PARKme System

System Requirements Specification (SRS)

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1.0 INTRODUCTION

1.1 Identification

This System Requirements Specification (SRS) describes the requirements for the PARKme System. This document will be reviewed and approved by the PARKme system engineers and project sponsors and will then serve as the complete set of requirements necessary for the system to continue into future stages of development. After approval of this SRS, future changes to requirements will be made by submitting Requirements Change Requests and following the requirements management process set forth by the PARKme system engineers.

1.2 System Overview

This section provides a brief overview of the necessity for the PARKme system. It then briefly examines the PARKme structure and its interaction with the environment through a context diagram.

1.2.1 PARKme Need

Problem Statement:

"Finding a parking space at the university is a common frustration for commuters at the GMU campus. Finding the parking space that best suits your needs can be very time consuming and often times the "drive around looking method" does not result in the best space. Campus parking lots are often overcrowded during certain times of the day and week making parking a guessing game and a matter of luck."

University parking areas are not sufficient to handle the abundance of commuters that frequent GMU on an everyday basis. The parking process involves driving around the parking lots until you find an available space. This process works for small lots but at the university driving form lot to lot wastes time and resources and usually does not result in the user finding the best space for their needs.

The PARKme system will provide a method for those wishing to park at the university a tool to search the real-time availability of spaces from multiple locations.

1.2.2 PARKme System Context

The PARKme system functionality is organized into three major subsystems. Each of these subsystems is described in detail in section 1.5 along with a further breakdown of each subsystem. The three top-level subsystems are as follows:

- Data Network Subsystem
- Parking Space Subsystem
- User-Interface Subsystem

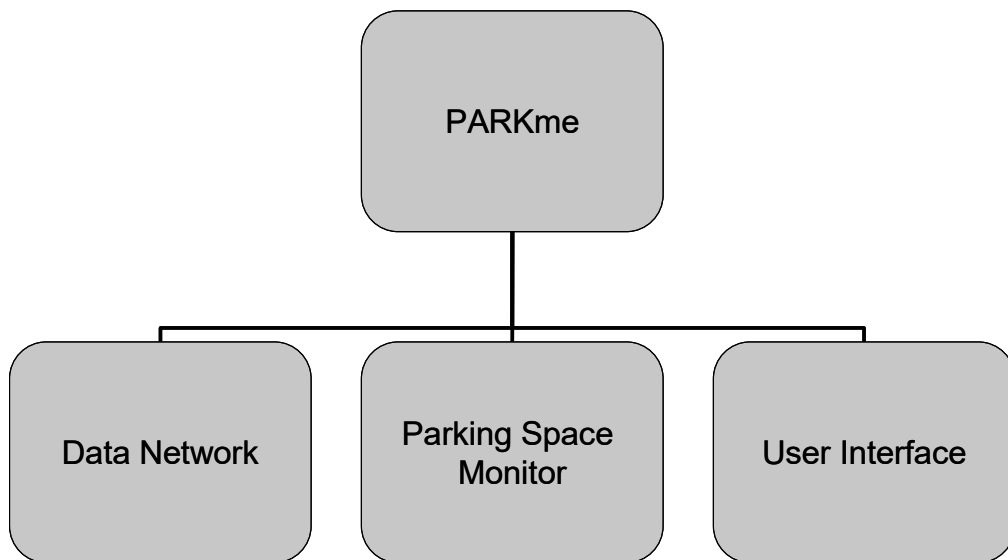Figure 1.2-1 shown below, visualizes the subsystems under the PARKme system.

Figure 1.2-1 - Subsystem Diagram

Figure 1.2-2 shows a high-level input output diagram. This diagram provides a notional picture of the I/O needed and is not intended to influence or restrict design.
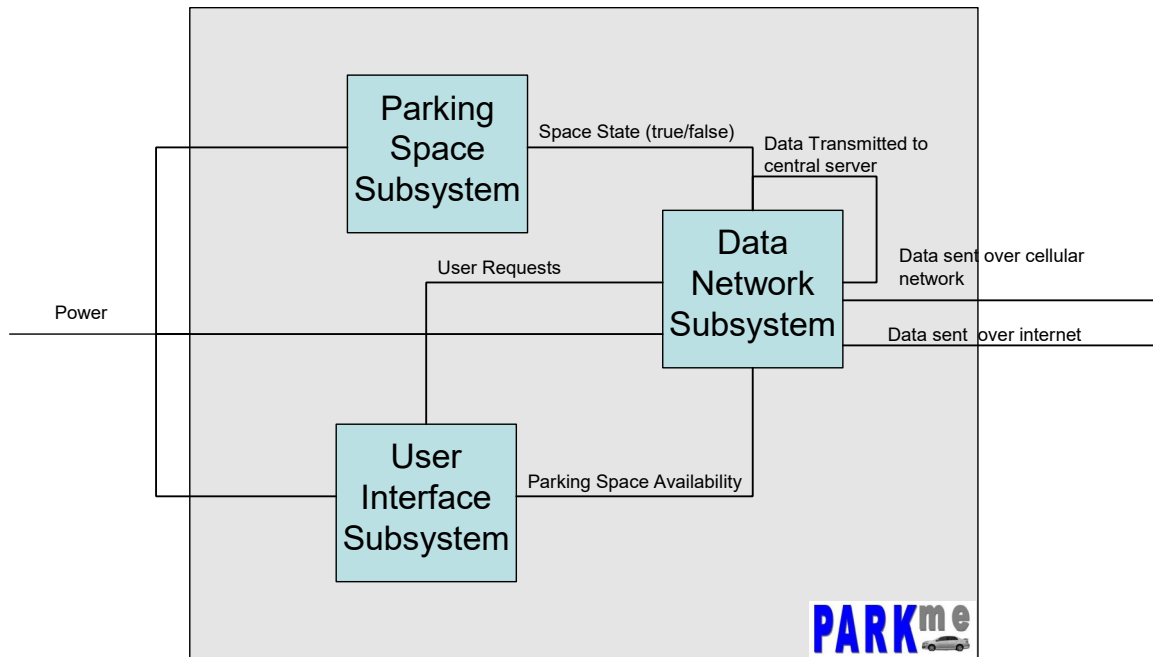
Figure 1.2-2 - High Level IO diagram

