# Mechatronics 3700 Death Star Tracker: Technical Manual

Team Dirac

November 3, 2014

#### Abstract

This document describes how each of the modules (including both software and hardware) work, and how to use them.

# Part I Technical Documentation

#### Introduction

#### 1.1 Document Identification

This document describes the design and development of the "Yavin IV Orbital Tracking System". This document and design brief is prepared by Dirac Defence Limited for assessment in MTRX3700, year 2014. The was approved by lieutenants Reid and Bell, and small scale testing initiated.

#### 1.2 System Overview

This document outlines a proposed and prototyped design in response to the Rebel Alliance Commander Rye's request for a defence system to combat the imminent threat posed by The Empire, and their Death Star weapons platform. This system is to effectively, efficiently and easily track a space-based planetary annihilator, approximately the size of a small moon.

The system described in this paper is the small scale prototype for stage one of implementation and testing prior to contract approval and large scale deployment.

#### 1.3 Document Overview

#### 1.4 Reference Documents

#### 1.4.1 Acronyms and Abbreviations

## System Description

•	-4	T .		1			
<b>2</b> .	1	Int	ro	dı	110	11	n
<i>-</i>	1		$\perp$ $\cup$	u	$\mathbf{u}$	UL	$\mathbf{O}\mathbf{D}$

- 2.2 Operational Scenarios
- 2.3 System Requirements
- 2.4 Module Design
- 2.5 Module Requirements: Module X
- 2.5.1 Functional Requirements

Inputs

Processes

Outputs

**Timing** 

Failure Modes

2.5.2 Non-Functional (Quality of Service) Requirements

Performance

Interfaces

**Design Constraints** 

- 2.6 Conceptual Design: Module X
- 2.6.1 Assumptions Made
- 2.6.2 Constraints on Module X Performance

# User Interface Design

- 3.1 Classes of User
- 3.2 Interface Design: User Class Y
- 3.2.1 User Inputs and Outputs
- 3.2.2 Input Validation and Error Trapping

## Hardware Design

- 4.1 Scope of X System Hardware
- 4.2 Hardware Design
- 4.2.1 Power Supply
- 4.2.2 Computer Design
- 4.2.3 Sensor Hardware
- 4.2.4 Actuator Hardware
- 4.2.5 Operator Input Hardware
- 4.2.6 Operator Output Hardware
- 4.2.7 Hardware Quality Assurance
- 4.3 Hardware Validation
- 4.4 Hardware Calibration Procedures
- 4.5 Hardware Maintenance and Adjustment

## Software Design

- 5.1 Software Design Process
- 5.1.1 Software Development Environment
- 5.1.2 Software Implementation Stages and Test Plans
- 5.2 Software Quality Assurance
- 5.3 Software Design Description
- 5.3.1 Architecture
- 5.3.2 Software Interface
- **5.3.3** Software Components
- 5.4 Preconditions for Software
- 5.4.1 Preconditions for System Startup
- 5.4.2 Preconditions for System Shutdown

# System Performance

- 6.1 Performance Testing
- 6.2 State of the System as Delivered
- 6.3 Future Improvements

Safety Implications

## Conclusions

# Part II Appendicies

# **Supporting Calculations**

# DOxygen Documentation

Code Listing