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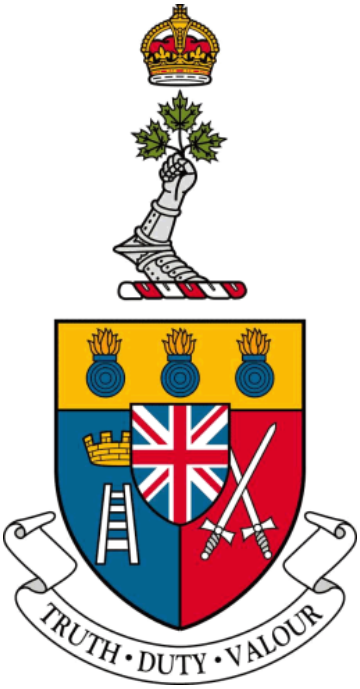

DID-03 - Statement of Requirements

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Contents

Part 1

Introduction

1.1 Document Purpose

The purpose of this document is to outline the project requirements. That is, what the project is to accomplish once all of the requirements outlined in this document have been completed and to what standard they shall be considered done. The benefits of meeting these requirements and solving this problem will be. This document will then identify the constraints that these requirements impose on this project will be.

1.2 Background

Both in the consumer and professional sectors the use of autonomous aerial vehicles is growing quickly.

Background is going to be a long section and maybe we should have subsections

1.3 Aim

1.4 Scope

Part 2

Requirement Definition Activities

2.1 Information

2.1.1 Meetings with Dr. Givigi

2.2 How References Were Used

2.2.1 First Reference

2.2.2 Another Reference

Part 3

Product Requirements

3.1 Functional Requirements (FR)

3.1.1 FR-01: State Machine

Create a state machine for both land and air robots that allows for a movement decision to be made based on an input from the robot.

3.1.2 FR-02: Movement Toward Target

Be able to control the robot using ROS. In particular, given that our task is to move toward a target the robot must be able to do so in a manner that is controlled. (Don't think talking about ROS goes here, I would say "The air and land robots will be able to move toward a target under control", maybe throw a speed in there?)

3.1.3 FR-03: Trajectory Library

Create a trajectory library that contains all possible allowed movements for both the land and air robots.

3.1.4 FR-04: Trajectory Library Updating State Machine

The Trajectory Library will update the state machine when a movement was made. The state machine will then account for this displacement and later correct the movement to keep the robot on the path to the target.

3.1.5 FR-05: Identification of Target

The robot shall recognize optically a goal and be able to give information on the targets location relative to the robot.

3.1.6 FR-06: Avoiding Obstacle

The robot shall be able to make a deviation from its current movement pattern to avoid an obstacle in its path and then return to this pattern.

3.1.7 FR-07: Identification of Obstacle

The robot shall recognize optically obstacles in its environment and identify where they are relative to itself.

3.1.8 FR-is 08: Multiple Obstacles

The robot shall be able identify multiple obstacles and determine which is the most dangerous and avoid it accordingly.

3.2 Performance Requirements (PR)

3.2.1 PR-01: Target Identification

The robot will be able to identify and locate an OpenCV SYMBOL within a 15m radius. See FR-05.

3.2.2 PR-02: State Machine Corrections

The state machine will be able to correct for movements made and put the robot back on its original path without deviating more than 15cm??. See FR-04.

3.3 Interface Requirements (IR)

3.3.1 IR-01: Turtlebot Communication through ROS

Communication to the Turtlebot will be done through Robot Operating System through USB.

3.3.2 IR-02: Air Robot Communication

The air robot will be communicating through Robot Operating System over wireless network.

3.4 Simulation Requirements (SimR)

3.4.1 SimR-01: Air Robot

The final product will be an air robot, but for simulation we will be using a TurtleBot to create and test our systems.

3.5 Implementation Requirements (ImpR)

3.5.1 ImpR-01: Turtlebot Robot Operating System

The simplest obstacle avoidance algorithm must be implemented on a Turtlebot using the Robot Operating System.

3.6 Schedule Restrictions (SR)

3.6.1 SchR-01: First Prototype

The first functional prototype shall be available for Beta testing no later than November 1st (Military standard is 01 Nov 18, but thats soon...)

Part 4

Risk Assessment

4.1 Risks

4.2 Likelihood

4.3 Impact

Part 5

Conclusion

5.1 Summary

5.2 Link to Preliminary Design Specification

References