2023 Spring Software Engineering: Smart Campus

Team Project Proposal

Team 9

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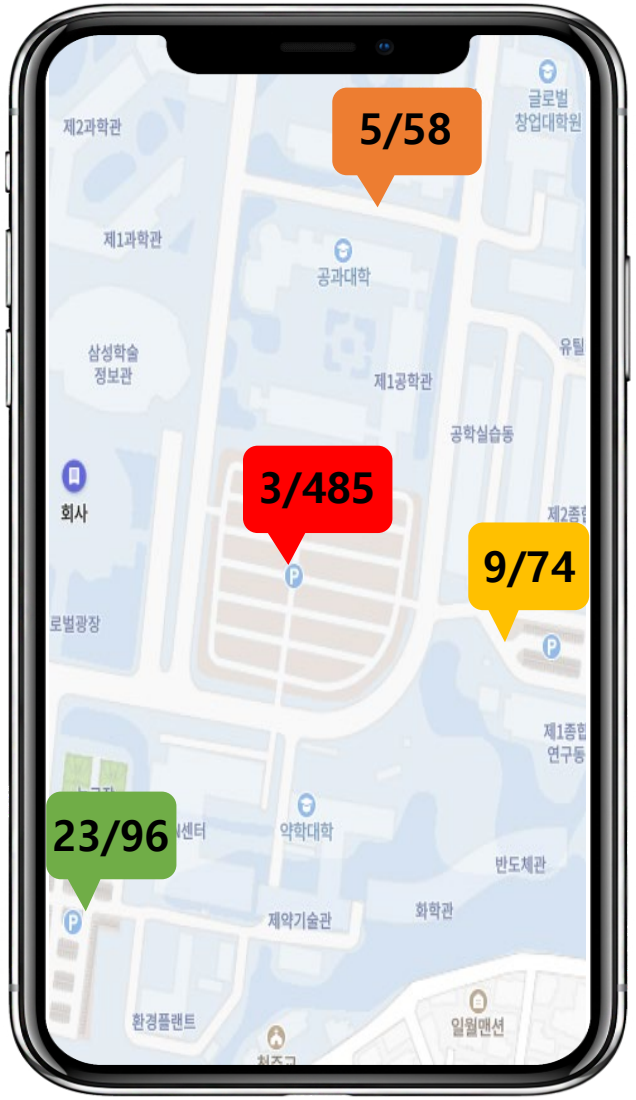
이채영 임하리
전유진 정우석

2023. 04. 06

01. Introduction

- Overview



ParKingo

: Real-time SKKU campus parking space calculating service

The service that provides real-time empty slot information of each parking zone through mobile application and LCD monitor at the entrance

