SAVITRIBAI PHULE PUNE UNIVERSITY A MINI-PROJECT REPORT ON

SMART PARKING SYSTEM

SUBMITTED TOWARDS THE

PARTIAL FULFILLMENT OF THE REQUIREMENTS OF

THIRD YEAR SEMESTER II OF ENGINEERING

(Computer Engineering)

BY

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CERTIFICATE

This is to certify that the Mini-Project Entitled

SMART PARKING SYSTEM

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is a bonafide work carried out by Students under the guidance of **Prof. Rajesh Ingle** and it is submitted towards the partial fulfillment of the requirement of **Third Year Computer Engineering Semester II** of **Savitribai Phule Pune University**.

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Smart Parking System

Abstract:

Handling of the vehicular traffic at the prime spots of the city is an himalayan task nowadays. A hefty contribution to this is due to the improper parking of vehicles which lead to the congestion. Here an automated parking system will assist in managing the parked vehicles using the IoT devices and systems. It's a smart solution for the problem and contribution towards the smart city project.

Smart Parking System can notify the driver about the nearby vacant parking spaces which can be located through the app installed in the phone. It's a quick, simple and quite reliable way to cut down the problems related to parking and the traffic.

INTRODUCTION

Smart Parking System is developed to avoid the congestion of traffic due to improper parking of vehicles. The driver will be notified about the status of the parking spaces in the nearby area based upon the location of his/her device which is indeed a smart solution as there is no need to physically check the available slot to park the vehicle based upon the IoT devices that are assembled at each slot of the parking spaces. Here the driver just needs to install the mobile based application and look for the desired spaces in and around his/her location.

MOTIVATION

Managing the traffic is a difficult task especially in the metropolitan cities. In everyday commutes a lot of time is wasted due to traffic in which improperly parked vehicles play a major role. So in order to smartly manage the parking and reduce the traffic congestion problem the Smart Parking System truly is a boon which will not only save time and money but also the process of parking the vehicles will be simplified and hassle-free.

PURPOSE

The main purpose of developing a smart parking system is to simplify the process of parking of vehicles and thereby assisting the local authority to manage traffic without much intervention as the process will be automated itself.

2. PROBLEM STATEMENT AND SCOPE

Problem Statement

To develop a cost-effective and simplified solution for the parking of vehicles in the metropolitan cities.

Scope

The scope of this project is to develop an app enabled system which notifies the driver about the parking spaces available around his/her location. The status of the parking is rendered through the sensors and other devices which are assembled at the parking .

3. DESIGN AND ANALYSIS OF SYSTEM

1. Existing Systems

The Existing Parking Systems does not have any provision to keep the record of parking spots and does not maintain any databases

2. Problems in Existing Systems

Existing systems have the following problems:

i) Does not have any database for vacant parking slots
ii) User will know that there are no parking spot free only if it is mentioned before he enters the parking space
iii) Does not keep the record of parking spots

3.Design of Newer System:

This system keeps a mobile app for users to check the vacant parking spots for that it maintains the database of that particular parking spot using the infrared sensors

Module Information

This system has the following modules:

1. Raspberry Pi 3
2. Jumper Wires (Generic)
3. Type A Cable connector
4. PC
5. Android phone

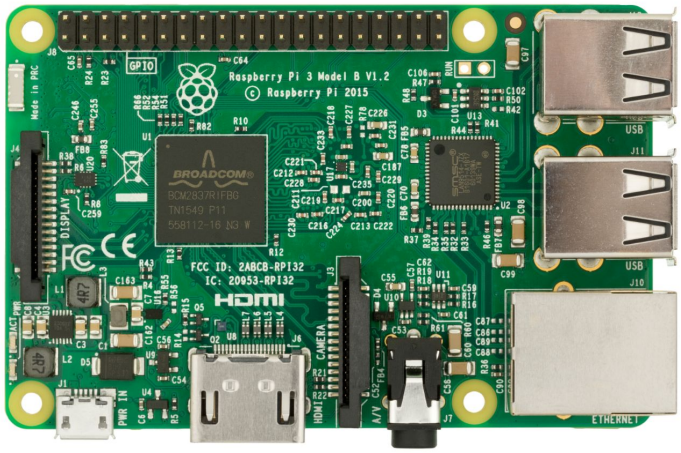
6. Android application

7. IR sensor

8.HDMI cable

2. Module Description

1. **Raspberry pi 3** : The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.



