Parkin: Smart Parking System using Image Processing

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1. INTRODUCTION

The Parkin system is a smart parking solution that can tackle the problem of spending excessive time searching for an available parking spot. It works by utilizing sensors, a computer system, and display panels to efficiently manage parking and minimize traffic congestion, time wastage, expenses, car emissions, and pollution. There are different techniques that can be employed to detect vehicles in the parking area, such as image processing, which uses cameras to capture several cars simultaneously. The images are then analyzed using software that compares the variations between successive frames. The parking lot detection is achieved by recognizing the circular green icon in each parking space, and the system can be easily adjusted as needed. The project uses OpenCV software and real-time parking lot images.

2. OBJECTIVES

- Use IoT to improve existing solutions to reduce car congestion.

- Improve overall parking area of the College of Computer Science and Information Technology to increase efficiency of the parking.

- Help drivers to save time and book space through a mobile application remotely.

3. METHODS

Log into the system → Choose parking space → Confirm Information → Update the status (Available / Busy)
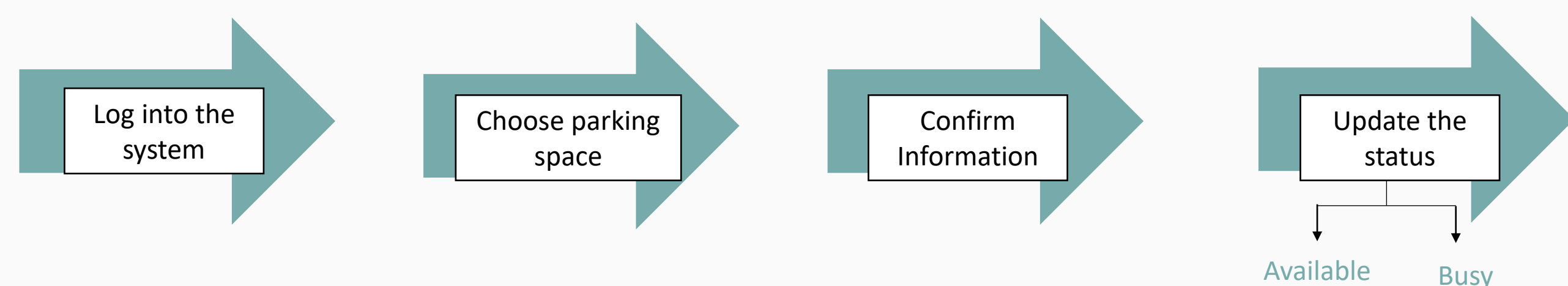
- The user first logs in to the application by entering his information. information will be validated, and an email will be issued to the user.

- The user reserves a parking space and parks his or her vehicle there based on the available slots in the parking spaces.

- When a slot is filled, the database is updated, and the application displays the number of available slots.

Parkin system is a prototype that was developed using IoT to improve and facilitate the movement of parking vehicles, reduce congestion and accidents in CCSIT parking areas particularly. Observation method was conducted for the movements of parking vehicles in CCSIT parking lots, as we have observed a random parking behaviors.

We have developed this project in three phases:

1. **Planning and Gathering Requirements:** The project's overall plan is built at this phase, and the needs have been identified and gathered.
2. **Design:** In the second phase, we have clarified how the system as a whole will be constructed to meet its requirements. This comprises the hardware components, their connections, and the hardware monitoring software.
3. **Implementation:** we divided this phase into two sections: development of hardware and development of software. The two sections were developed simultaneously then they were connected as the final end product. The hardware aspect consists of a ESP32-CAM located near the parking area and a laptop with the help of Arduino IDE to process the images. OpenCV was used to receive the data from the camera and read the status of the parking space such as full or empty. In addition, it was used to send the data to firebase. The application on the other hand was developed using Flutter, it receives the data from Firebase then display it to the user.

Our project was developed in a respectful and trusting environment between the team, in addition to the excellent experience of the team members regarding IoT.