→ Enable users to park easily and efficiently

Example

3/485 C zone, 3 empty slots out of 485 slots, Very crowded

23/96 D zone, 23 empty slots out of 96 slots, Loose

01. Introduction

- Motivation

Pictures of crowded SKKU parking lot

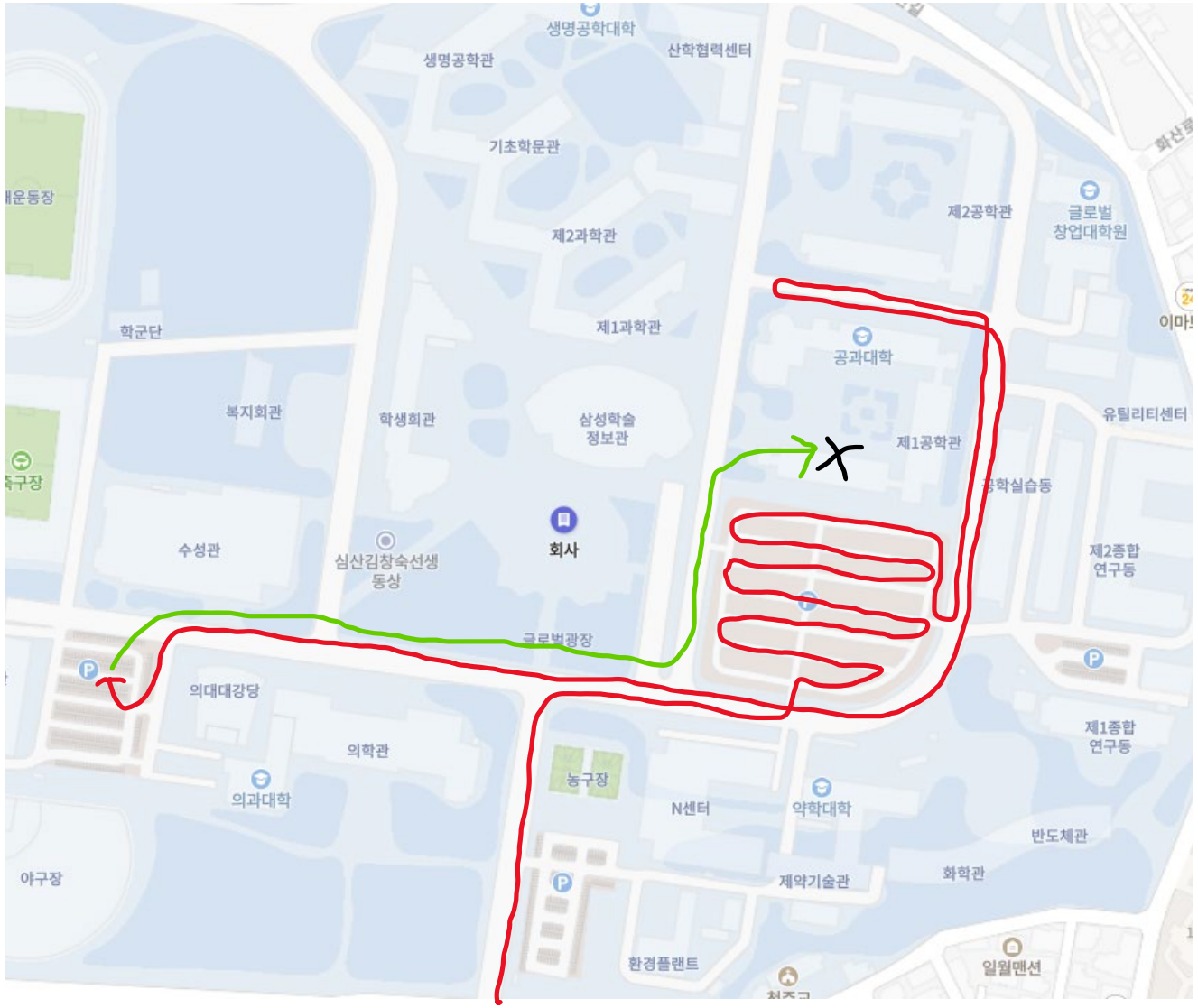
Full capacity sign

- Full capacity problem is very severe in SKKU
- Full capacity sign is placed when it is full
- However, full capacity sign is inaccurate due to human error and constant flow of cars
- Most users do not trust full capacity sign
- Users tend to go inside and wonder around for vacancy, which is waste of time and cost

→ **Accurate real-time parking space notification service is needed**

01. Introduction

- Motivation



Example of inefficient route

Many users are wasting time and cost

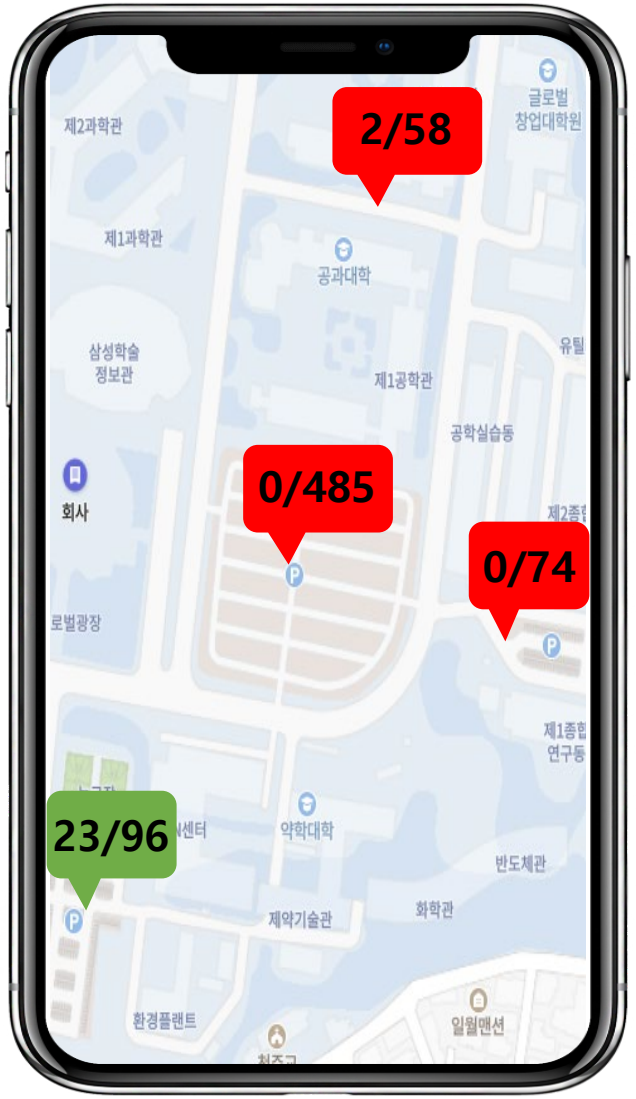
Car route

Walking route

Destination(Engineering building)

