Lab II - Product Specification Outline

CS 411W Lab II

Prototype Product Specification
For
ParkODU

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Table of Contents

List of Figures

List of Tables

1 Introduction

1.1 Purpose

ParkODU is an application to help drivers find available parking spaces closest to their destination on campus. It is accessible on any web browser on an Android and an iOS. The application will compile data gathered in real time by various vehicle counting systems installed in garages and parking lots and make the information available to drivers. The prototype of ParkODU will be simulation based as the data that would normally be obtained by the vehicle detection device will be simulated. The prototype of ParkODU will then the simulated data to demonstrate all the features and capabilities of the web app and the native Android/iOS App except support for digital signs.

1.2 Scope

The main objective of this software is to inform drivers of the available parking spaces in garages in real-time, so drivers can avoid overfull parking facilities and instead go directly to the open facilities. The secondary objective of ParkODU is to provide ODU Transportation and Parking services with parking data for analysis of current utilization rates of their parking facilities for use the information for future strategic planning.

1.3 Definitions, Acronyms, and Abbreviations

Administrator - a special user with access to additional tools for user account and space management

Agile - a methodology that anticipates the need for flexibility and applies a level of pragmatism into the delivery of the finished product

Best Garage - the closest garage to the destination building with the specified minimum number of available spaces

Driver - anyone who drives and parks at ODU

Driver Entry Rate - the number of vehicles entering the garage each minute

Driver Exit Rate - the number of vehicles exiting the garage each minute

Event - an occasion which affects garage and/or space availability

Garage Rate - Driver Entry Rate - Driver Exit Rate (a positive number denotes that the garage is filling up)

Operating Hours - 7:00AM - 10:00PM

Permit - a physical decal that specifies in which spaces the vehicle is allowed to park

Predictions - a guess based on current and historical data about garage space availability

Real-time - current time

Reconfigurable - software-based creation, deletion, or editing of spaces, floors, and garages

Rush Hours - 7:45AM - 9:00AM, 12:00PM - 1:00PM, 3:00PM - 4:30PM

Sensor - any device which indicates to the software whether a space is occupied or not

Signage - signs that indicate the number of available spaces

Statistical Analysis - the ability to use sample data to form predictions

User - an entity using Park ODU

Vehicle Detection Technology - any device which indicates to the software that a vehicle has entered a specified area

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1.5 Overview

This product specification provides the hardware and software configuration, external interfaces, capabilities and features of the Product ParkODU prototype. The information provided in the remaining sections of this document includes a detailed description of the hardware, software, and external interface architecture of the ParkODU prototype; the key features of the prototype; the parameters that will be used to control, manage, or establish that feature; and the performance characteristics of that feature in terms of outputs, displays, and user interaction.

2 General Description

The primary goal of the ParkODU Prototype is to provide a working demonstration of the ParkODU product. This is accomplished by implementing only the necessary components and features of the full product. As a prototype, the product will still be able show simulated data to demonstrate all the features and capabilities of the web app and the native Android/iOS App except support for digital signs.

2.1 Prototype Architecture Description

"The hardware for vehicle detection will be simulated by a REST client application. The application will send requests to ParkODU REST endpoint and update the vehicle counts. The application will closely mirror the actual ODU parking traffic

during weekday normal hours and also simulate special events on weekends." (13)

ParkODU Product is comprised of the following major components:

- Vehicle Detection Device (IR sensors) - If the customer chooses IR sensors they will be installed at each parking space in all parking garages which will detect if the space is empty or not to count by space.
- Vehicle Detection Device (Inductive loops) - If the customer chooses inductive loops which will not have the count by space feature, they will count only by floor and send the data to the vendor's servers which will be further accessed by ODU for occupancy data.

