



VISION BASED SMART PARKING SYSTEM

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Abstract:

The basic idea of this project is to create a smart parking system which is much needed system to save money, time, and even environment. Here internet of things aims at developing a smart parking system inside a smart city which automatically finds the nearest available parking slot.

In this project a smart parking feature which enables a user in finding a parking location and a free slot in that parking space inside a city or outside of shopping malls. This project focuses on reducing time wasted on finding parking space nearby and ongoing through the filled parking slots. This in turn reduces the fuel consumption and standard of living.

This system is also used to recognize a user entry and exit and it will be uploaded to cloud server. This system uses RFID Reader. We will send vehicle number when it is there at parking slot and again, we will send vehicle number when it is leaving. We need to estimate time and cost for that particular vehicle.

Keywords: *Raspberry Pi, RFID Reader, PHP Server, Slot Booking, Time recording.*

Introduction:

A vehicle parking system that helps drivers find a vacant spot. Using sensors in each parking space that detect the presence or absence of a vehicle, signs direct incoming drivers to available locations. This rapid urbanization has led to an increase in automobiles on road which in turn has spiked demand for parking space. However, most metropolitan cities have limited space they can allocate for parking.

In recent times, the number of systems using IOT are increasing as the information is brought directly to the fingertips. A multitude of devices are expected to be involved in IOT, which provide a rich source of information. Cloud computing is basically the usage of cloud storage area that combines devices and virtual environment to monitor and store data. There are many parking related problems that remain unsolved. Firstly, the longtime taken to wait and search for parking spots, that result as an inconvenience to the drivers by delaying their set schedules. Next, traffic congestions caused

inside parking areas due to heavy vehicles entering into parking lots and occupying wrong sized parking spots. Then, the lack of availability of intelligent reservations for parking spots and access of their information remotely to the drivers. Additionally, there is the huge manpower costs, effort, discomfort, potential quarrelling of drivers while searching for parking spots, etc. Finally, the problem of security at the parking bays to prevent unregistered entry of vehicles, keeping customers safe along with remote monitoring of their parking bays for the owner to keep track of their vehicle.

The solution to this issue is a smart vehicular parking system which efficiently manages parking and provide users with information regarding nearest parking spots. These systems incorporate technologies such as Wireless Sensor Networks (WSN), Webserver, Internet of Things (IOT) couples with RFID Technology.

Existing system:

In the existing system, there is no autonomous system for entry and exit in parking locations. And manually the user will be roaming to check for empty parking slots.

Drawbacks:

- Time consuming.
- Fuel wastage.

Proposed System:

This project proposes smart parking system which detects and find a parking location for consumer’s vehicle. This system uses RFID Reader. We will send vehicle number when it is there at parking slot and again, we will send vehicle number when it is leaving. We need to estimate time and cost for that particular vehicle.

Ref	MCU Used	Merits	Demerits
Ahmed, M. and Wei, W. (2014)	STC Microcontroller	Stopping of unwanted entry	Machine coding
Thorat, P., M. A., Kelshikar, A., Londhe, S. & Choudhary, M. (2017)	Nodemcu	IOT based parking	Need more pins if we want include any other sensors.

Table1: Comparison of Existing Works

Block Diagram:

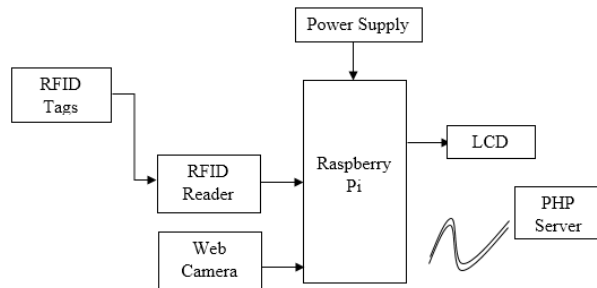


Fig1: Block Diagram



Fig2: Raspberry Pi

Hardware Requirements:

A) Raspberry Pi:

Raspberry pi is a powerful microcontroller that exists in credit card size. It serves as micro controller, also it serves as a minicomputer by connecting essential cables like HDMI cables, audio cable. Simply we can say Raspberry Pi is a credit card sized computer which also serves as microcontroller. It is fast as compared to other controllers.

B) Liquid Crystal Display:

LCD is 16X2 LCD which displays 32 characters at a time. It has 8 data transferring Pins, RS which is Register select, En is Enable, and R/W is Read and Write Pin.