02. Implementation Plan

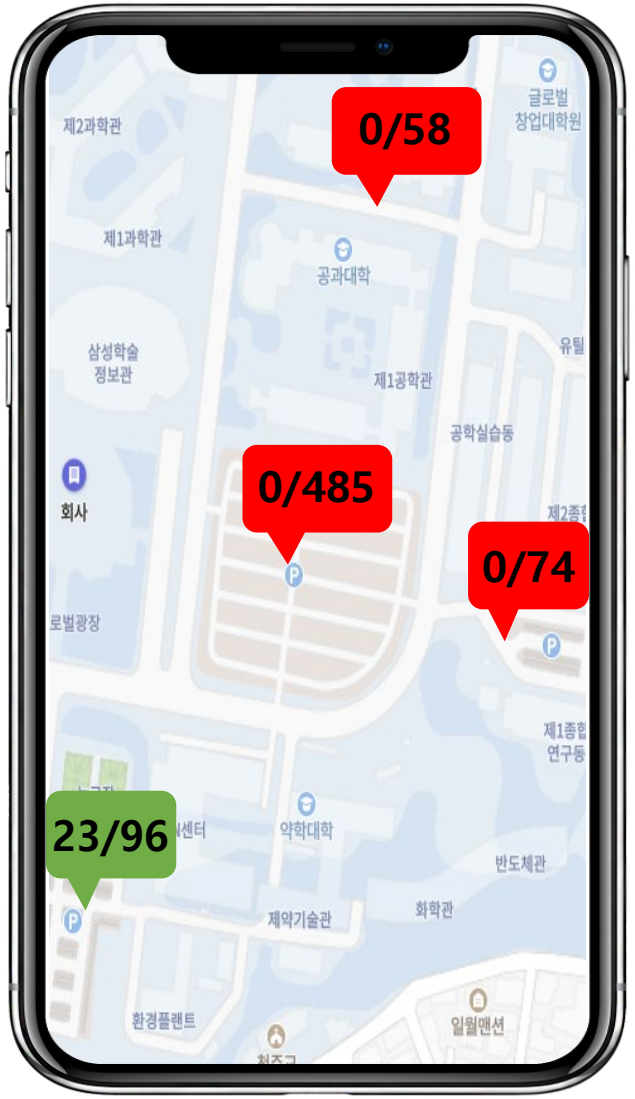
- Motivation



Check empty slot between En. building

Lucky

Go and park in hurry



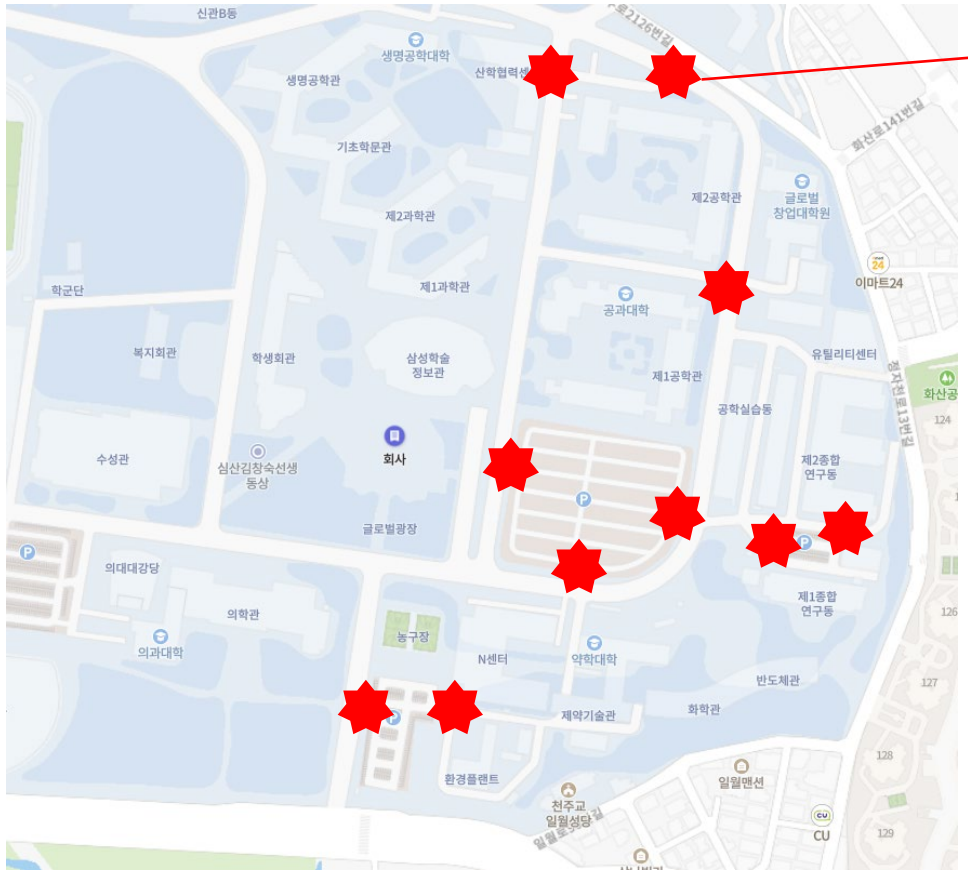
Check no slots inside

No need to enter
Park at the entrance space

Efficient!