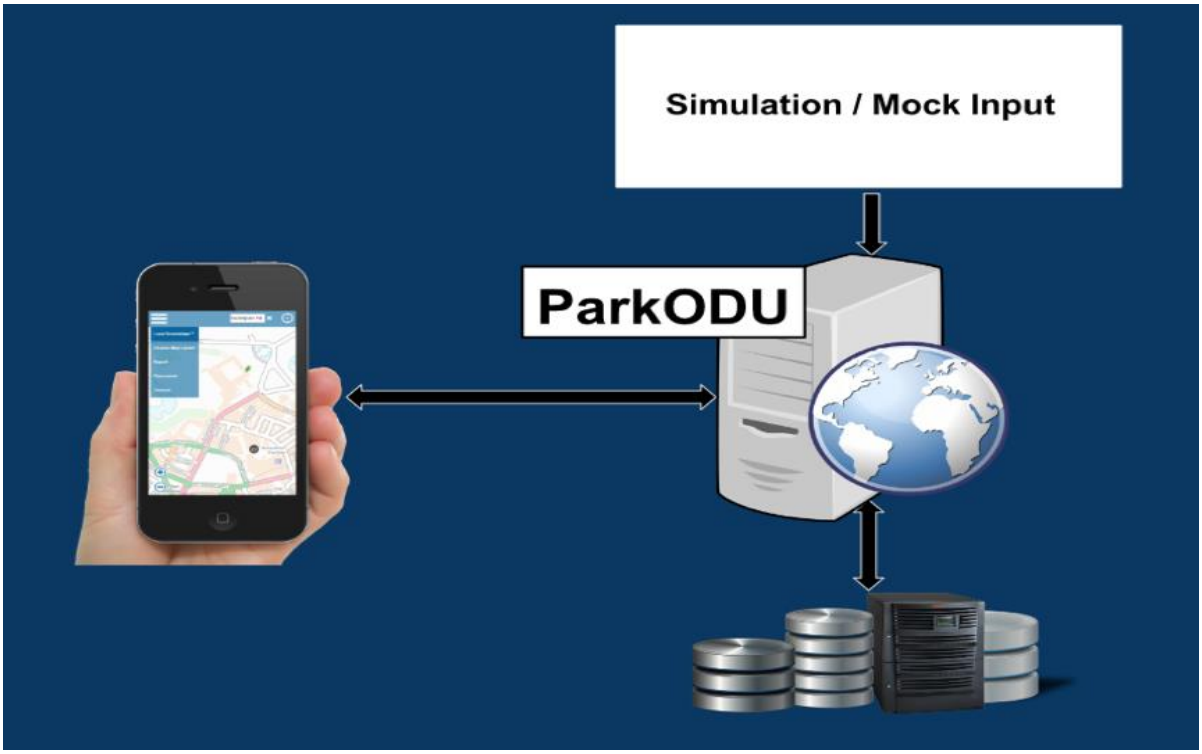

Figure 1. ParkODU Prototype MFCD.

2.2 Prototype Functional Description

The ParkODU prototype will simulate display a real-time vehicle count by floor in every garage. The prototype will provide the details of the floor plan along and option for navigation to the available space. The ODU faculty or students will be able to import his/her schedule, which will allow them to see the closest parking destination accordingly.

These functionalities will help drivers to park at ODU quicker and more effectual by reducing the amount of time spent manually searching for parking.

Table 1. shows all the features that ParkODU real-world product will have versus ParkODU prototype.

Feature	RWP	Prototype
Real-time vehicle counts on every level of each garage	*	*
Display floor plan to show counts by space on each floor	*	*
Display average vehicle count at each location by time of the day	*	*
Allow users to sort garages by walking travel time	*	*
Allow users to filter garages, floors, and space by their parking permit type and space types	*	*
Allow ODU parking staff to configure parking garages, floors, and spaces.	*	*
Provide directions to each garage from user's current location	*	*
Predict future vehicle counts based on the current and historical traffic pattern	*	*
Upload special event schedules and allow the apps to display notification to end users	*	*
Send data to digital signs at the entrance of every garage	*	

Table 1. ParkODU Features

2.3 External Interfaces

There are four types of external interfaces for ParkODU. These external interfaces are Hardware Interfaces, Software Interfaces, User Interfaces, and Communications, Protocols, and Interfaces.

2.3.1 Hardware Interfaces

ParkODU is designed to operate on the user's local machine or a mobile device. Since it is a web application it would the computer or the mobile device will require an internet connection in order to connect to the website.

2.3.2 Software Interfaces

There are two databases to which ParkODU will be interfacing – Hazelcast which will the primary and MongoDB the secondary. These databases will be used for parking - to acquire the parking that are available, events – to acquire events from the ODU site and user account – to save account for the user for importing their custom schedule.

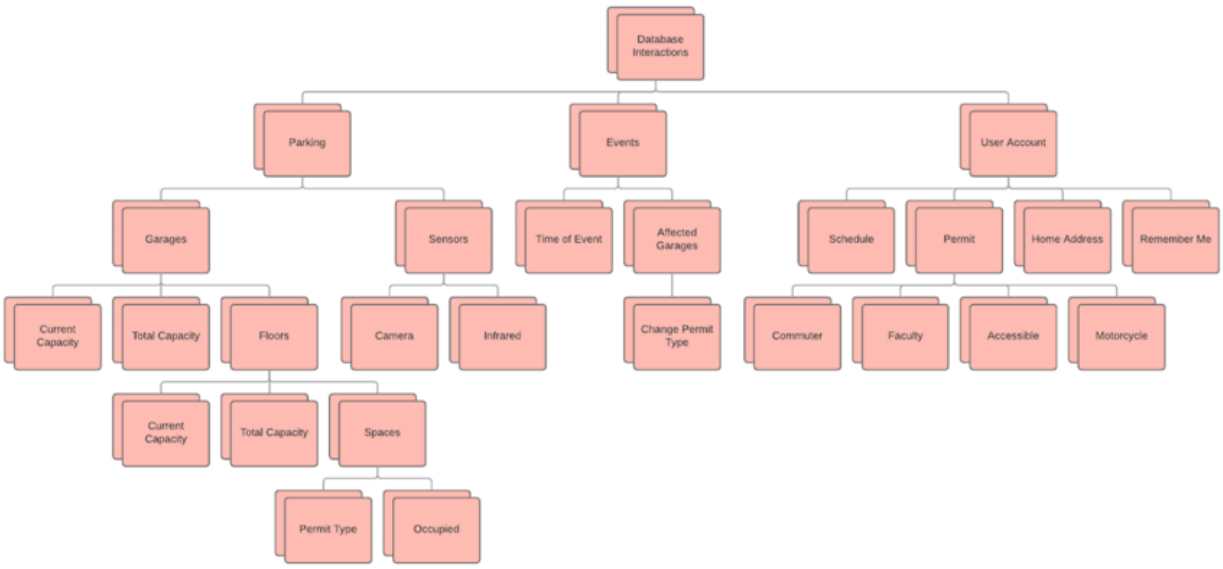

Figure 2. Database Interactions

2.3.3 User Interfaces

- Computer screen: to display the option in the web application to view parking availability or login in the web application for custom results.
- Keyboard: for typing in the user's class schedule for custom recommendation for the parking and typing the starting point or destination.
- Mouse: for selecting menu options in the ParkODU prototype.

2.3.4 Communications Protocols and Interfaces

The Protocols and interfaces used by ParkODU will be TCP/IP establish Internet connections to its databases and SSH protocol to operate network services over the ODU network.

3 Specific Requirements

This Section was submitted separately.