2.Jumper Wires (Generic) : Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

3.Type B Cable Connector: A Type B cable connector is used to connect Arduino UNO to the PCs USB port.

6. PC: A PC or Laptop is need to perform coding and dumping the code into Raspberry PI

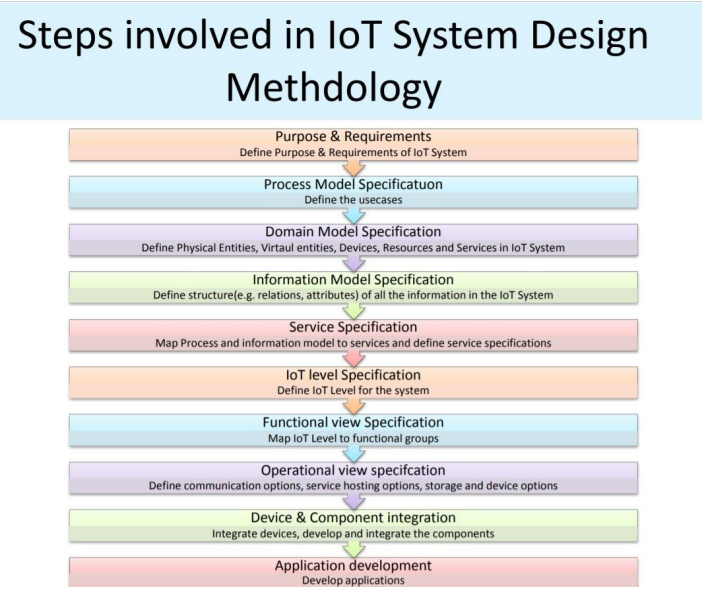
7. Android application: An application that will be used to monitor parking

8.Android device: The device will be used to operate the application.

9. IR sensor:An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

10.**HDMI cables**:HDMI is a proprietary audio/video interface for transmitting uncompressed video data and compressed or uncompressed digital audio data from an HDMI-compliant source device, such as a display controller, to a compatible computer monitor, video projector, digital television, or digital audio device

4. IoT Design Methodology Steps



Step 1: Purpose and Requirement Specification

1. The purpose of the system is to provide a smart vehicle parking system that helps drivers to find a vacant spot using sensors in each parking space by detecting the presence or absence of a vehicle.
2. System monitors and keeps track of available parking space.