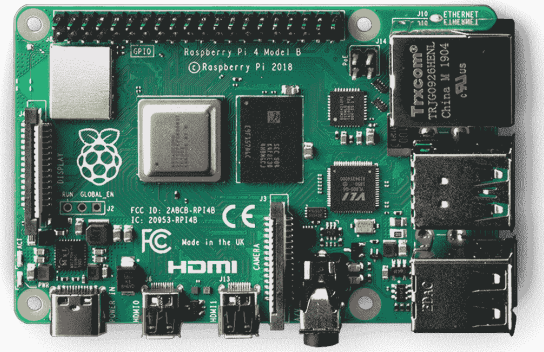
02. Implementation Plan

-System Flow



Place RaspberryPi and sensors at every possible entrance

Transfer data through SKKU Wi-Fi and ssh connection



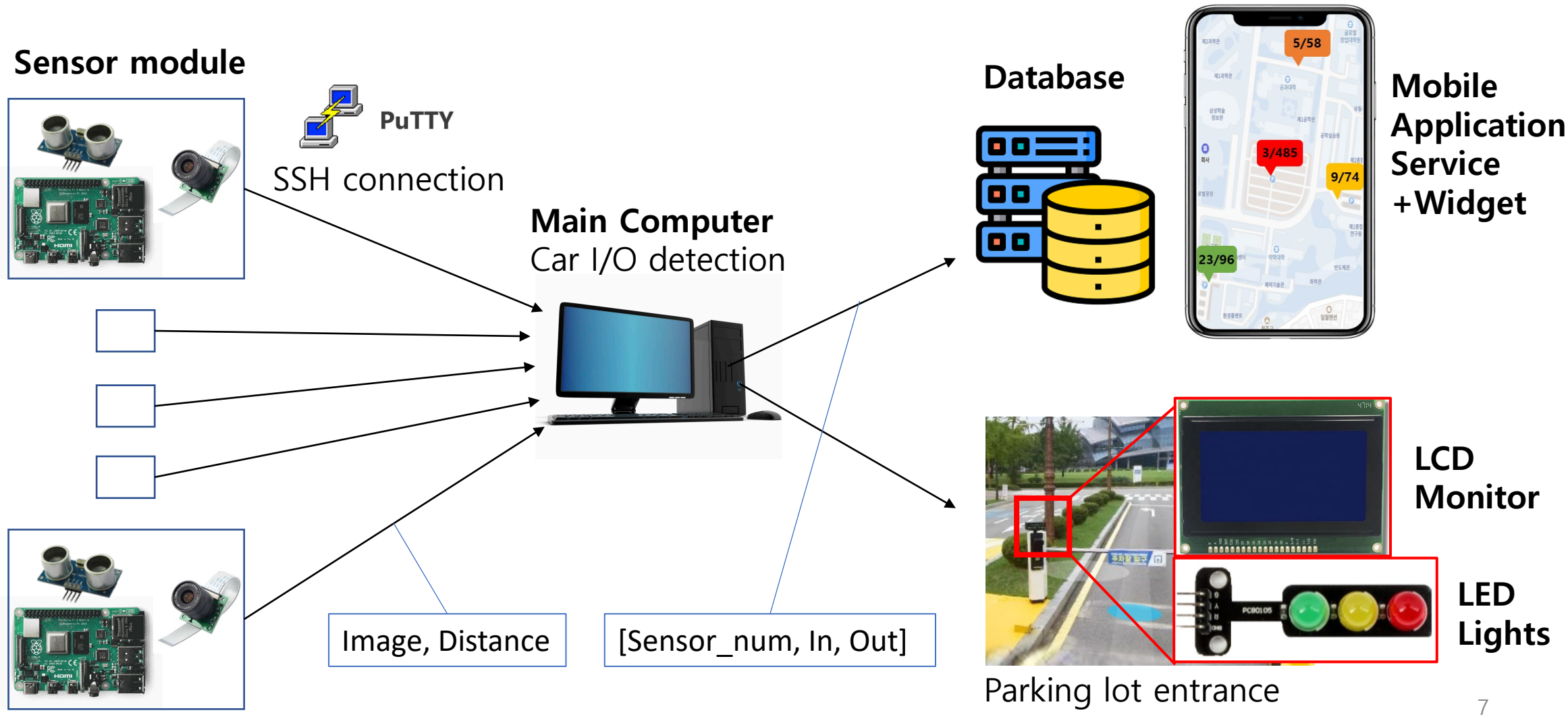
RaspberryPi 4 model B

