

Final Report For RockSat-X Payload - Hephaestus

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Abstract

The Oregon State University (OSU) RockSat-X team shall be named Hephaestus. The progress of our project shall be outlined in this document. The mission requires that the payload, an autonomous robotic arm, perform a series of motions to locate predetermined targets. The hardware shall be capable of performing the motions to reach the targets. The software shall determine the targets and send the commands to the hardware to execute the motion. The combination of the hardware controlled by the software shall demonstrate Hephaestus's ability to construct small parts on orbit.



Hephaestus Mission Logo

Approved By - Dr. Nancy Squires _____ Date _____

Approved By - Helena Bales _____ Date _____

Approved By - Amber Horvath _____ Date _____

Approved By - Michael Humphrey _____ Date _____

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1 Introduction

The Hephaestus Payload is a rocketry payload that will fly onboard the 2016-2017 RockSat-X rocket. The rocket will be launched from Wallops Flight Facility filled with student-made payloads. The Hephaestus payload will be made up of a deployable arm and a video camera. The arm will perform a series of motions that will be recorded by the video camera and sensors. Following the experiment, the arm will retract back into the rocket. The Hephaestus mission will be Oregon State University's first space mission and will prove not only our ability to develop a space-ready payload, but also the viability of construction in space using a robotic arm.

1.1 Document Overview

2 Project Overview

2.1 Project Purpose

The Oregon State University RockSat-X team will demonstrate that an autonomous robotic arm can locate predetermined targets around the payload under microgravity conditions by using precise movements. The technical actions performed by this demonstration will illustrate a proof of concept for creating assemblies, autonomous repairs, and performing experiments in space.

2.2 Mission Success Criteria

2.2.1 Minimum Mission Success Criteria

2.2.2 Maximum Mission Success Criteria

2.3 Concept of Operations

2.4 Programmatic

2.4.1 Organizational Chart

2.4.2 Sponsors

3 Requirements Document

3.1 Original Requirements Document

3.2 Changes Since Original Requirements Document

3.3 Final Gantt Chart

4 Design Document

4.1 Original Design Document

4.2 Changes Since Original Design Document

5 Technical Review Document

5.1 Original Technical Review Document

5.2 Changes Since Original Technical Review Document

6 Weekly Blog Posts

NOTE: Follow the format and put your posts for fall week 4 in Fall 2016/Week 4/Your-Name for example. Change the weeks to have the right ranges. Delete this note.

6.1 Fall 2016

6.1.1 Week 4

6.1.1.1 Helena Bales

6.1.1.2 Amber Horvath

6.1.1.3 Michael Humphrey

6.1.2 Week 5

6.1.2.1 Helena Bales

6.1.2.2 Amber Horvath

6.1.2.3 Michael Humphrey

6.1.3 Week 6

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6.1.3.2 Amber Horvath

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6.1.5 Week 8

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6.1.6 Week 9

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6.1.6.2 Amber Horvath

6.1.6.3 Michael Humphrey

6.1.7 Week 10

6.1.7.1 Helena Bales

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6.3.1.2 Amber Horvath

6.3.1.3 Michael Humphrey

6.3.2 Week 2

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6.3.2.2 Amber Horvath

6.3.2.3 Michael Humphrey

6.3.3 Week 3

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6.3.3.2 Amber Horvath

6.3.3.3 Michael Humphrey

6.3.4 Week 4

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6.3.4.2 Amber Horvath

6.3.4.3 Michael Humphrey

6.3.5 Week 5

6.3.5.1 Helena Bales

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6.3.5.3 Michael Humphrey

6.3.6 Week 6

6.3.6.1 Helena Bales

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6.3.6.3 Michael Humphrey

6.3.7 Week 7

6.3.7.1 Helena Bales

6.3.7.2 Amber Horvath

6.3.7.3 Michael Humphrey

6.3.8 Week 8

6.3.8.1 Helena Bales

9.1.2 Books and Print Materials

- 1.

9.1.3 Faculty and Personel

- 1.

10 What We Learned

10.1 Helena Bales

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11 Appendix 1: Essential Code

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11.1.1 CSspace_Mapping.ino

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