Software Requirements Specification

for

MoonTrek Telescope Application

Version 1.0 approved

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## Revision History

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<tr>
<td>First Draft</td>
<td>11/21/19</td>
<td>First Document for Review &amp; Approval</td>
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1. Introduction

This Software Requirements Specification Document, SRS provides a general description of the MoonTrek Telescope Application, MTTA, including the functional and nonfunctional requirements necessary to implement the software. In addition, the associated hardware, mostly telescope, accessories, and user device will be discussed to provide a consistent view of the project.

MTTA will serve as a tool for use by amateur astronomers and any user interested in the moon. This application will allow users to view high-resolution data sets of most of the moon’s surface as well as obtain statistics about lunar regions. In addition, it should work in conjunction with telescope hardware if available.

1.1 Purpose

The purpose of this SRS is to serve as the main source of requirements for the MTTA programmers who will write the SDD and then implement the code for the MTTA software. The document’s first version is the one being reviewed and approved. The next version of the document will include input from review and any modifications approved for telescope hardware integration.

The requirements will be listed with entries for each of the modules initially understood to be part of MoonTrek Application. These tables may be modified after the SDD has been generated and approved. Lastly there are requirements that will be better understood during implementation and these will be the last modifications to the requirements table before full implementation and delivery to its customers.

1.2 Intended Audience and Reading Suggestions

The main users of this MTTA SRS are the developers that will write the corresponding SDD and the software implementation coders that will write the software code. Also, audience to this document include reviewers who will be approving this document.

No other user/reader is expected at this time.

1.3 Product Scope

The software is identified as MoonTrek Telescope Application, MTTA for short. MTTA is an online application that serves as a tool for amateur astronomers. The purpose of this application
is to provide an interface between the user and the MoonTrek Database. It should facilitate and enhance observation of the moon.

Goals:
- Provide simple UI for users of the application
- Promote community interest in science and celestial observation

1.4 Definitions, Acronyms, and Abbreviations
- ASCOM: Astronomy Common Object Model
- MTTA: MoonTrek Telescope Application
- SRS: Software Requirements Specification
- SDD: Software Design Document
- TBD: To Be Determined
- UI: User Interface
- WMTS: Web Map Tile Service

1.5 References
Macias, Jose Recommended Template for Software Requirements Specifications
ASCOM Standards
https://ascom-standards.org/
MoonTrek API
https://trek.nasa.gov/tiles/apidoc/trekAPI.html?body=moon
Vue.js Framework
https://vuejs.org/
WMTS Implementation Standard
https://www.opengeospatial.org/standards/wmts
2. Overall Description

DFD 1

User → 1.1 User Interface Module → Display

User Input

User Input

Image of Moon

Image of Moon

Telescope → 1.2 Communication Module → MoonTrek Database

Coordinates

Image of Moon

User Input and Coordinates
2.1 Product Perspective
This software is dependent on two outside products, a digital telescope and NASA’s MoonTrek database. It takes in coordinates from the digital telescope and user input from the software display so that it can pass it to the MoonTrek database. The database then sends us back a picture of the moon based on said coordinates and user input to pass back to the display.

2.2 Product Functions

- MTTA will display a live image of the moon from the telescope’s perspective.
- MTTA will provide statistical data based on the geographical portions of the moon.
- MTTA will allow users to isolate information based on their interests.
- MTTA will provide functions to users to overlay informative maps over the current portion of the moon they are observing.

2.3 User Classes and Characteristics

The user classes that belong to MoonTrek include but are not limited to students, professors, hobbyists, etc. This software is mainly intended for those that seek to discover various pieces of interesting/informative moon knowledge that may have previously been unknown to them.

2.4 Operating Environment

As for now, MTTA is a web-based application, run on any network environment.

2.5 Design and Implementation Constraints

Limited Vue Experience-Developing an Web-based application will be a first for some members of the group, and assuring that everyone is on the same page and understands what is going on will take a significant portion of the deadline time.

Limited Time as briefly alluded to developing an app for experienced professionals takes a lot of time, and even they have trouble meeting deadlines. Our application will be due by the end of the year, and we still have less time and less experience than professionals have.

