S-Park (Smart Parking System)

PROBLEM STATEMENT **:** Develop an IoT enabled solution with Android application to give **real-time parking space** available on the Campus / City / Resident Societies .

- The above mentioned will be applicable to those vehicles that have **already registered** in to the system and used the navigating system.
- But we also need to consider those vehicles which have not registered and are manually finding parking space and heading towards the same parking slot.
- Develop a **smart efficient application** system to solve the problem related to **real-time parking space**. Whenever a person wants to find a parking space on the campus, he has already registered to the application using his user id and password. When he finds for the parking space, the server will send a response with the available parking details, real-time **mapped directions and real-time parking space to allocate parking according to the size of the vehicle**.
- The application would be smart enough to identify whether the car is heading towards the same parking space or If not, the application would **re-route** the same car to another nearest available parking space.

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TEAM CODE : C17

TEAM NAME **:** S-Park.

S-Park is a smart parking system, with a pure vision to eliminate time wastage at parking spaces and increase the security factors. It helps in reducing human labour, fuel consumption and pollution ensuring the efficiency and reliability of the parking system.

Solution/Prototype :-

Data Collections

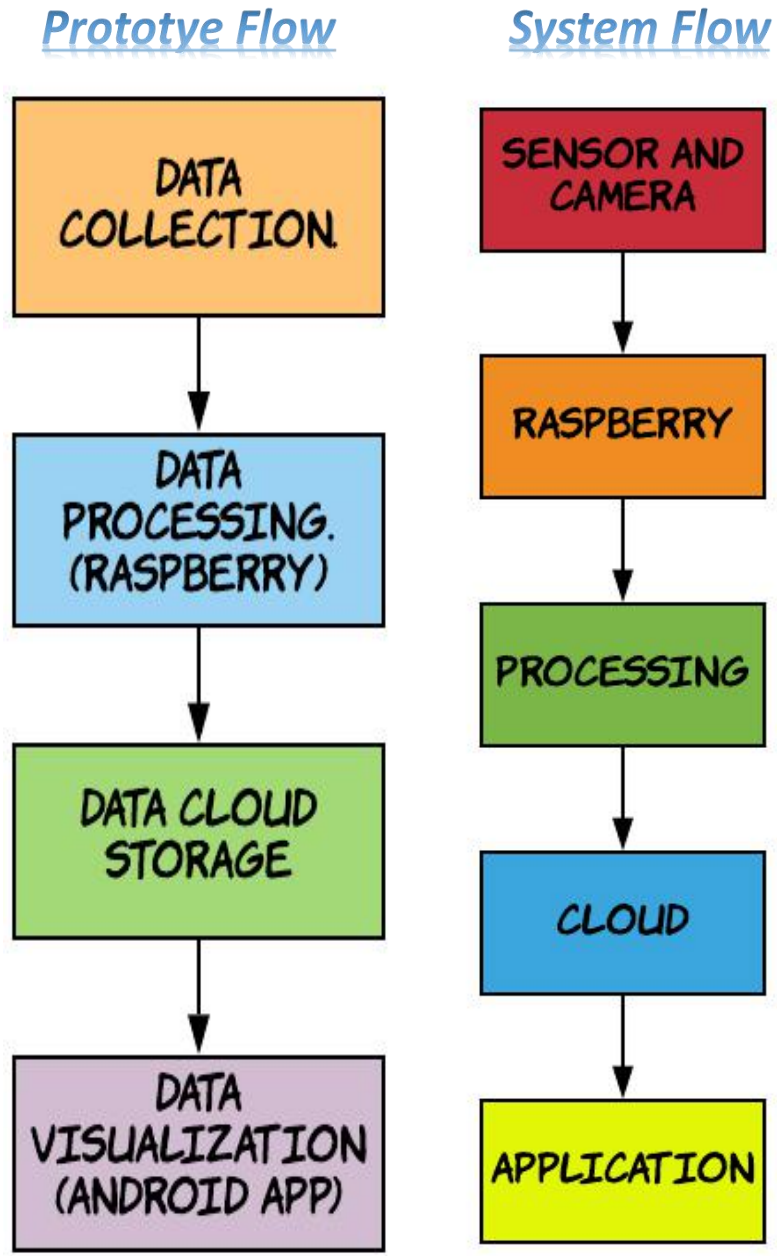
- At the gate , when IR sensor gets activated the camera module will be triggered and that specific data will be fed into Processing layer .
- At the parking area the camera module will continously observe atleast 4 parking spaces and send the data to the processing layer.

