Software Subsystem Test Design For RockSat-X Payload - Hephaestus

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Abstract

The Oregon State University (OSU) RockSat-X payload Hephaestus is a proof of concept for the construction of physical structures in space using a robotic arm. This document shall describe the experiments that will be used to test three of the functional requirements of the Hephaestus payload described in previous documents and reviewed briefly in this document.

The purpose of these experiements is to discover bugs in the software prior to system integration into the RockSat-X rocket. The experiments shall be performed throughout the implementation and integration phases of the payload development. The experiments shall constitute one third of the module tests and shall cover the requirements for target generation, arm movement, and arm position tracking.

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1 Introduction

This document is an initial design of the experiments that will be conducted in order the test the modules of the Hephaestus payload. The purpose of performing these tests is to discover bugs in the Software Subsystem prior to integration of the software with the hardware and electrical subsystems in the Hephaestus payload and to the integration of the payload with the 2017 RockSat-X rocket.

These experiments will constitute the module tests to be performed throughout the implementation and integration phases of the Hephaestus project. Data shall be collected from these experiements, which will provide a guide for fixing bugs and insuring that the payload operates within our desired parameters.

System and integration tests shall be performed to supplement these unit tests. In addition to these unit tests, unit tests shall be developed and performed for the six other functional requirements defined in the Technical Review Document.

1.1 Document Overview

This document includes an overview of the three functional requirements that will be tested. These requirements include target generation, arm movements, and arm position tracking. The requirements were defined in the Technical Review and Requirements Overview documents. They will be covered again in this document. Additionally, this document will describe the experiments that will be performed as tests. These descriptions will include the experiment's purpose, pre-conditions, post-conditions, tools required, method, and data. Finally, this document will include the inputs that will be used as test cases for the experiments.

2 Requirements Review

2.1 Target Generation

2.1.1 Description

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2.2 Arm Position Tracking

2.2.1 Description

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2.3 Arm Movement

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3.1.1 Purpose

3.1.2 Pre-Conditions

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3.1.5 Method

3.1.6 Data

3.2 Experiment 2: Deterioration of Position Accuracy Over Course of Flight

3.2.1 Purpose

3.2.2 Pre-Conditions

3.2.3 Post-Conditions

3.2.4 Tools

3.2.5 Method

3.2.6 Data

3.3 Experiment 3: Validation of Path Efficiency

3.3.1 Purpose