4. RESULTS
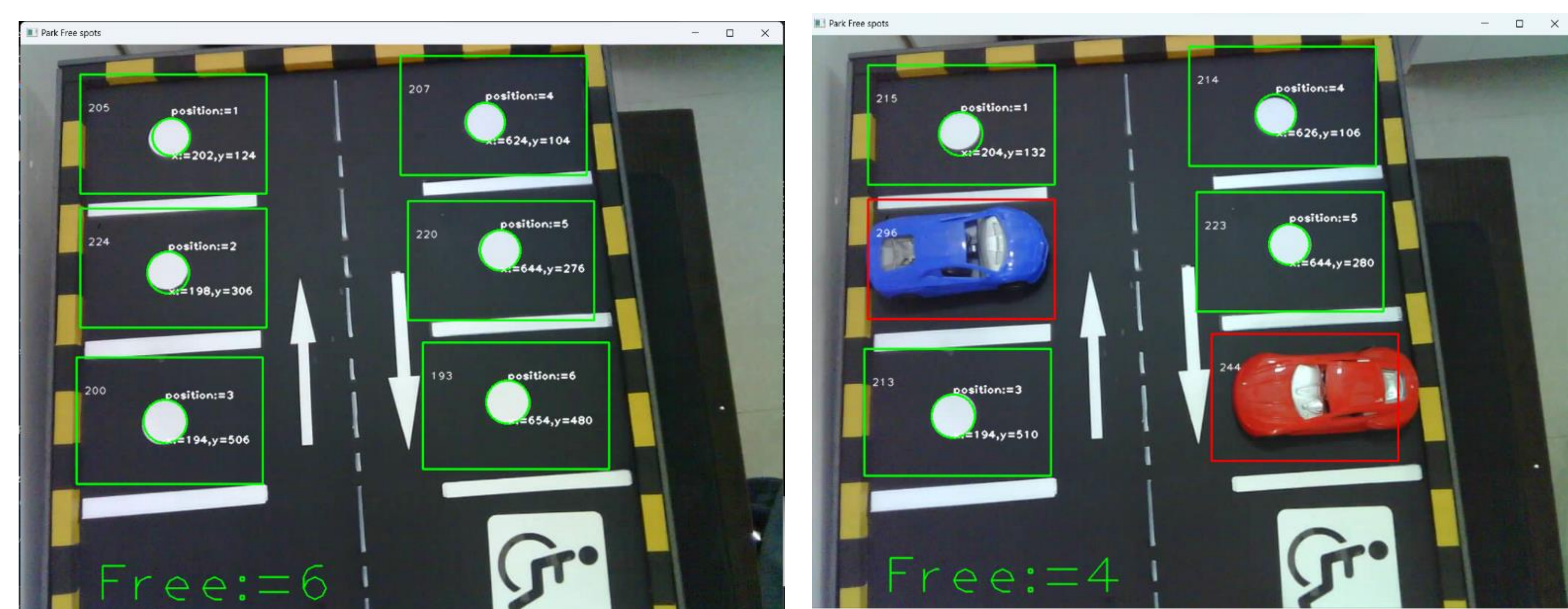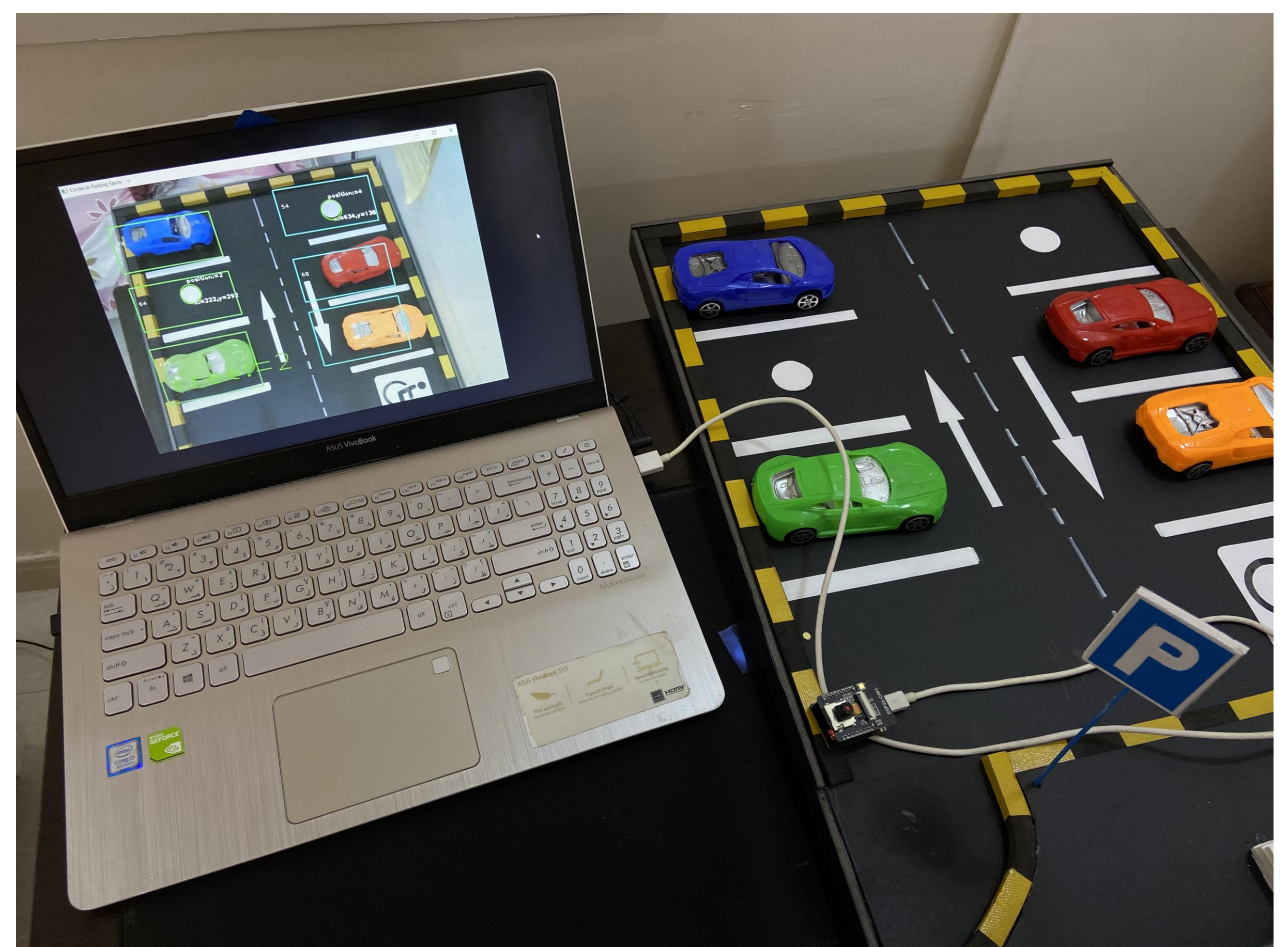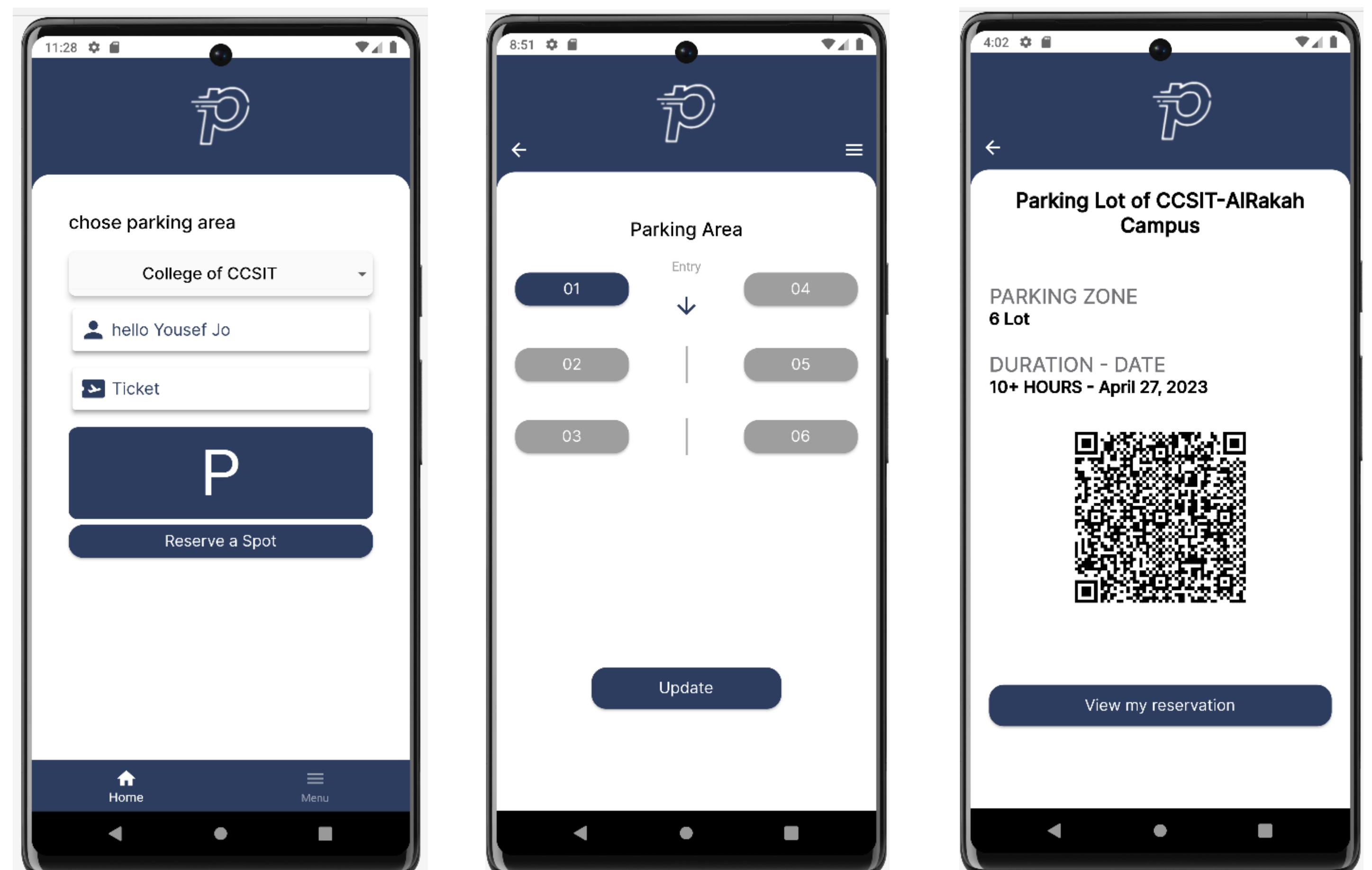
5. CONCLUSION

This poster depicts the Parkin application, which allows users to book parking spots that uses a computer vision and image-processing technologies to detect parking space status. The primary concept behind our project's use of computer vision, Internet of Things, and image based. Thus, Parkin can measure whether the parking slot is available or busy by using an ESP32-CAM that sends information to the Arduino IDE, and this is how the availability can be displayed through the application.

REFERENCES