

Smart Parking System Using WSN



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ABSTRACT

With the development of technology, smart devices are becoming more common in everyday life. The development of devices that connect to the internet and transmit data has been a source of inspiration for smart city designs. During peak hours most of the reserved parking area gets full and this leaves the user to search for their parking among other parking area which creates more traffic and leaves them with no indication on availability of parking space. To overcome this problem there is definitely a need for designed parking in commercial environment. This paper focuses on different smart parking techniques using various wireless sensor network and providing real-time data analysis from the sensors, some papers include system based on resource allocation and reservation of parking lot which have various problems in efficiently achieving the goals. This paper will be useful for new researchers for study of various guided parking and information techniques and algorithms which are covered in this paper.

Keywords- Smart Parking, Wireless Sensor Network (WSN), Reservation, Resource Allocation, parking guidance and information.

I. INTRODUCTION

In today's parking lots there is no standard system to check for parking spaces. The system heavily relies on human interaction with the physical space and entity. These parking lots are dependent on Human-to-Human Interaction (HHI) which is not efficient. Previously, various techniques have been proposed to overcome such problems. Smart parking with help of short messaging service(SMS) was devised to provide an entry and exit password which would allow the person to authenticate himself/herself at the entry/exit point. The ZigBee wireless sensor network along with global system for mobile (GSM) used a data from each node to show if the parking space is available and the data was available only at the entry point and at the administration end.

In a study of "A Reservation-based Smart Parking System" which introduces the concept of pre booking of parking slots by using the concept of Bluetooth as a part of hardware for data transfer, it was found, that the major drawback of the model was that it was not cost efficient and even prone to security breach.

This paper is based on new technology of hardware which

will be cost efficient and even easily implemented. This paper overcomes all the drawbacks of other discussed papers. This paper will help the owners to earn money by renting their parking slots and it is best suited for the smart cities.

A. Overview

This paper uses the three components in the smart parking model, including parking lots, users and the smart parking system. The management system determines the parking prices, and broadcast lives parking availability information to users (also drivers). Upon receiving parking information, the user selects a desired parking lot and reserves a space in the parking lot.

In the architecture given below will help in developing the model. In the architecture multiple stages are Arduino, power supply, GPS receiver, IR sensors, DC motor, keypad, ESP 8266 Wi-Fi module. These are different components used for hardware implementation.

II. LITERATURE SURVEY

Sl No	Paper Name	Year	Review	Advantage	Disadvantage
1.	Approach to IoT based Car Parking and Reservation system on Cloud	2015	In this paper we have surveyed that this paper is based on the approach to IoT based car parking and reservation system on cloud. The future scope of the work is to design the algorithm, test the solution and implement it in simulated environment.	<ul style="list-style-type: none"> 1. This system uses cloud for reservation. 2. Reservation can be implemented from a wide range. 3. It uses mobile application is used for implementation. 	<ul style="list-style-type: none"> 1. It requires new concepts and it is mobile platform dependent. 2. It's expensive.
2.	A Survey on "Smart Parking" System	2016	This paper is very useful for new researcher for innovation of new techniques to manage the problem faced by drivers on day to day basis.	<ul style="list-style-type: none"> 1. Parking lot vacancy module uses ZigBee along with PIC. 2. Security Feature: The exit password must be entered else the user is not allowed to get out of the parking bay as the barrier gate will not get open until correct exit password is entered. 	<ul style="list-style-type: none"> 1. Implementation of the concept is costly. 2. Hardware requirement is high and require highly skilled engineers.
3.	A Reservation-based Smart Parking System.	2015	This paper is very useful for new researcher for innovation of new techniques to manage the parking in smarter way by using concept of pre booking. A new prototype of Reservation-based Smart Parking System (RSPS) to optimize parking management.	<ul style="list-style-type: none"> 1. Reservation feature is available for the user. 2. Multilevel parking inside an infrastructure is possible. 	<ul style="list-style-type: none"> 1. Security is less as compared to other models. 2. Implementation of application is essential.
4.	Smart Parking Service based on mobile application.	2015	The proposed smart parking system consists of wireless sensor networks, embedded web-server, central web-server and mobile phone application as Android and iPhone.	<ul style="list-style-type: none"> 1. Use of android application provides ease of usage and better interface. 2. GPS helps in max coverage of available area, displaying various options for parking. 	<ul style="list-style-type: none"> 1. Reservation feature is not available for the user. 2. Multilevel parking inside an infrastructure is not available

III. PROBLEM STATEMENT

We are moving towards smart cities and there is lack of good technologies for parking the vehicles in parking lots. No secured environment is available for parking and earning money from it.