Arducam
Camera module

Ultrasonic sensor
HC-SR04

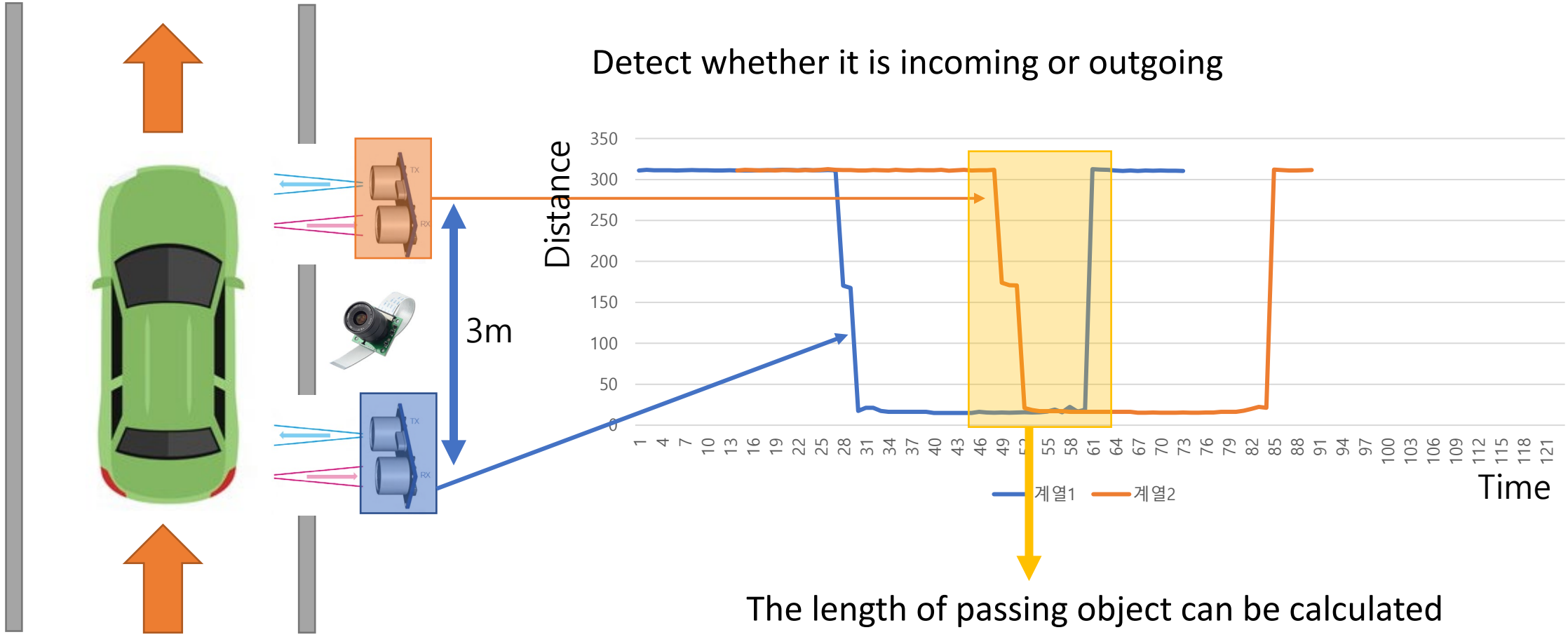
02. Implementation Plan

-System Flow



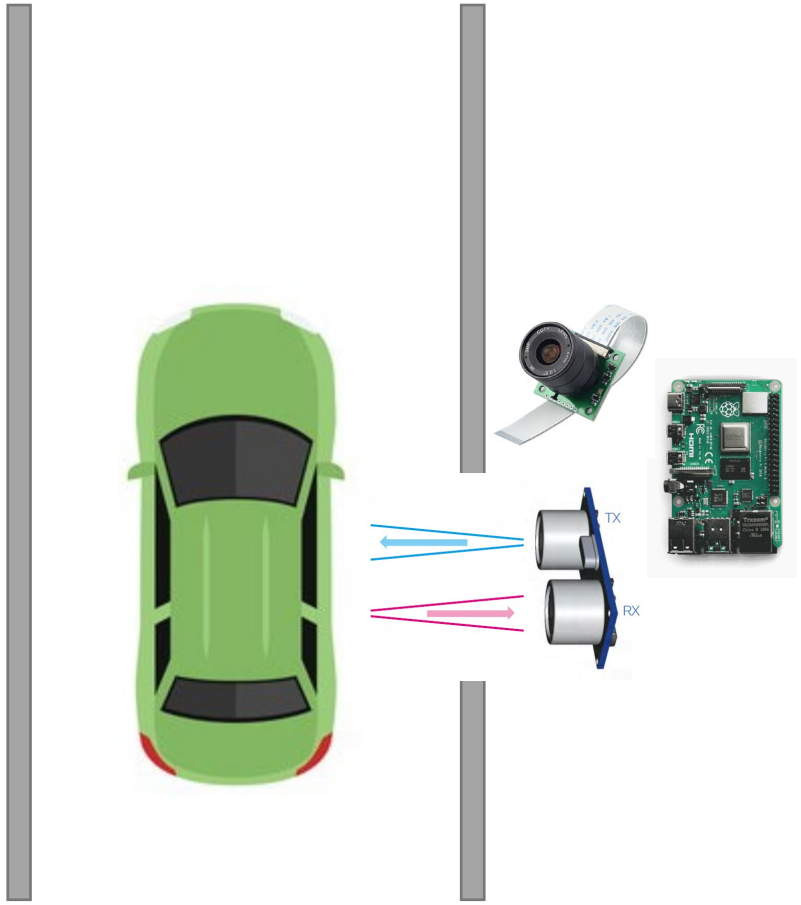
02. Implementation Plan

-Car I/O Detection Algorithm

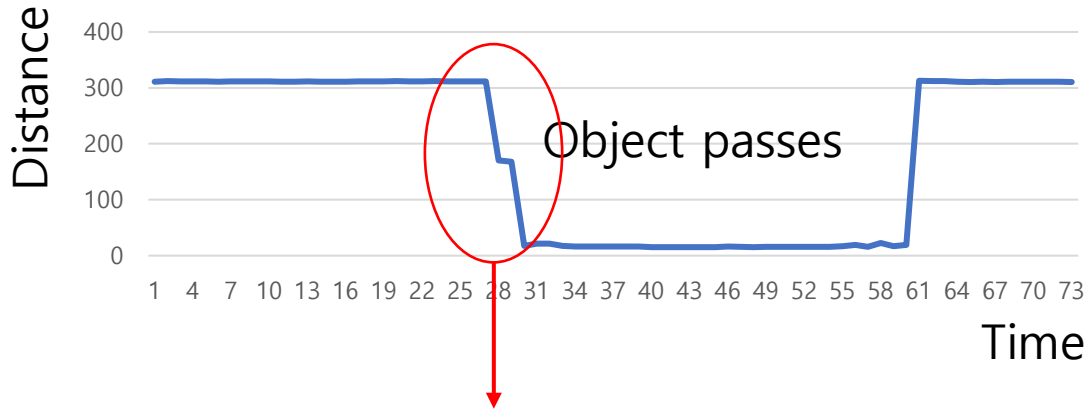


