CHRIST

(DEEMED TO BE UNIVERSITY)

BANGALORE · INDIA

REPORT

Smart Parking System

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1. INTRODUCTION

Internet of Things can be defined as, "A network of **Internet** connected objects able to collect and exchange data". It is commonly abbreviated as IoT. The word "Internet of Things" has two main parts; **Internet** being the backbone of connectivity, and **Things** meaning objects / devices.

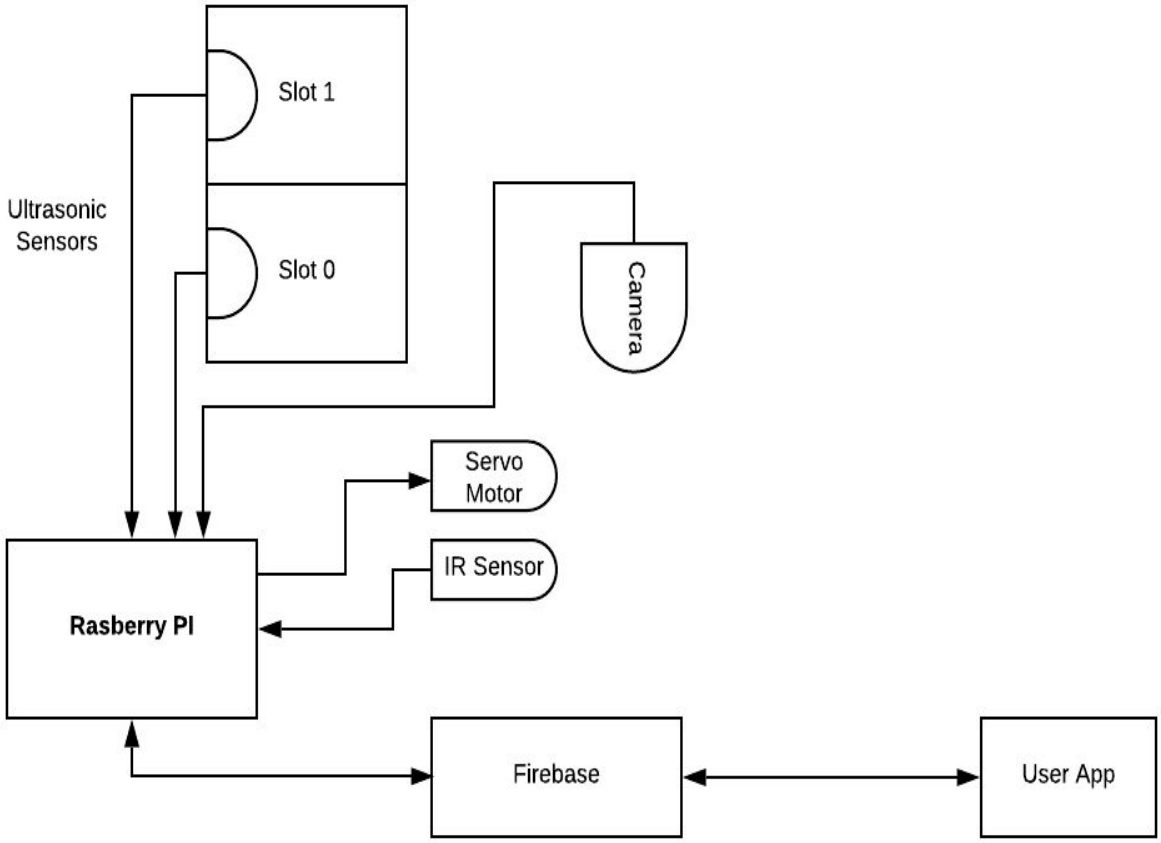
In a simple way to put it, you have "things" that sense and collect data and send it to the internet. This data can be accessible by other "things" too.

In recent times the concept of smart cities has gained great popularity. Thanks to the evolution of Internet of things the idea of smart city now seems to be achievable. Consistent efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities and road safety are being addressed by IoT.

1.1 PROBLEM STATEMENT

The idea of creating a Smart City is now becoming possible with the emergence of the Internet of Things. One of the key issues that smart cities relate to are car parking facilities and traffic management systems. In present day cities finding an available parking spot is always difficult for drivers, and it tends to become harder with ever increasing number of private car users. This situation can be seen as an opportunity for smart cities to undertake actions in order enhance the efficiency their parking resources thus leading to reduction in searching times, traffic congestion and road accidents. Problems pertaining to parking and traffic congestion can be solved if the drivers can be informed in advance about the availability of parking spaces near to their intended destination. Recent advances in creating low-cost, low-power embedded systems are helping developers to build new applications for Internet of Things.