1.3 User Definition

1.3.1 Customer

The Customer is defined as the user who is accessing the system to view the current state of the parking situation on campus. The Customers include students looking for parking spaces, faculty looking for spaces, and visitors looking for parking spaces, staff receiving information about current parking atmosphere.

1.3.2 Operator

The Operator is defined as the user who is accessing the system in order to provide maintenance/administrator functions, initialize and setup the system, monitor the system, run queries on data for analysis.

1.4 Document Overview

This SRS contains the requirements necessary to perform analysis of alternatives and design the PARKme system in full compliance with the requirements and expectations of the PARKme systems engineers and project sponsors.

1.5 Concept of Operations

The PARKme system is a system that combines both hardware and software to provide users with situational awareness of the parking infrastructure at the university. The system would allow customers to interact with the system through on campus locations as well as through the Internet. This user interaction would allow the user to look up what spaces are available at any of the parking lots throughout the campus.

1.6 Overview of Functionality

This section provides a brief explanation of the functional components of the PARKme system.

1.6.1 Primary Subsystems

In this section, descriptions of the primary subsystems are provided in order to gain a better understanding of how each of the subsystems contributes to the overall functionality of the system.

1.6.1.1 Data Network Subsystem

The Data network subsystem is divided into two separate secondary subsystems, Data Storage and Data Transmission.

1.6.1.1.1 Data Storage

The Data storage subsystem is responsible for storing the necessary data associated with the parking spaces as well as the database for collecting parking data for further parking research and optimization.

1.6.1.1.2 Data Transmission

The Data Transmission subsystem is responsible for the transmission of all data from and to other parts of the PARKme system as well as to any external systems. Parking Space Monitoring Subsystem

1.6.1.2 Parking Space Monitoring Subsystem

The Parking Space Monitoring subsystem is responsible for the detection of all parking spaces at the campus and determining if they are occupied or empty. User-Interface Subsystem

1.6.1.3 User-Interface Subsystem

The User-Interface subsystem is the portion of the system where users interact with the PARKme system in order to view data contained by the system.

2.0 APPLICABLE DOCUMENTS

PARKme System Concept of Operations (CONOPS)

GMU Parking Map

3.0 REQUIREMENTS

This section describes the requirements that must be met for the PARKme system design. Requirement types subdivide the section: Functional, Non-Functional, Development and Schedule.

3.1 Functional Requirements

This section contains the functional requirements required of the PARKme system arranged by subsystem. The requirements in this section specify the functions that each subsystem must be capable of performing.

3.1.1 Data Network

This section specifies the requirements that must be performed by the Data Network subsystem.

3.1.1.1 - The PARKme system shall be capable of transmitting data to the user-interface at an update rate of once every 30 seconds.

3.1.1.2 - The PARKme system shall be capable of receiving data from the parking space monitoring subsystem at a constant rate.

3.1.1.3 - The PARKme system shall be able to send information stored on the data network in the form of emails to no less than (# of students + # of faculty).

3.1.1.4 - The PARKme system shall be able to send information stored on the data network in the form of text messages to no less than (# of students + # of faculty).

3.1.1.5 - The PARKme system shall be able to collect and store information about every parking space on the university campus at 30-second intervals for no less than one year.

3.1.1.6 - The PARKme system shall be able to calculate by distance the best available parking space based on the customer's preferences.

3.1.1.7 - The PARKme system shall be able to transfer data from the data network to external devices. External devices include but are not limited to USB drives, Tape drives and firewire drives.

3.1.1.8 - The PARKme system shall be able to display and print reports of the data stored on the network based on user specified criteria.