02. Implementation Plan

-Car I/O Detection Algorithm



Continuous distance measurement via ultrasonic sensor



Triggered → take picture

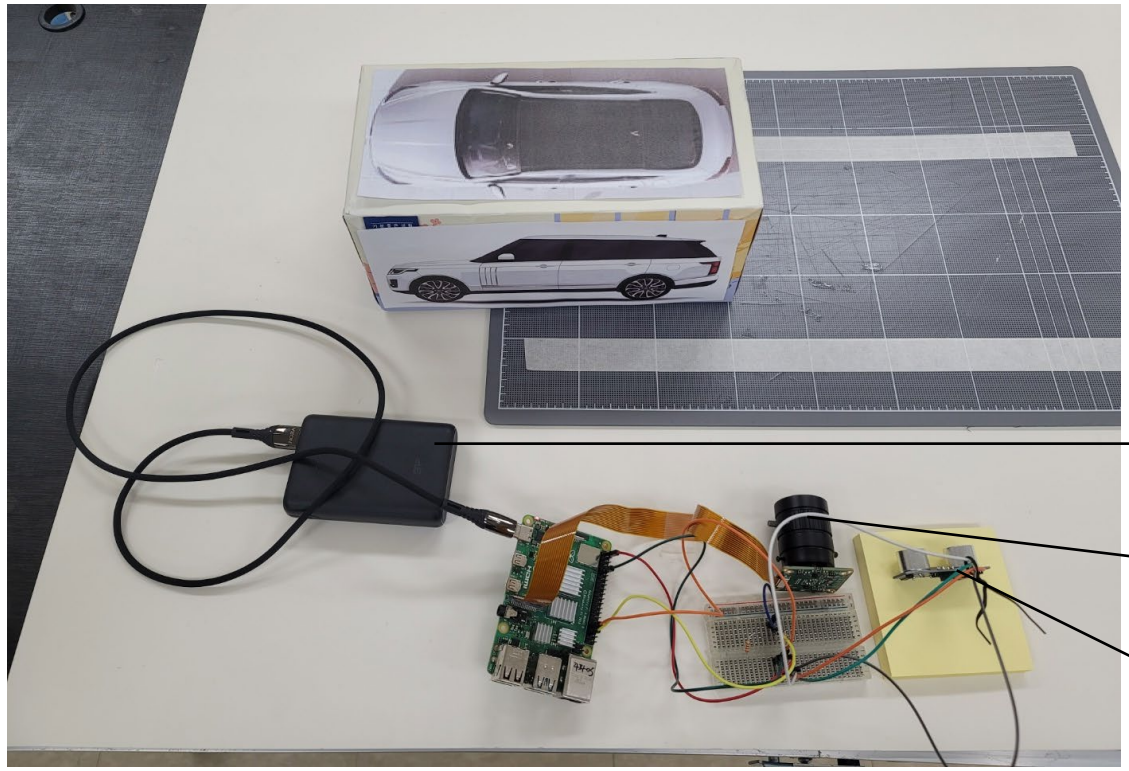
Deep Learning-Image Classification → Car/others judgement