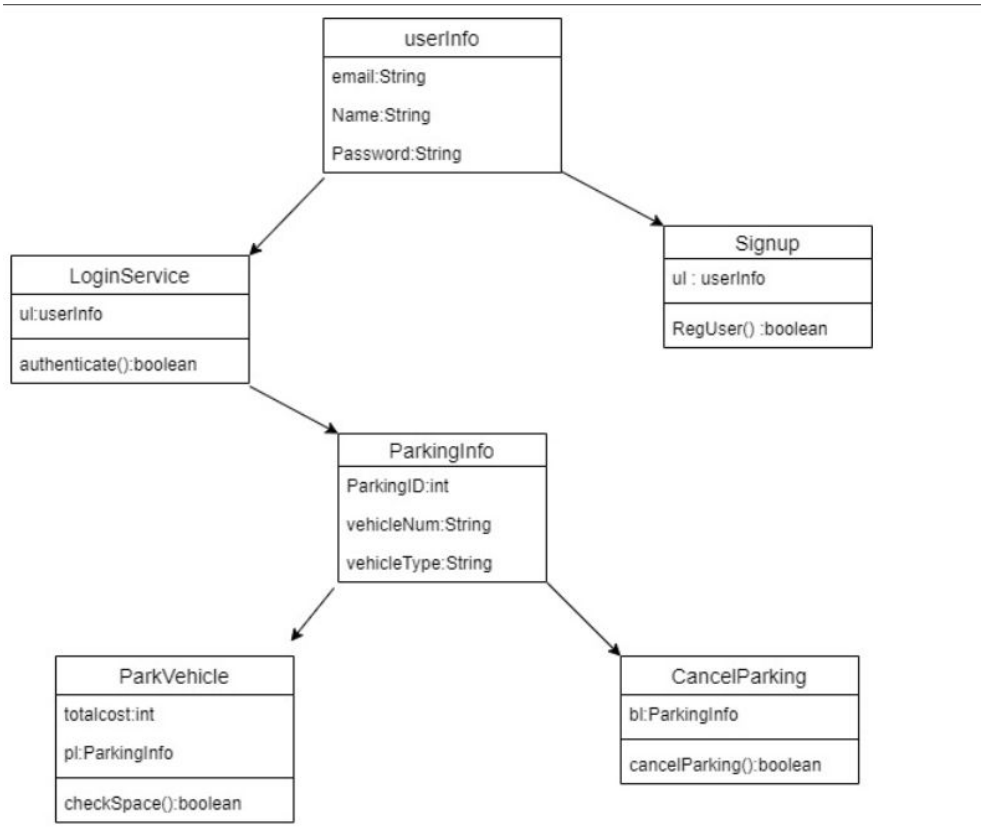
Step 2: Process Specification

1. The use cases for process specification would be:
    1. Logging in to the app
    2. Checking for available space, if available mark space as occupied.
    3. Else the parking space is marked as free.
2. Further, the system should respond independently for each of these cases.

Step 3: Domain Model Specification

1. The main entities in the system are the sensors, the IoT device, and the mobile application.
2. The entities include the Android device, wires, sensors, Raspberry Pi device.

Step 4: Information Model Specification



Step 5: Service Specification

1. Once a user occupies a parking space, the sensor captures the change of state and transmits it to the mobile application thereby changing the availability.
2. The application sets the parking slot state to either Available or Unavailable. Thereby, changing state and updating in the database.

Step 6: IoT Level Specification

1. The Iot level specifies the deployment level of the IoT System.
2. Here, we have used IoT level 2 as our application uses cloud as a database so that multiple users can access the same.

Step 7: Functional View specification

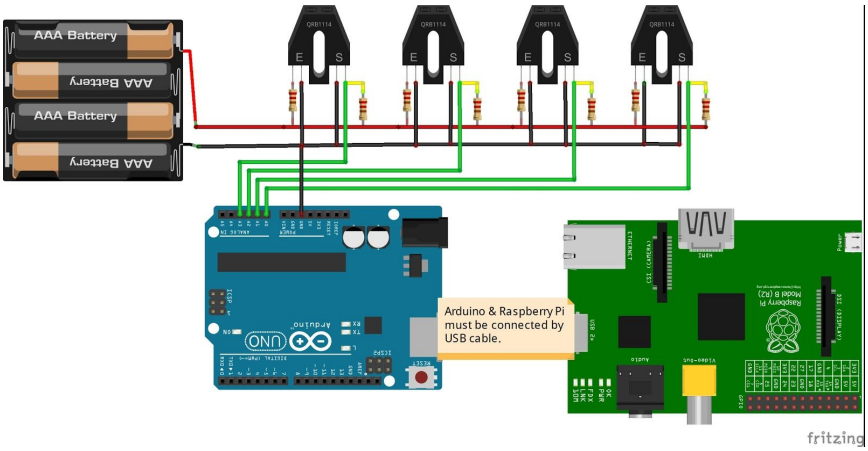
1. Firstly, the user parks his/her vehicle in the available free parking slot.
2. The sensor changes its state and sends a signal to the application.
3. The state of the parking slot is changed and updated in the database.
4. The slot is marked as available/unavailable.