Data Processing

- At the gate, the number plate , vehicle type (Car , Bike , Truck) and the entry-exit time is saved to the cloud using **KNN algorithm** and **Conventional Neural Networks** .
- At the parking area, which vehicle (number plate) is parked in which slot is detected using vehicle classifier and the image of it is passed to number plate detection module.

Data Cloud Storage

- The Output of data processing layer is saved into cloud that is vehicle type , entry-exit time , number plate , slot occupied and payment details .



Data Visualizations (Android app)

- The **current vacant parking spots** in each floor will be made visible on site and on the app after which he can move toward his desired floor and parking slot .
- The user will be **automatically shown shortest path to nearest free space available ,** once he clicks on map he also has the option to choose any free space available on the map .

Additional Features

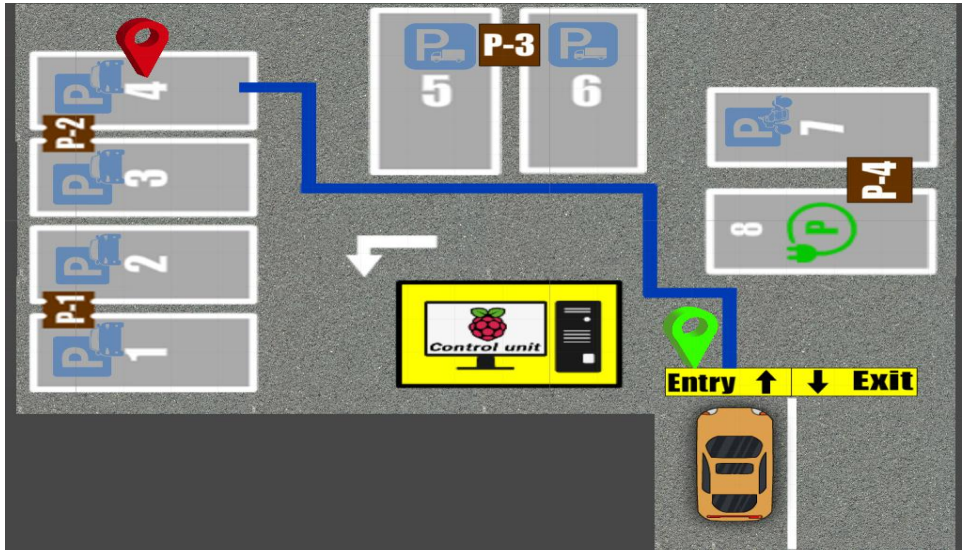
- The user can pay at the **cash counter** on exit, or use **Paytm**.
- If **he loses track**, he can opt for the “LOST” option, which will **detect his location** on certain parameters and redirect him.

Register User Benefits

- The staff will have **fixed parking** spot .
- **Monthly payment**. (For the time, the parking slot was used) .
- **Net banking.** (Automatically montly money deducted).
- All the **visit details** (entry and exit time) will be visible to him at all times.
- If his **slot gets occupied** by someone else, the **admin** will be **notified immediately.**