Determine car passing using image and distance graph

02. Implementation Plan

-Feasibility

실현가능성 검증

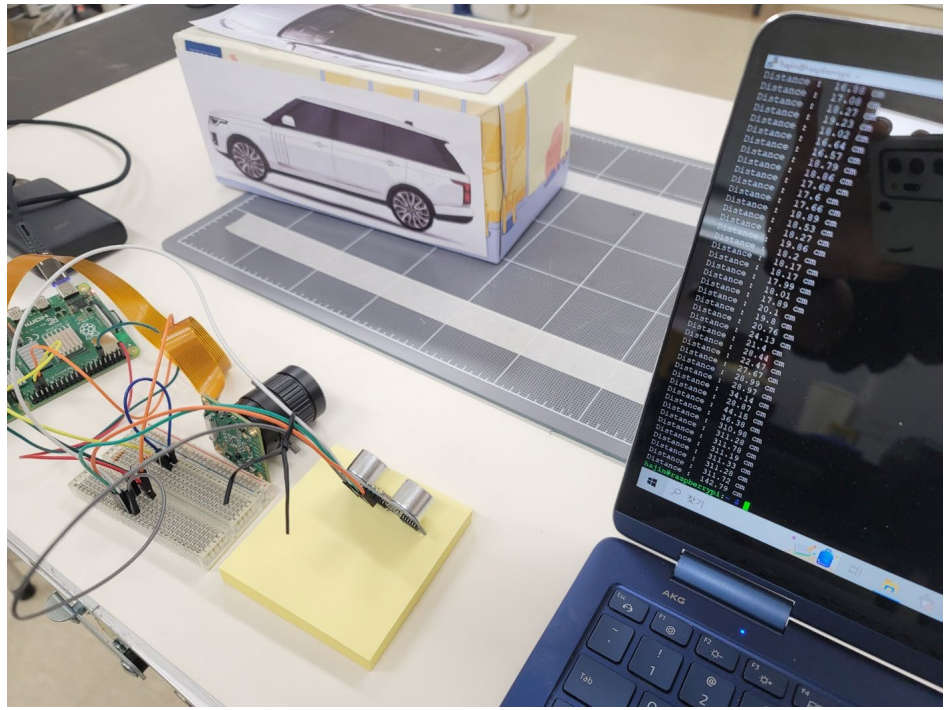


- Complete wireless system
- Battery last more than 8h
- Communicate on SKKU wifi and ssh

02. Implementation Plan

-Feasibility

실현가능성 검증



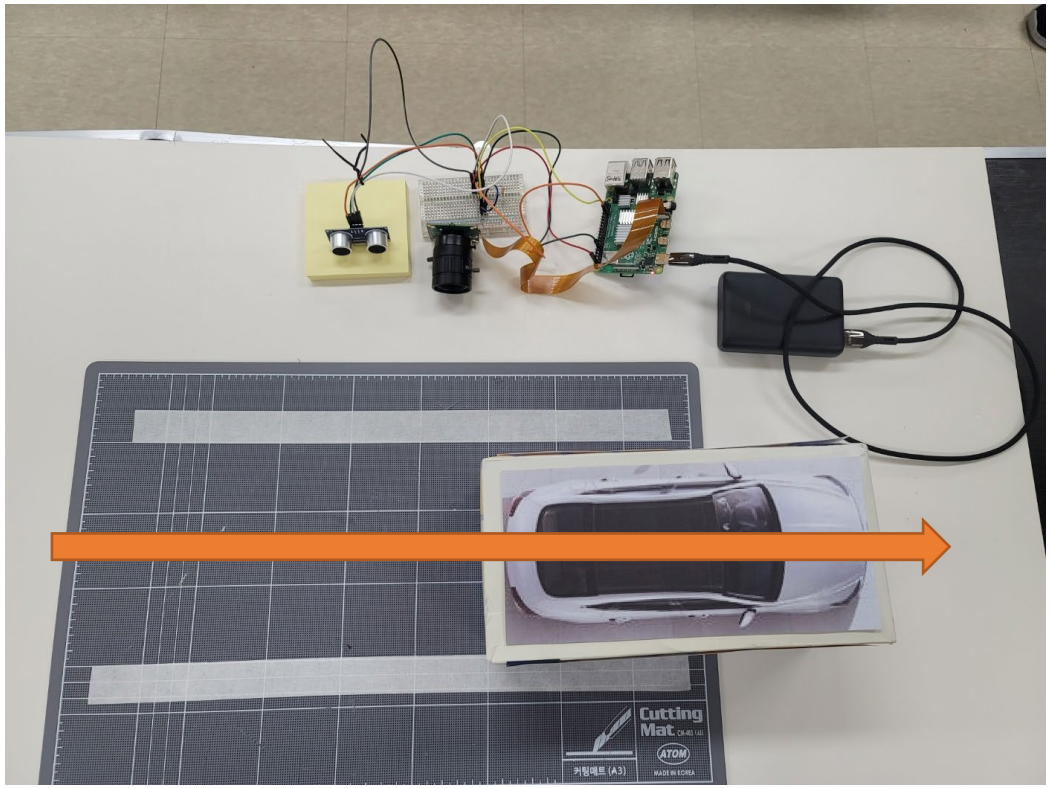
Getting real-time distance data through SKKU wi-fi and ssh(wireless)