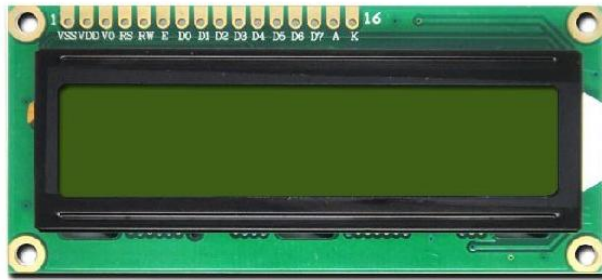


Fig3: LCD

C) Web Camera:

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video.



Fig4: Web Camera

D) RFID Reader:

The RC522 RFID Reader module is designed to create a 13.56MHz electromagnetic field that it uses to communicate with the RFID tags (ISO 14443A standard tags). The reader can communicate with a microcontroller over a 4-pin Serial Peripheral Interface (SPI) with a maximum data rate of 10Mbps. It also supports communication over I2C and UART protocols.

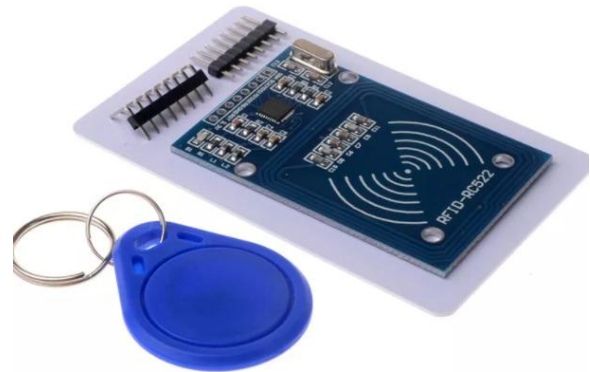


Fig5: RFID Reader & Tags

E) 5V 2A Adapter:

5 Volt 2 Amp Power Adapter takes an AC INPUT of 100-240V and gives 5V 2A DC output.

Specifications: -

- Input - 100-240 VAC 50/60Hz
- Category - Switch Mode Power Adaptor (SMPS)
- Output Type - DC
- Output - 5Volts 2Amp



Fig6: 5V 2A Adapter

F) USB Cable:



Fig7: USB Cable

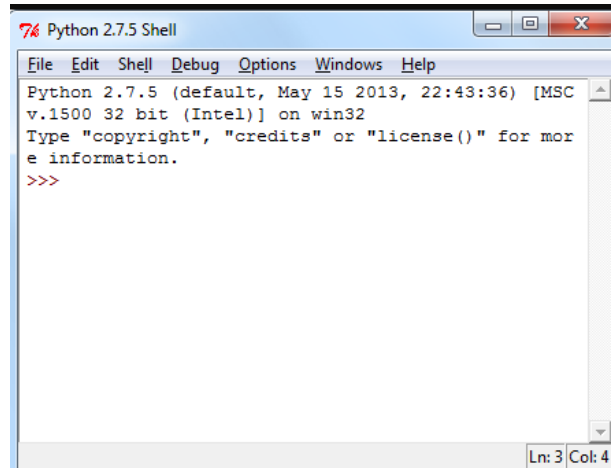


Fig8: Python Shell

Software Requirements:

A) Python:

Python is an interpreter, high level, interactive and general-purpose programming language. It was developed by Guido van Rossum during 1985 – 1990. The source code is available under general public License. Python is named after a TV Show ‘Monty Python’s Flying Circus’ and not after Python-the snake. It supports Object Oriented programming approach for developing applications.

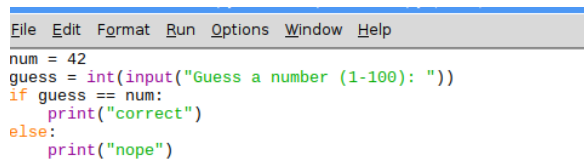


Fig9: Python Script

PHP Server:

PHP started out as a small open-source project that evolved as more and more people found out how useful it was. Rasmus Lerdorf unleashed the first version of PHP way back in 1994.

- PHP is a recursive acronym for "PHP: Hypertext Preprocessor".
- PHP is a server-side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites.

It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.

Working of the Project:

The project consists of Raspberry pi, web camera and RFID reader and Tags. When the car



enters the parking area the RFID tag will be swiped and one number will be sent to the so that the in time of the vehicle is taken and when the same card is swiped then out time will be taken. If camera detected car in the parking area, then the slot is booked will be shown in the website which is created using Php Server. By using this website, we can book slot in prior before entering into the parking slot. So that in website it will be shown in red color that the slot is booked. Here in this project, I am showing 4 slots.

The figures in results shows the output of the project.

The following is the procedure to follow while parking the vehicle.