Data Processing

Data Visualization



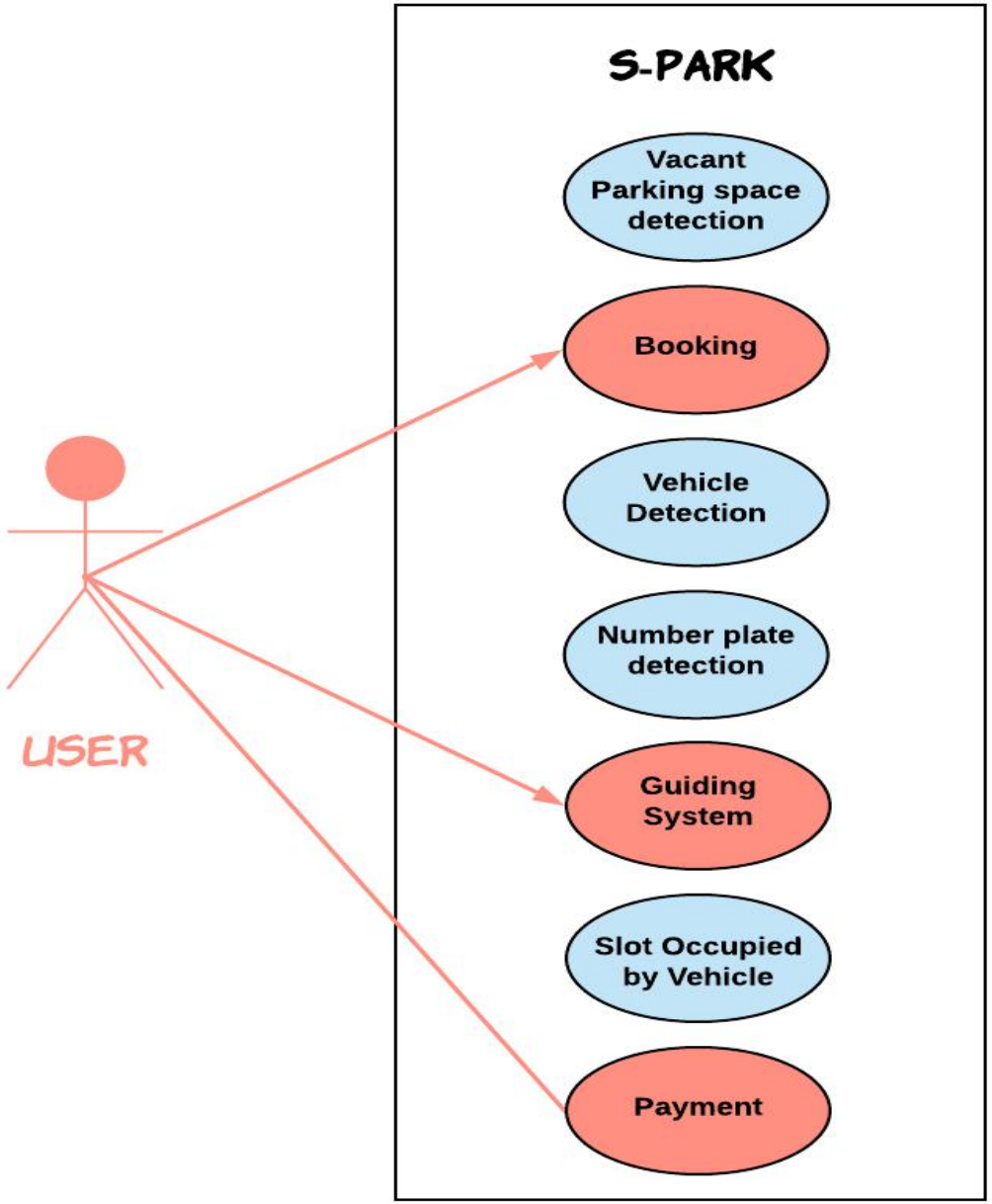
Technology Stack

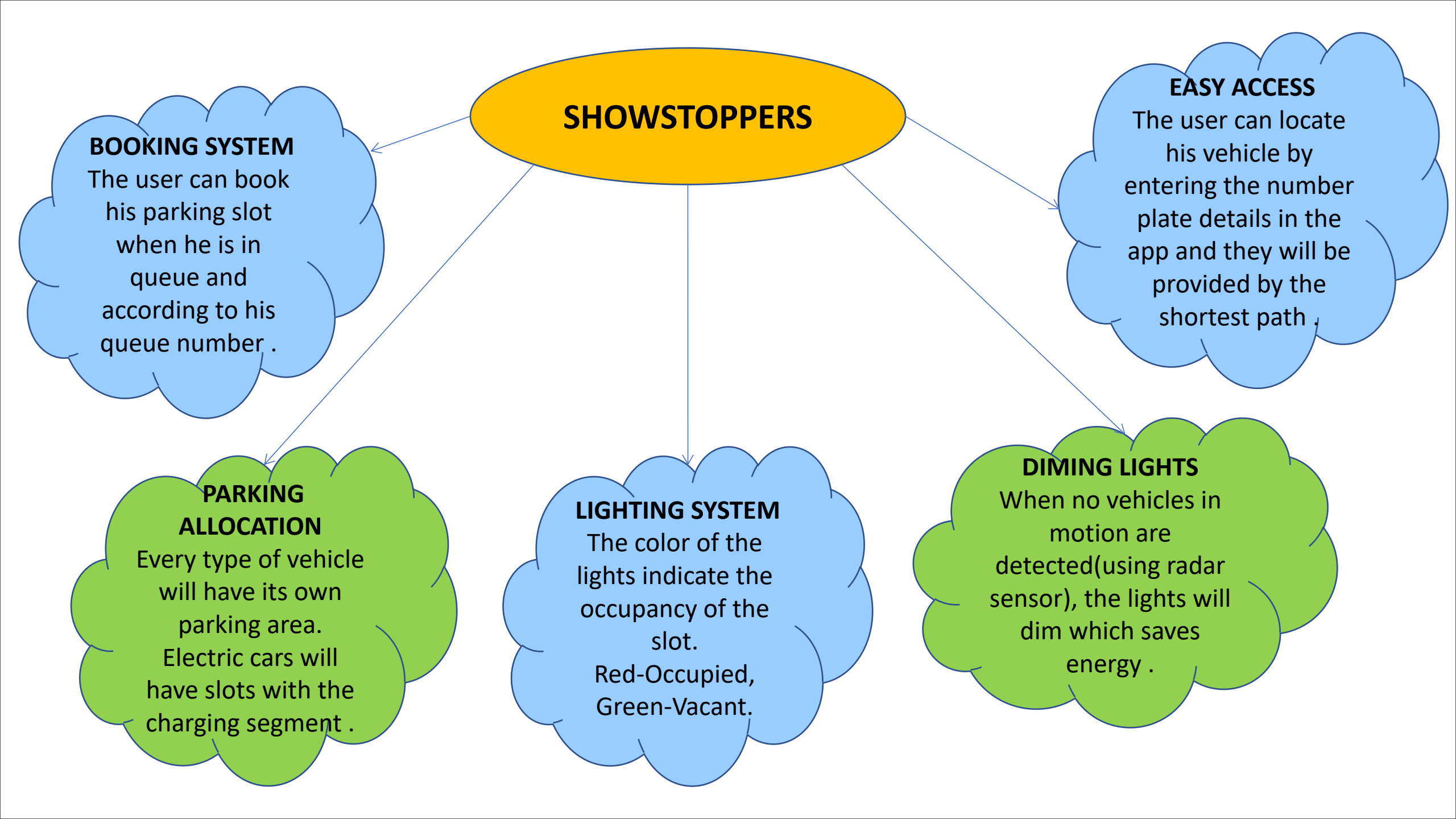
- **Modern Technology** :- Machine learning and Deep learning, Visualization .
- **Mobile Development** :-Android Studio, Android SDK .
- **Backend Development** :- Firestore and Firebase.
- **Hardware Components** :- Raspberry pi 4, Sensors, Servo motors , Cameras , LCD, BULB etc .

Dependencies

- Requires **Android version Jellybean and higher .**
- **Hardware components and their installation and power supply .**

Use Case




SHOWSTOPPERS
BOOKING SYSTEM
The user can book his parking slot when he is in queue and according to his queue number .
EASY ACCESS
The user can locate his vehicle by entering the number plate details in the app and they will be provided by the shortest path .
PARKING ALLOCATION
Every type of vehicle will have its own parking area.
Electric cars will have slots with the charging segment .
LIGHTING SYSTEM
The color of the lights indicate the occupancy of the slot.
Red-Occupied,
Green-Vacant.
DIMING LIGHTS
When no vehicles in motion are detected(using radar sensor), the lights will dim which saves energy .