1.2 BLOCK DIAGRAM



1.3 ACTION PLAN

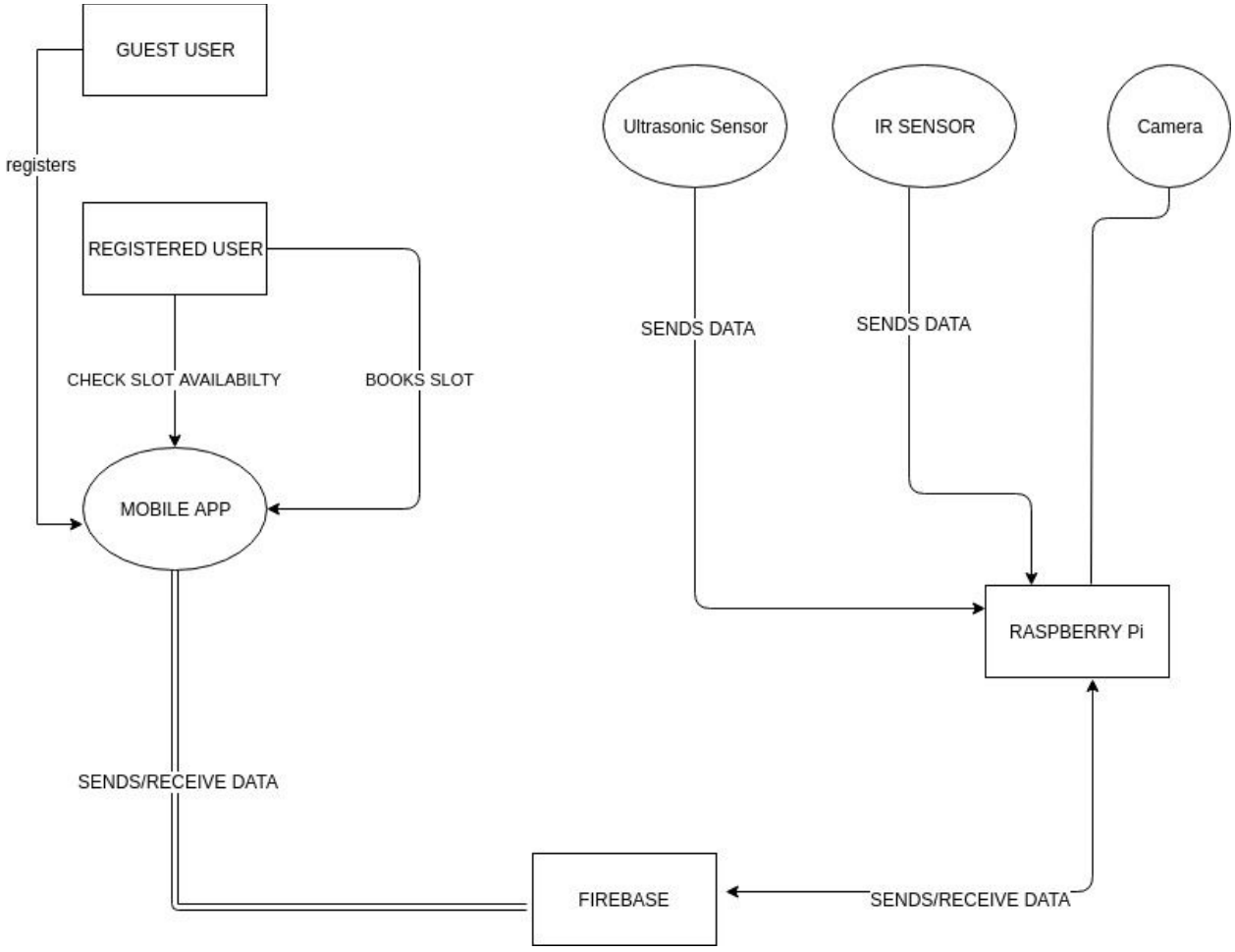
Aekansh : Work on number plate recognition & IR sensors, Android Reserve Parking Display

Shouvik : Android frontend, Pi setup, Web App.

Jagraj : Working on Android backend, slot full/empty on field, rotatory motors.

2. SYSTEM ANALYSIS

2.1 SYSTEM ARCHITECTURE – FLOW DIAGRAM



2.2 FUNCTIONAL REQUIREMENTS

- Users must have mobile phone with internet & parking app installed
- User must be registered on the app to check the empty parking lots.
- There must be proper internet connectivity for raspberry pi to send / receive data
- The number plate must be as per govt. rules & not stylized number plate.
- The mobile app displays the availability of parking slots
- The user can book the parking in advance

2.3 REQUIREMENT SPECIFICATION

- Raspberry Pi
- Ultrasonic Sensors
- Connectivity of sensors, micro-controller and cloud over internet
- Android App
- USB Camera module

2.4 SCHEDULE AND ESTIMATION

3. SYSTEM DESIGN

3.1 MODULAR SPECIFICATION

i). Entry

Working of the components described in this module are as follows:

1. Infrared Sensor: This sensor detects any car entering from the entry gate that triggers the python script to take the image of the car's number plate using **opencv** and processing the number plate using **openalpr**.
2. Web Camera: It captures the image of the car's number plate.
3. Raspberry Pi 3 - It is responsible to power and manage all the devices and sensors connected. Python scripts are deployed on the device which are checking any change in

data from ultrasonic sensors & IR sensors. When IR sensor triggers, pi captures the image, process it & sends the notification to respective car owner.

