer will keep record of vehicle parked. It will start counting the time as the car will be parked in the particular slot. When the user will leave the parking area, he will have to pay charges for using the slot. These charges will be taken as per the time such that charges per hour or charges per minute. The user will have to pay the charges to the exit gate while leaving the parking area.

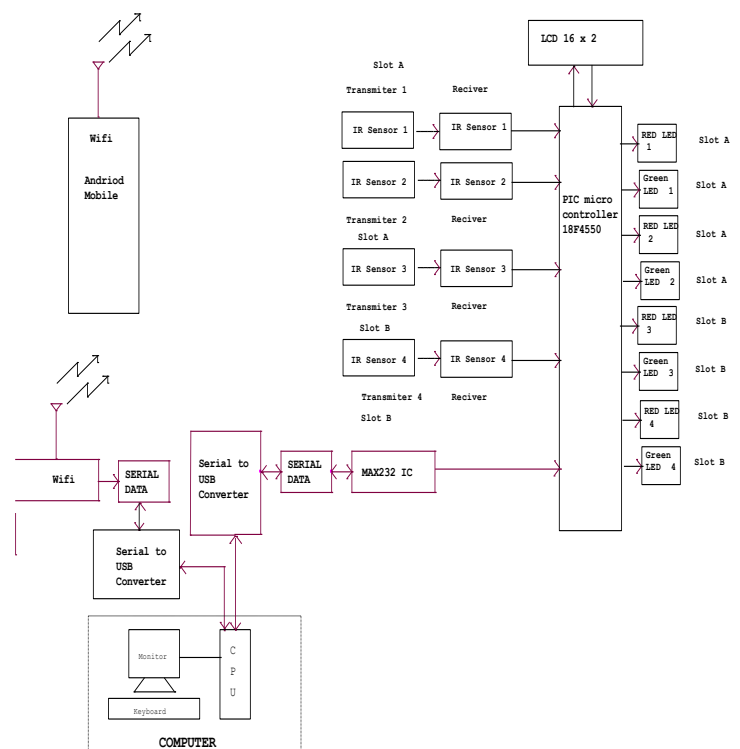


Figure -2: Block Diagram

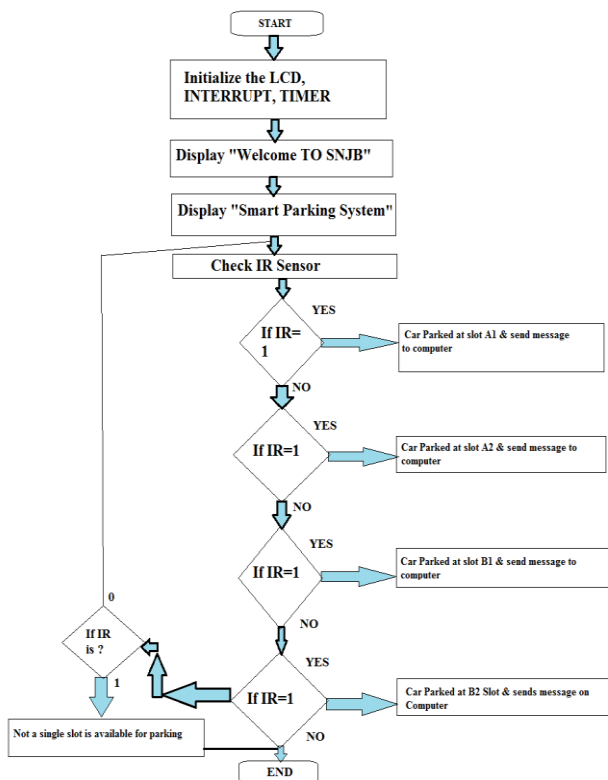


Figure -3: Flow Chart

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4. CONCLUSION

In this system, the issue of parking and presented it using IoT and wi-fi based. The system proposed provides real time information regarding availability of parking slots in a parking area. User from remote area can book a parking space using mobile app. The efforts taken in this system are with intention to improve the parking facility of the city and aim to provide the ease to people. The proposed work-in-progress described in this system reveals the research agenda that aims at lifting the parking space management from a purely physical business to a business that transforms parking in to a computational service. The system outlines the agenda of this on-going wok to enable value added services around parking to both end- user and the parking service provider. Advantages of this are User friendly, Saves time for chasing the empty space, Saves fuel and traffic congestion is under control.

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