

**Software Requirements Specification**  
**Mobile Navigation Control for Planetary Web Portals**  
**(MNCPWP)**

**Prepared by**  
**Catherine Suh**  
**Max Ru**  
**Frank Navarrete**  
**Kevin Parton**  
**John Calilung**  
**Miguel Martinez**

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**California State University, Los Angeles**

# Table of Contents

<b>1. Introduction</b> .....	<b>4</b>
1.1 Purpose	
1.2 Document Conventions	
1.3 Intended Audience and Reading Suggestions	
1.4 Product Scope	
1.5 References	
<b>2. Overall description</b> .....	<b>5</b>
2.1 Product Perspective	
2.2 Product Functions	
2.3 User Classes and Characteristics	
2.4 Operating Environment	
2.5 Design and Implementation Constraints	
2.6 User Documentation	
2.7 Assumptions and Dependencies	
<b>3. External Interface Requirements</b> .....	<b>7</b>
3.1 User Interfaces	
3.2 Hardware Interfaces	
3.3 Software Interfaces	
3.4 Communication Interfaces	
<b>4. System Features</b> .....	<b>9</b>
4.1 Standalone Site Features	
4.2 Mobile Application Features	
4.3 School Server Features	
4.4 AmazonS3 Features	
<b>5. Other Nonfunctional requirements</b> .....	<b>11</b>
5.1 Performance Requirements	
5.2 Safety Requirements	
5.3 Security Requirements	
5.4 Software Quality Attributes	
5.5 Business Rules	

## Appendix A: Glossary

## Appendix B: System Diagram

## Appendix C: To Be Determined List

### Approved By:

\_\_\_\_\_  
Dr. Kang                      Date

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JPL Liaison                      Date

### Revision History

Name	Date	Reason For Changes	Version
Team	11/29/16	Original version	1.0

# **1. Introduction**

## **1.1 Purpose**

The purpose of this document is to layout the functional and nonfunctional requirements of the Mobile Navigation Control for Planetary Web Portals application.

## **1.2 Document Conventions**

This document follows MLA format. With bold-faced text used to emphasize the section headings. Numbered bullet points have been used to quickly identify sub sections and organize the document in an easy to track manner. The document attempt to concisely outline the requirements of the application. It also outlines the expected behavior of the application.

## **1.3 Intended Audience and Reading Suggestions**

1.3.1 This documentation is intended for developers, software engineers, end users, and testers.

1.3.1.1 Developers, software engineers, and other technical professionals shall refer to this document for gaining insight on technical aspects of the product in terms of frameworks used to develop the product, performance and functional issues, backend functions and processes, server communication, and data processing.

1.3.1.2 Users and testers shall refer to this document for gaining insight on what the application is intended to provide to an end user in terms of features, functions, and navigation through the user interface.

## **1.4 Product Scope**

The scope of the Mobile Navigation Control for Planetary Web Portals was to create an interactive environment on a mobile device platform allowing users to control navigation of the desktop version of the planetary Trek portals for Mars and Vesta or navigating on the hyper wall. The application shall be developed from open-source software. The application shall be available as a native application for the iOS platform and as a web-based application which will be accessible on all platforms.

Implementation of more features and rigorous testing will continue Spring Semester 2017.

## **1.5 References**

Provided below are links to other resources or documents that pertain to the development of the product.

<http://csns.calstatela.edu/wiki/content/eykang/courses/cs496/2016-2017/JPLMobNav>

## **2. Overall Description**

### **2.1 Product Perspective**

The mobile web controller, both the web implemented and native application, are part of an effort to create a more interactive product for students and those who are curious about the surface of Mars and Vesta. The use of this product will be designed to allow home users the chance to control the site at home, while allowing museums or organizations to use the product to have hyperwalls for an interactive experience for visitors.

### **2.2 Product Functions**

The product allows users to control the website without the necessity of a keyboard and mouse. It will take input from sensors such as the accelerometer to control the trek websites. Also the product will detect swipes and have an interactive joystick.

### **2.3 User Classes and Characteristics**

2.3.1 Trek Users: Trek users will use the application to control the trek site remotely without the use of keyboards or mice. These users will have most but not all features, i.e. the ability to hand over and receive the ability to control the Hyperwall will not be given to this group.

2.3.2 Presenter Users: Presenter users will have full control of the application. The features given to this group will allow this user to present the Trek websites in a lecture or presentation manner.

## **2.4 Operating Environment**

The product shall operate in a mobile environment and utilize certain sensors and input devices on mobile devices. The iOS version of the product shall operate on the iOS mobile operating system. The iOS product shall use the accelerometer sensor of the Apple mobile device to receive user input via movement gestures. It shall receive user input via the touch screen.