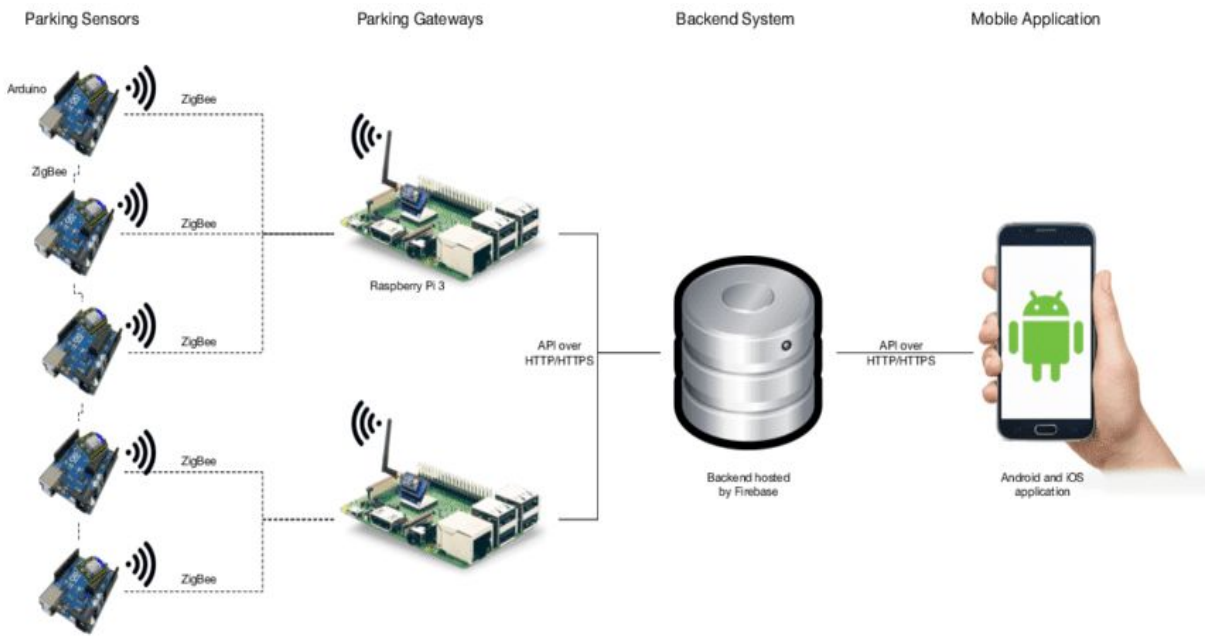
Step 8: Operational View Specifications

1. The operational view includes the following:
    1. The sensor changes its state and decides the state of the parking slot availability.
    2. Device management- Arduino device/Raspberry Pi
    3. Application management using a mobile app.

Step 9: Device and Component Integration

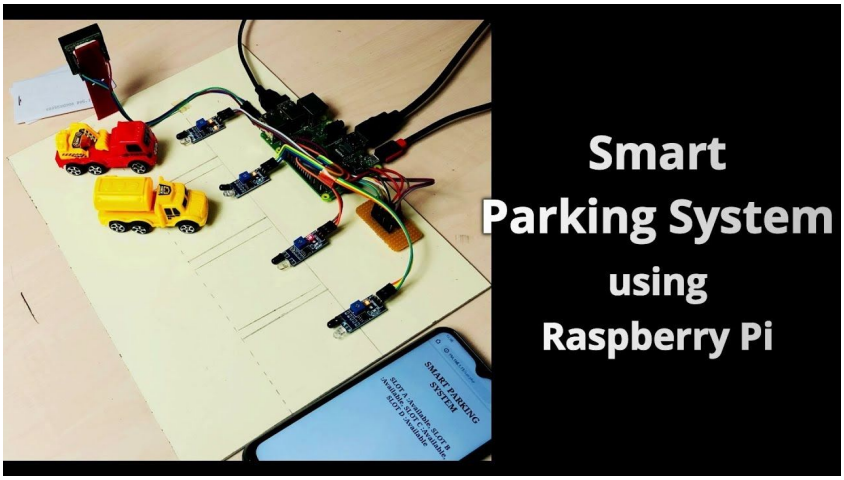
1. The device and components are included in the diagram.