Familiarity with Specific Data Types-When brainstorming about certain aspects of our application, we thought about Data Structures that we knew about conceptually, and knew would get the job done best, but had never used in actual practice.
2.6 User Documentation
Within the MTTA, there will be a “Manuals” button that when pressed will display detailing how to use the application. The tutorials will provide step-by-step examples of how to use MTTA.

2.7 Assumptions and Dependencies
MTTA will fulfill all requirements with the assumption that the user has a valid internet connection. This software will not be functional without an internet connection. It is also assumed that the user will have a compatible telescope to integrate with MTTA. Without the presence of a telescope the application will be provided a set of hardcoded coordinates for a user to research information.

2.8 Apportioning of Requirements
ASCOM standards implementation
3. External Interface Requirements

The MTTA Data Flow Diagram level 0, or Context Diagram below provides a pictorial view of all external requirements associated with the application.
## 3.1 User Interfaces

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<thead>
<tr>
<th>User Interfaces</th>
<th>Descriptions for User Interface</th>
</tr>
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<tr>
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<td>User will request MoonTrek website</td>
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<tr>
<td>3.1.2 Response</td>
<td>Website will display to user</td>
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<td>3.2.1 Logo Link</td>
<td>Website will take user back to Home Page</td>
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<td>3.2.2 Express Navigation Bar</td>
<td>Website will show express links of different pages</td>
</tr>
<tr>
<td>3.2.2.1 About Us Link</td>
<td>Website will direct user to description of our services</td>
</tr>
<tr>
<td>3.2.2.2 Contact</td>
<td>Website will direct user to contacts page</td>
</tr>
<tr>
<td><strong>MoonTrek Services</strong></td>
<td></td>
</tr>
<tr>
<td>3.2.3.1 Moon Image</td>
<td>Website will display image from coordinates provided by telescope</td>
</tr>
<tr>
<td>3.2.3.2 Moon overlay services</td>
<td>Website will provide utilities to overlay informative images onto previous moon image.</td>
</tr>
<tr>
<td>3.2.3.3 Moon information services</td>
<td>Website will provide statistical location based information from Telescope coordinates</td>
</tr>
</tbody>
</table>
3.2 **Hardware Interfaces**
Telescope (model: TBD)

3.3 **Software Interfaces**
- Vue.js (develop back-end of application)
- MoonTrek API (query data from API database)
- ASCOM (To bring vendor-independent and language-independent plug-and play compatibility between MoonTrek Telescope Application and telescope)

3.4 **Communications Interfaces**

See the Flow diagram above
4. Requirements Specification

4.1 Functional Requirements

4.1-1 The application shall query and display different layers of data associate of the MoonTrek API and return specific details.

4.1-2 The application should limit user input.

4.1-3 The application shall be able to overlay layers and change opacity for visualization convenience.

4.1-4 The application should allow user search for specific data set

4.1-5 The application should be able to allow user to change the scale of the returning data layer

4.2 External Interface Requirements

4.2-1 The interface will show the lists of the layers and users by clicking at the layers to use them. The layers will overlay the moon and return specific details.

4.3 Logical Database Requirements

MoonTrek database contains many different moon layers, For example, “Surface Temperature of the moon”, “Grain Density” or “Gravity Degree Strength L1200”, etc. Moreover, MoonTrek database will provide WMTS endpoints, by using those layers just need to connect to the endpoint.

4.4 Design Constraints

Limited Vue Experience-Developing a Web-based application will be a first for some members of the group. Assuring that everyone is on the same page and understands what is going on will take a significant portion of the deadline time.

Familiarity with Specific Data Types-When brainstorming about certain aspects of our application, we thought about Data Structures that we knew about conceptually, and knew would get the job done best, but had never used in actual practice.
5. Other Nonfunctional Requirements

5.1 Performance Requirements
There are no additional performance requirements at this time.

5.2 Safety Requirements
There are no safety requirements at this time.

5.3 Security Requirements
There are no security requirements at this time.

5.4 Software Quality Attributes
TBD

5.5 Business Rules
There are none at this time.
6. Other Requirements

There are no additional requirements at this time.