The web-based version of the product shall operate on the web browser of a user's mobile device; in this case the product would be able to be used on any mobile operating system. The web-based product shall use the accelerometer of whatever mobile device is being used to receive user input via movement gestures. It shall receive user input via the touch screen.

## **2.5 Design and Implementation Constraints**

Web application must be accessible and easy to use on modern devices such as an Android phone or iPhone

UX and UI for iOS Application must be optimized for all iPhones since the iPhone 5.

Joystick mode, Touch mode, and Accelerometer mode must be consistently implemented across both iOS and the Web Application.

## **2.6 User Documentation**

iOS users shall download the app and scan the QR code available on the JPL portal site. Non-iOS users require only the URL displayed on the JPL portal site. That URL shall take the user to a verification page where a 4-digit pin code is to be entered. Both iOS and non-iOS mobile devices will redirect to the default controller which shows two joysticks in landscape mode. The left joystick is to control directionality (left, right, up, or down) and the right joystick controls the zoom (up to zoom in, down to zoom out). To switch controller mode, the iOS app has a toggle button which changes the controls to portrait mode where the user can swipe or pinch in and out. The web app has buttons to switch to portrait mode to use either the accelerometer or swipes and pinches.

Currently, the accelerometer control only displays readings and does not actually navigate the portal site.

There is a menu bar available on all views which can take you back to the home page. The home page has links to information about Mars and Vesta and to a converter of Earth to Mars weights.

## **2.7 Assumptions and Dependencies**

- 2.7.1 Web browser application users are assumed to have the orientation lock off.
- 2.7.2 Users for both the iOS app and the Web Browser application are expected to have consistent and stable internet connections
- 2.7.3 iOS devices are assumed to have a working camera.
- 2.7.3 Accelerometer sensor are assumed to be enabled and working correctly.

## **3. External Interface Requirements**

### **3.1 User Interfaces**

The application shall have several “views” or user interface states which the end user will encounter when navigating throughout the application.

#### **3.1.1 Home Screen View**

- 3.1.1.1 It shall have a button which leads to the controller view.
- 3.1.1.2 It shall have a button which opens a page with information about Mars.
- 3.1.1.3 It shall have several buttons at the bottom which link to social media apps.

#### **3.1.2 Controller View**

- 3.1.2.1 It shall offer a landscape mode (the default).
  - 3.1.2.1.1 It shall be navigated by two joysticks (one directional and one to zoom).

- 3.1.2.2 It shall allow mobile navigation using the accelerometer.
  - 3.1.2.2.1 It shall be toggled on or off from landscape mode.
  - 3.1.2.2.2 It shall first require calibration before being used.
    - 3.1.2.2.2.1 It shall require the user to pick a base position.
    - 3.1.2.2.2.2 It shall require the user to turn the phone to the left.
    - 3.1.2.2.2.3 It shall require the user to turn the phone to the right.
    - 3.1.2.2.2.4 It shall require the user to tilt the phone up.
    - 3.1.2.2.2.5 It shall require the user to tilt the phone down.
  - 3.1.2.2.3 It shall offer a portrait mode.
    - 3.1.2.2.3.1 It shall navigate with swipes, pinches, and un-pinches.
  - 3.1.2.2.4 It shall display a menu bar linking to the Home Screen View on both modes.

### **3.1.3 About View**

- 3.1.3.1 It shall have information about Mars (i.e. climate, why JPL/NASA have concentrated on this planet/rock).
- 3.1.3.2 It shall allow input of weight on Earth and output what that weight would be on Mars

## **3.2 Hardware Interfaces**

- 3.2.1 iOS devices (iPhone 5 and later)
- 3.2.2 iOS and Android devices with modern browsers

## **3.3 Software Interfaces**

- 3.3.1 Eclipse Neon (4.6.1)
- 3.3.2 Xcode 8.0
- 3.3.3 Tomcat 7
- 3.3.4 Apache Server

## **3.4 Communication Interfaces**

- 3.4.1 HTTP GET
- 3.4.2 Server side events

# **4. System Features**



## 4.1 Standalone Site Features

- 4.1.1 It shall display the program run from MarsStandAlone (*tbc*).
- 4.1.2 It shall display a box in the bottom right with instructions on how to connect to the site with a mobile device.
  - 4.1.2.1 It shall offer a URL with verification code for web-app users.
  - 4.1.2.2 It shall offer a QR code for iOS users.
- 4.1.3 It shall receive commands pushed from the school server.
- 4.1.4 It shall send requests to Amazon's CDN for specific images.
- 4.1.5 It shall receive responses from Amazon's CDN for the specifically requested images