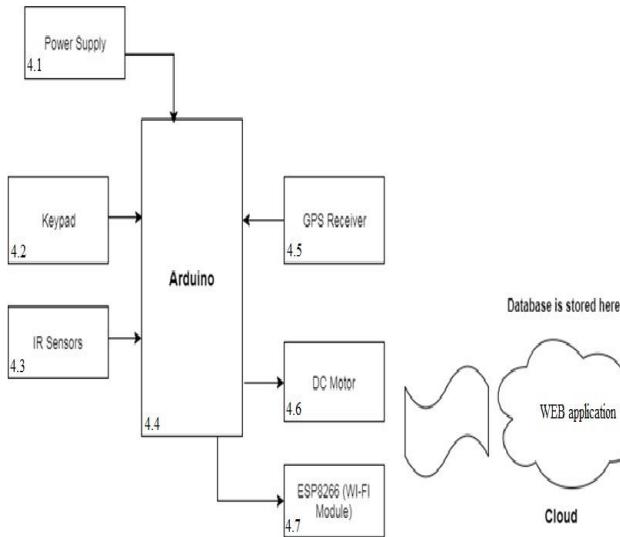
IV. SYSTEM ARCHITECTURE AND DESIGN

In this section, we present the architecture and design of proposed reservation based smart parking system, which implements a reservation service to systematically park the vehicles and earn money .

4.1 Power Supply

A power supply is a component that supplies power to at least one electric load. Typically, it converts one type of electrical power to another, but it may also convert a different form of energy – such as solar, mechanical, or chemical - into electrical energy.

A power supply provides components with electric power. The term usually pertains to devices integrated within the component being powered. For example, computer power supplies convert AC current to DC current and are generally located at the rear of the computer case, along with at least one fan.



4.2 Keypad

Keypad is used for entering the generated code (unique key).It is simply a keyboard like our desktops have. Function is same which is taking input from user.

4.3 IR Sensor

An infrared sensor is an electronic device, That emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, Rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode

which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received.

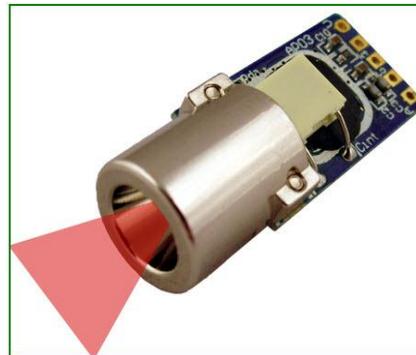


Fig. IR Sensor

4.4 Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IOT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

4.5 GPS Receiver

Any navigation solution provided by a GNSS Receiver is based on the computation of its distance to a set of satellites, by means of extracting the propagation time of the incoming signals travelling through space at the speed of light, according to the satellite and receiver local clocks.

Notice that satellites are always in motion, so previous to obtaining the navigation message, the satellite's signal is detected and tracked. The receiver's functional blocks that perform these tasks are the antenna, the front-end and the

baseband signal processing (in charge of acquiring and tracking the signal).

Once the signal is acquired and tracked, the receiver application decodes the navigation message and estimates the user position. The Navigation Message includes:

- Ephemeris parameters, needed to compute the satellite's coordinates.
- Time parameters and Clock Corrections, to compute satellite clock offsets and time conversions.
- Service Parameters with satellite health information.
- Ionosphere parameters model needed for single frequency receivers.
- Almanacs that allow computing the position of all satellites but with a lower accuracy than the ephemeris.

4.6 DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

4.7 ESP8266 (WIFI Module)

Your ESP8266 is an impressive, low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone WiFi connected device—just add power!

The feature list is impressive and includes:

- 802.11 b/g/n protocol
- Wi-Fi Direct (P2P), soft-AP
- Integrated TCP/IP protocol stack

V. CONCLUSION

In this concept, we have developed a new prototype of Reservation-based Smart Parking System (RSPS) to optimize parking management. In this system, we implement parking reservation policy to balance the benefit of service providers and requirements from the users. Moreover, we have presented the detailed design, implementation and evaluation of the prototype. Based on the obtained results from our simulation study, we conclude that the proposed reservation-based smart parking system

can alleviate traffic congestion caused parking searching and reduce the amount of traffic volume searching for parking.

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