Step 10: Application Development

1. The application is developed according to the circuit diagram and the core is dumped into the Raspberry Pi.
2. Once the sensor senses a change in state, the availability of the parking slot changes.
3. The output can be seen on the mobile application by the user to determine free parking slots.



5. CIRCUIT DIAGRAM

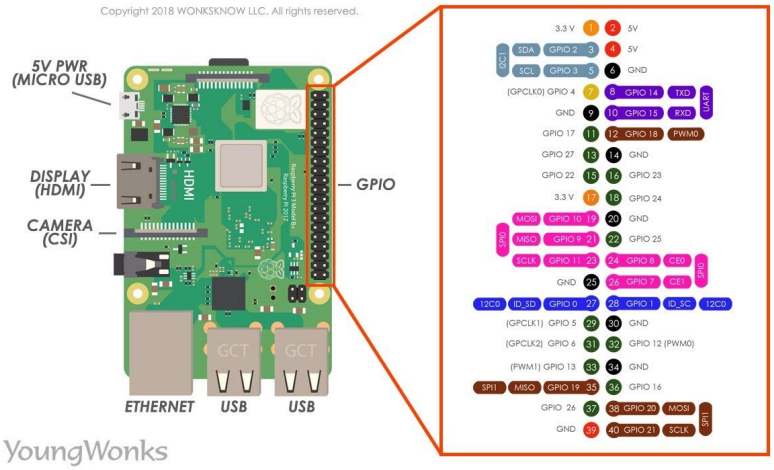


Figure 1: Raspberry Pi 3

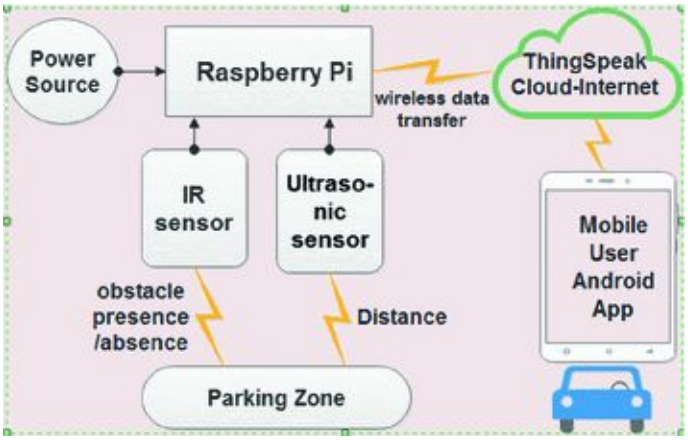


Figure 2: Diagram for proposed system

6. CONCLUSION AND FUTURE WORK

1. Conclusion

The system benefits of smart parking go well beyond avoiding time wasting. Enables cities to develop fully integrated multimodal intelligent transportation systems with great security and efficiency. Developing smart parking solutions within a city solves the traffic and pollution problem.

2. Future work

The future of smart parking system parking is expected to be significantly influenced by the arrival of automated vehicles(AVs).Several cities around the world are already beginning to trial self-parking vehicles, specialized AV parking kits and robotic parking valets.

This can be expanded in the sense of security. Using metal detectors and CCTV cameras security of the parking area can be enhanced. In future this system or technique will be the one which is used in every industry and even in household apartments.

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