## 4.2 Mobile Application Features

- 4.2.1 It shall send a request to the school server with the verification code presented on the standalone site.
- 4.2.2 It shall send commands to the school server on how the image displayed on the standalone site is to be manipulated.
- 4.2.3 It shall have several views.
  - 4.2.3.1 Home Screen View
    - 4.2.3.1.1 It shall have a button which leads to the controller.
    - 4.2.3.1.2 It shall have a button which opens a page with information about Mars.
    - 4.2.3.1.3 It shall have several buttons at the bottom which link to social media apps.
  - 4.2.3.2 Controller View
    - It shall offer a landscape mode (the default).
    - It shall be navigated by two joysticks (one directional and one to zoom).
    - It shall allow mobile navigation using the accelerometer.
    - It shall be toggled on or off from landscape mode.
    - It shall first require calibration before being used.
    - It shall require the user to pick a base position.
    - It shall require the user to turn the phone to the left.
    - It shall require the user to turn the phone to the right.
    - It shall require the user to tilt the phone up.

It shall require the user to tilt the phone

It shall offer a portrait mode.

It shall navigate with swipes, pinches, and un-pinches.

It shall display a menu bar linking to the Home Screen View on both modes.

#### 4.2.3.3 About View

4.2.3.3.1 It shall have information about Mars (i.e. climate, why JPL/NASA have concentrated on this planet/rock).

4.2.3.3.2 It shall allow input of weight on Earth and output what that weight would be on Mars.

### **4.3 School Server Features**

4.3.1 It shall take the standalone site's User Agent and IP Address.

4.3.2 With the above and the time in milliseconds, it shall create a Hyperwall ID (HID).

4.3.3 The HID shall be put into the database.

4.3.4 With the above and the time in milliseconds, it shall create a URL with verification code.

4.3.5 It shall send the URL with verification code to the standalone site to be displayed.

4.3.6 With the above and the time in milliseconds, it shall create a QR code.

4.3.7 It shall send the URL with verification code to the standalone site to be displayed.

4.3.8 It shall take the mobile device's User Agent and IP Address.

4.3.9 With the above and the time in milliseconds, it shall create a User ID (UID).

4.3.10 The UID shall be put into the database.

4.3.11 It shall accept commands from the mobile device.

4.3.12 It shall push commands to the standalone site.

### **4.4 Amazon's CDN Features**

4.4.1 It shall receive requests from the standalone site for specific images.

4.4.2 It shall send responses to the standalone site for the specifically requested images

## **5. Other Nonfunctional Requirements**

### **5.1 Performance Requirements**

The application should receive and output desired motion immediately. Input device should maintain its fluid response throughout and saving and loading of setting should take less than one second. Updates received from the server should take no longer than 1 second to appear on screen.

### **5.2 Safety Requirements**

The possibility of harm, loss, or damage from the use of the application are highly improbable being that the product is intended for use in what is assumed to be controlled environment. Additionally, the intended use of the product does not present any foreseeable scenarios where a user would have to encounter harm of any kind in order to fulfill the maximum utility of the product.

### **5.3 Security Requirements**

The Application will only send and receive unique identifying information such as device ID and hyperwall IDs to determine the appropriate route for a connection to be established and maintained. No other personally identifiable information will be used. The application will also maintain secure and unique connections, to avoid unauthorized users from controlling other devices.

### **5.4 Software Quality Attributes**

The application shall be developed and tested to ensure that there is minimal latency in the background processes that occur during the use of the application. The application shall be designed to ensure that the user is able to quickly acclimate to the user

interface and is able to quickly learn how to navigate through the application be able to use all the functions of the application with ease.

## **5.5 Business Rules**

The application shall not be used as an enterprise application to assist in the operations of any organization involved in business, government, education, etc. However later implementations may allow the application to be used as an educational tool and as an application used for research. The domain of use for this application shall fall in the realm of consumer leisure and entertainment as it will be used as an application by users, which are assumed to have little to no scientific or technical knowledge, to interact with JPL's Mars and Vesta Planetary Trek portals.