3.1.1.9 - The PARKme system shall provide security to protect the integrity of the data network and the information that it contains.

3.1.1.10 - The PARKme system shall be able to collect information concerning fire lanes and loading zones and sends notices of this information to parking authorities through email and/or text messages.

3.1.1.11 - The PARKme system shall be able to transmit a broadcast signal containing the current parking space availability to any/all receiving devices within range of the signal. (Spiral Requirement)

3.1.2 Parking Space Monitoring

This section specifies the requirements that must be met by the Parking Space Monitoring subsystem.
3.1.2.1 - The PARKme system shall be able to detect when and if each individual parking space on campus is occupied (in 30 second increments) and be able to report this information to an external source.

3.1.2.2 - The PARKme system shall be able to detect when and if each individual parking space on campus is unoccupied (in 30 second increments) and be able to report this information to an external source

3.1.2.3 - The PARKme system shall be able to detect when and if campus fire lanes and loading zones are occupied (in 30 second increments) and be able to report this information to an external source.

3.1.3 User-Interface

This section specifies the requirements that must be meet by the User-Interface subsystem. This sub system includes the interface with the Customer and Operator as defined in section 1.3 of this document.

3.1.3.1 - The PARKme system shall provide the customer with choices as to what criteria are to be used to determine the best available space for them. These criteria shall include but not limited to, building the customer is wishing to visit or parking lot the customer wishes to park in.

3.1.3.2 - The PARKme system shall provide the customer with the option of having a map printed that displays the customer's results.

3.1.3.3 - The PARKme system shall be able to allow the user to set up dates and times for the system to transmit space availability information to their phone or email account.

3.1.3.4 - The PARKme system shall provide the customer with a source on campus to utilize the PARKme system. This source should be accessible from an automobile without having to exit the vehicle.

3.1.3.5 - The PARKme system shall provide the customer with a receiver capable of receiving current parking space information when the receiver is within range of the incoming transmission. (Spiral Requirement)

3.1.3.6 - The PARKme system shall provide the customer the ability to auto find the best spaces available for them based on their course schedule for that specific time and day.

3.1.3.7 - The PARKme system shall provide the operator an interface for initializing the system, which includes parking layout and all areas that are to be monitored.

3.1.3.8 - The PARKme system shall provide the operator an option to flag parking spaces as occupied when there is a problem with the space in order to prevent falsely displaying unavailable spaces as available.

3.1.3.9 - The PARKme system shall provide the operator with the ability to monitor the current state of the parking spaces.

3.1.3.10 - The PARKme system shall provide the operator with the ability to print daily, weekly, monthly, and annual reports of the parking spaces usage, and allow the operator to customize the type of output that is desired. This output would include certain lot usage, usage between certain times of the day, amount of visitors requesting information from the system.

3.1.3.11 - The PARKme system shall provide the operator with the ability to send information about campus parking to other users.

3.1.3.12 - The PARKme system shall provide users with 24/7 availability with the exception being during scheduled maintenance periods.

3.1.3.13 - The PARKme system shall be accessible via the Internet.

3.2 Non-Functional Requirements

This section specifies the non-functional requirements required of the PARKme system. This section is organized by category of requirement.

3.2.1 Performance

This section specifies the performance requirements that the PARKme system must adhere to.

3.2.1.1 - The PARKme system shall be able to provide continuous updating of every parking space monitored on a 30 second cycle. This involves designing an optimized scheduling algorithm.

3.2.1.2 - The PARKme system shall be able to provide the user with the information that contains the most recent updates of the parking spaces.

3.2.1.3 - The PARKme system shall be able to send customers' text messages and emails within 10 seconds of the user-desired time. This is measured as the time sent, not received. Phone and Internet network delays are not controllable by this system.

3.2.2 Reliability

This section specifies the reliability requirements imposed upon the PARKme system.

3.2.2.1 - The PARKme system shall have a reliability rating of 0.98. Reliability is defined as providing the user up to date, correct information when they need it. Information is considered correct when the parking spaces are accurately reported and the information is no more than 30 seconds old.

3.2.3 Maintainability

This section specifies the maintainability requirements imposed upon the PARKme system.

3.2.3.1 - The PARKme system shall not need more than 3 hours of weekly maintenance.

3.2.3.2 - The PARKme system shall not need more than 7 days of annual maintenance (system maintenance different from weekly maintenance).

3.2.4 Environmental

This section specifies the environmental requirements imposed upon the PARKme system.

3.2.4.1 - The PARKme system shall not cause physical harm to users and non-users.

3.2.4.2 - The PARKme system shall not cause interference to external systems.

APPENDIX A - DEFINITIONS

Shall – expresses a requirement that is mandatory.

Should – expresses a requirement that is important but is somewhat flexible.

APPENDIX B – ACRONYMS

The following are acronyms used in this document:

GMU – George Mason University
GUI – Graphical User Interface
SRS – System Requirements Specification