Initially the car enters into the area at that time the RFID tag attached to the car is read by the reader and will sent the ID to server so that the vehicle entering time will be taken.

The camera attached will check for the empty slot and will show on the server as green marking otherwise it will show red marking. The car can park in the green color zone.

At the time of leaving the parking area again card will read the out time. Based on in and out time the payment will be charged.

In this project user can prebook the slot by using the cloud server by logging into with credentials.

Results:

Hardware Part:

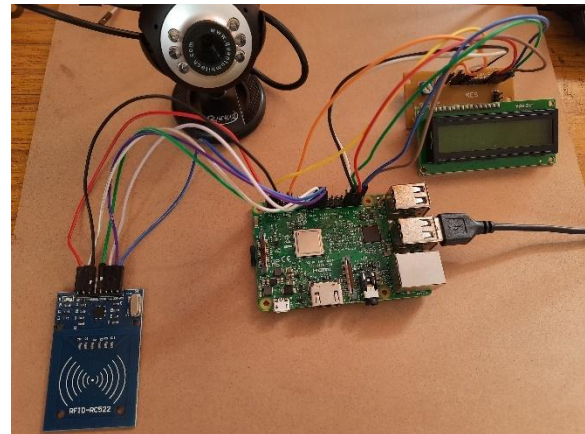


Fig10: Hardware Setup of the Project



Fig11: Displaying the Title of the Project



Fig12: Displaying the Filled Slots

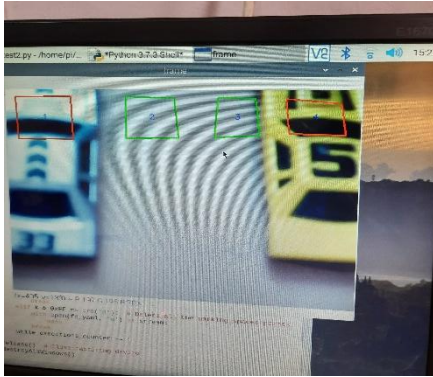


Fig13: Showing the Filled Slots on Monitor

For Web Portal:

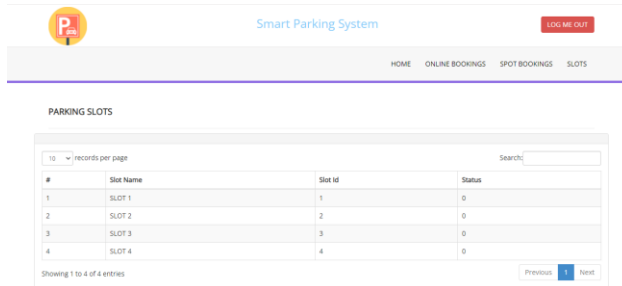


Fig14: Showing Slots available

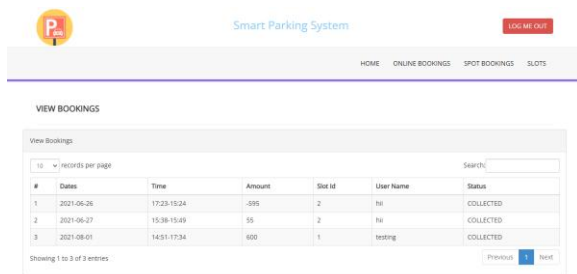


Fig15: Cloud Server for Online Booking

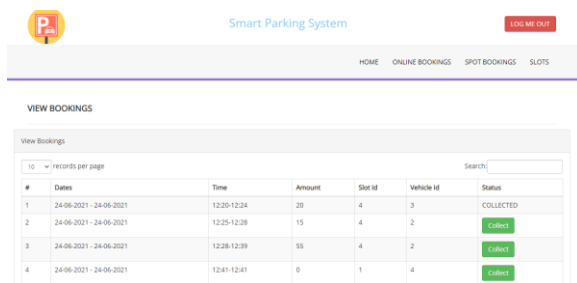


Fig16: Cloud Server for Spot Booking

Advantages:

- Easy to use.
- Reduction of fuel wastage.
- Reduces time wastage for finding empty slots.

Applications:

- In public parking places like in front of shopping malls, hospitals, theatres and more.

Conclusion:

We see that, this new system is an added value to the urban life style. In the current world, where Google cars are introduced and an improvement of great magnitude. Automated cars can do the parking on their own, if this car parking app is a part of their built-in system. Hence, I believe that this simple concept, when released into the world, will be one of those revolutionary changes in everyday activities.

Future Scope

In future we can add GPS to track the parking locations and some sensors to check vehicle safety and accident detection.

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