4. Servo Motor : When user receive notification at the entry of parking and the parking fee is paid by the user from app, the servo motor opens the entry gate. It basically controls the entry of the car to the parking lobby.

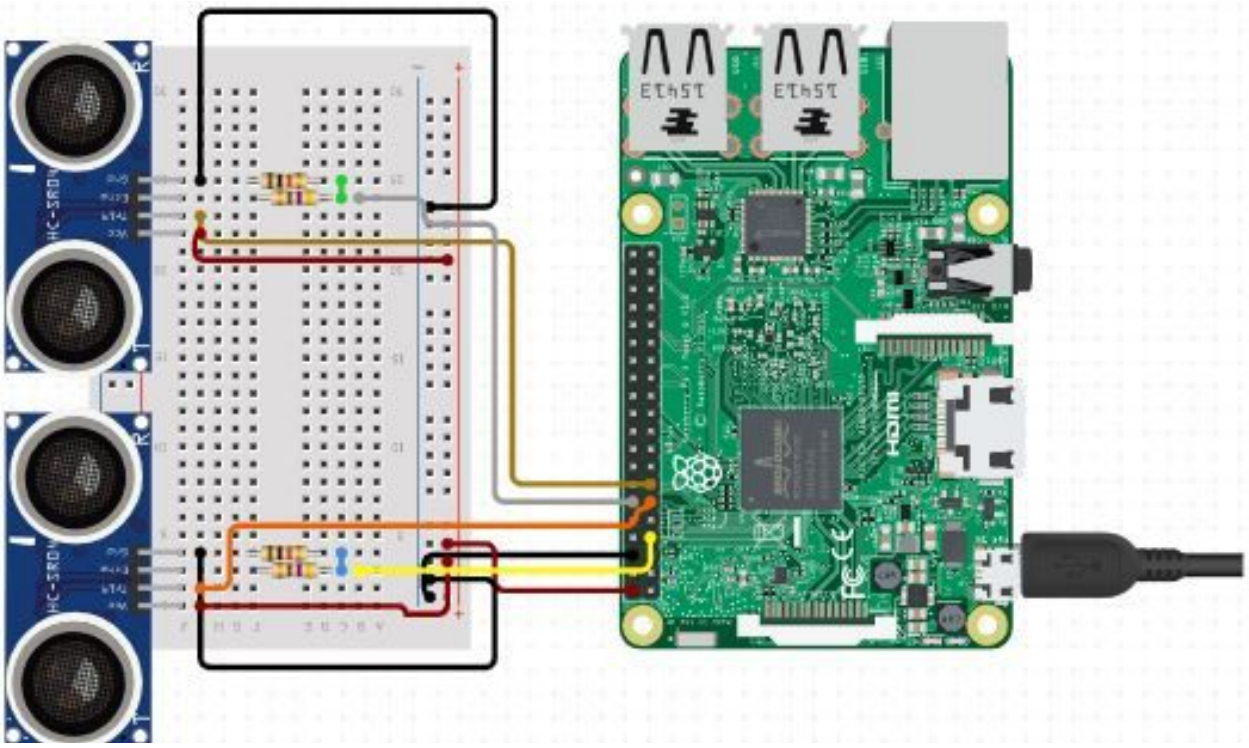
ii) Slot Allocation

1. Ultrasonic Sensor: This sensor detects the status of the Parking slot. It checks whether the slot is available or not using the distance between the sensor & object in front of it.
2. Raspberry Pi: If ultrasonic sensors detect empty/full parking lot, pi updates the data on firebase.

iii) User Module

User Module primarily consists of an android application which helps the user to park. The user needs to register through the app and enter the details like name, phone number and car's number plate. These informations are stored in the firebase server once it gets successfully registered. User gets the notification and on approving it, it allows the user to view the parking slots available and parks the car.

3.2 HARDWARE CIRCUIT DESIGN



3.3 COMPONENT DESCRIPTION

- ➔ **Raspberry Pi 3:** to connect all components together.
- ➔ **Web Cam**: It will be used in the entry gate which will be recognizing the number plates
- ➔ **Ultrasonic sensor:** used to check whether th parking slots are available or not.
- ➔ **IR sensors**: used to detect whether a car is entered in parking lot.

- ➔ **Connecting wires:** connects the sensors and the Raspberry Pi to the breadboard
- ➔ **Servo Motors**
- ➔ **Android Phone ----** To access the android application.

3.4 TEST PLAN