Captured image by Arducam

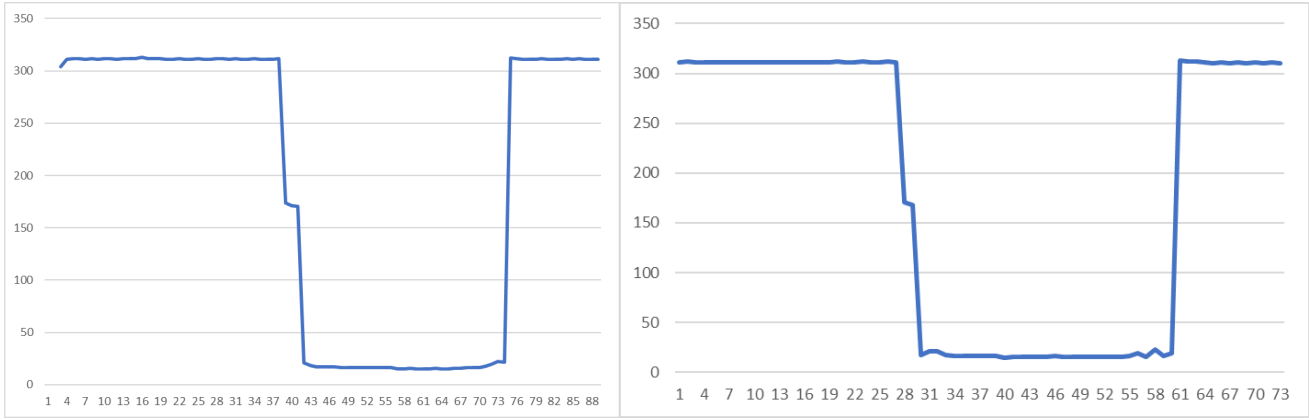
02. Implementation Plan

-Feasibility

실현가능성 검증



Test environment



Distance graph was observed as expected

02. Implementation Plan

-Mobile Application & Database

03. Role & Schedule

-Team Member Role

Mobile Application & Database

Front-End

- **임하리**

- Pigma 활용 UI 디자인
- Front-End UI/UX

- **김재영**

- Team Leader
- Front-End API 설계
- Front-End UI/UX

Back-End

- **정우석**

- Back-End API 설계

- **전유진**

- Back-End 서버 구축
- 내부 로직 구현

- **박현솔**

- DB 관리(my sql)

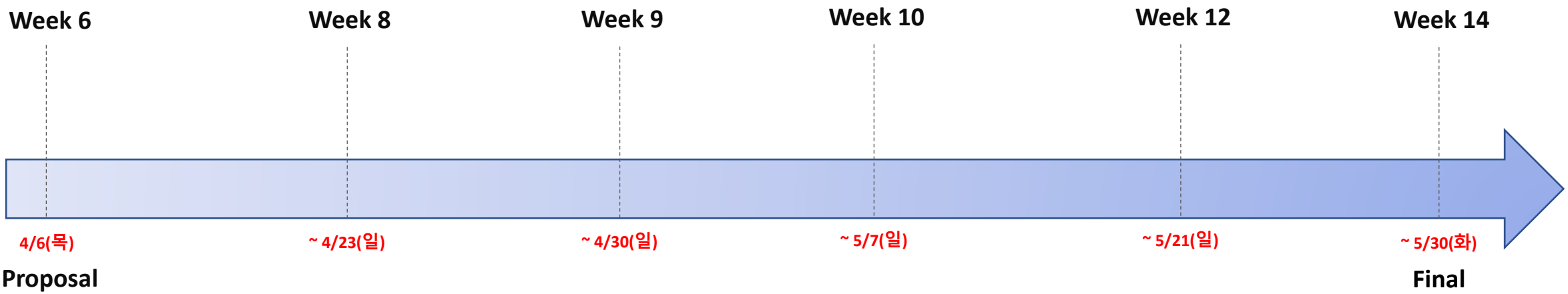
Sensor & Network & Algorithm

- **예하진**
- **이채영**

- Hardware configuration
- Wireless networking
- Data acquisition
- Detection algorithm

03. Role & Schedule

-Project Schedule



Mobile&Database Team	- Pigma UI Design 완료 - App Template 구성 - Flask Server 구축	- Mysql 연동 - Back-End API 설계 - Front-End UI/UX 설계	- Back-End API 명세 - Front-End API 설계		
Sensor&Network Team	- Hardware config 완료 - Data networking 구현	- Field test on single parking lot - LCD/LED notification system 구현	- SRS(Software Requirement Specification) 작성 - Field test on multiple parking lot	- 버그 수정 - Test Plan Specification - AWS 배포 및 테스트	- 버그 수정 - App 테스트

04. Expectation & Effect

Desirable application scenario

Expectation

Proposing a reliable real-time parking space calculation system in SKKU campus

Provide information through various media like mobile application, widget, LCD, LED

Effect

Save numerous users' time, cost, energy by presenting efficient parking sequence

Thank You for Your Attention

Q & A

Team 9