## **Appendix A: Glossary**

JPL - Jet Propulsion Laboratory

HID - Hyperwall Identifier

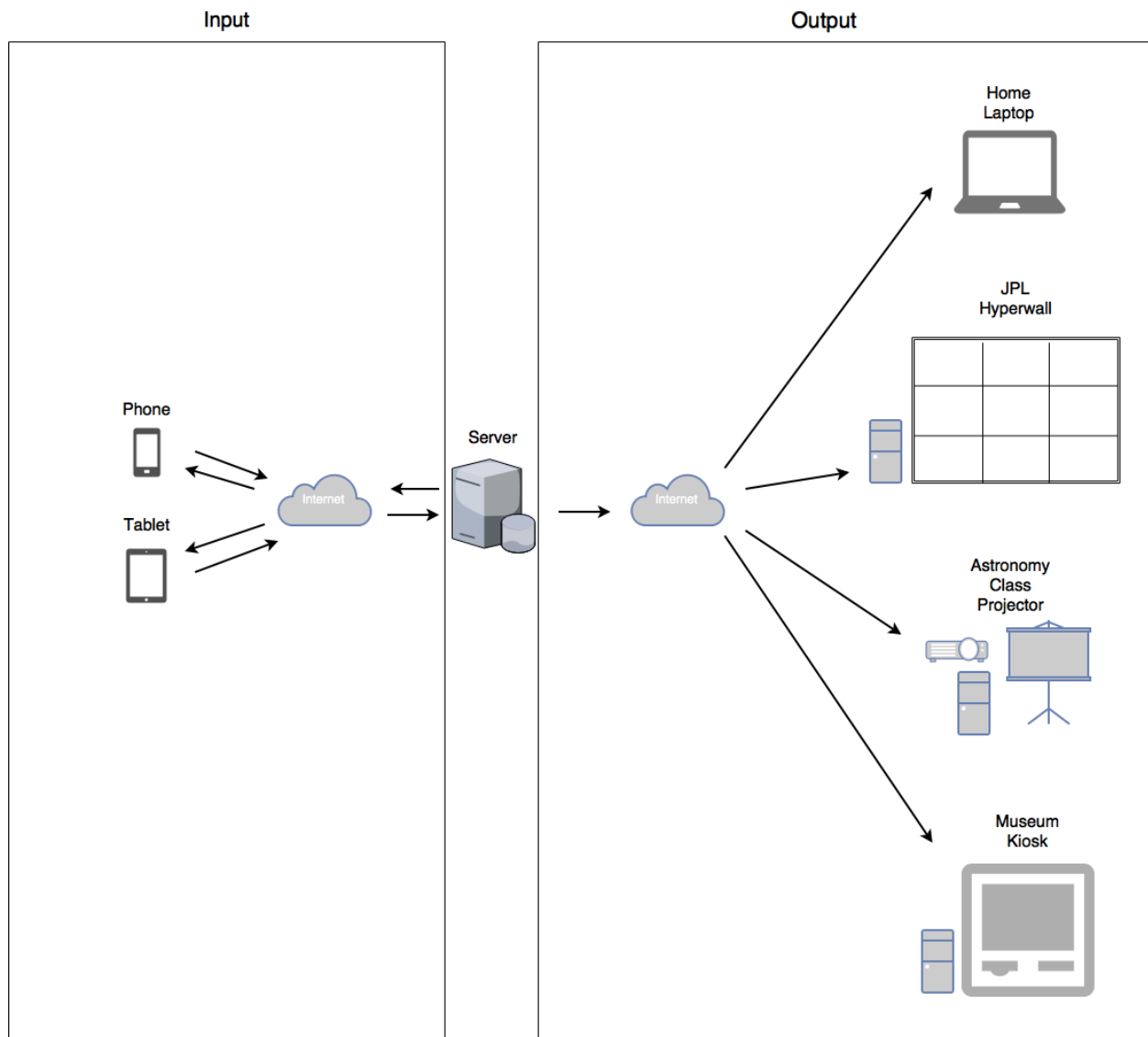
UID - User Identifier

QR Code - Quick Response Code

Amazon CDN - Amazon Content Delivery Network

URL - Unified Resource Locator

## **Appendix B: System Diagram**



## Appendix C: To Be Determined List

- Queue
  - It shall allow people to form a queue to navigate the site using a mobile device.
  - UIDs will be created for each user in the queue and stored in a database.
  - There shall be a variable amount of time for each user to navigate the site.

- o The wait time shall be dependent on the number of people in the queue.
- o If the user moves out of a certain range of the standalone site, he or she shall be removed from the queue.
- o Queue View
  - It shall say how many people are in front of the user in the queue.
  - It shall give an estimated wait time.
- Presenter Mode
  - o It shall not place a time limit on accessing the standalone site with a mobile device.
  - o It shall allow handing over control of mobile navigation of the standalone site.
- Views
  - o JPL News and Apps
    - It shall display, with links, the most recent JPL news.
    - It shall have links to other JPL apps.
  - o Menu Bar
    - It shall have a button to bookmark specific locations or coordinates.
    - It shall have a button to take a screenshot of whatever is currently displayed on the standalone site.
      - It shall allow the user to share the photo on social media.
- Voice Controls
  - It shall allow the URL with verification code to be read to the phone.
  - It shall allow moving through different views of the app.
  - It shall recognize verbal commands for the controller i.e. 'zoom in'
  - It shall move the standalone site's image to specific bookmarked locations