Requirements Document

Project: LIBERTY
Task: *Navigation*

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McGill

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2. CAPABILITIES

2.1 PURPOSE

Design and implement an autonomous navigation system that is able to meet the following requirements:

1. Drive at a given speed between two coordinates in a given reference system for the minimal distance. ***[REQ - NAV-2.1.1]***
2. Implement a conditional block to drive to the starting point of the transit options ***[REQ - NAV-2.1.2].***
3. Indicate the status of the navigation system as on or off.***[REQ - NAV-2.1.3].***
4. Switch to pause or resume depends on the inception or completion of other subsystems. ***[REQ - NAV-2.1.4].***
5. Return to initial position and stop its execution ***[REQ - NAV-2.1.5].***

2.2 SCOPE

For the navigation system to perform as designed, the ranges of the condition it operates in are as following:

1. The reference system and way point coordinates must be given ***[REQ - NAV-2.2.1].***
2. The operating speed must be pre-defined ***[REQ - NAV-2.2.2].***
3. The current location must be known ***[REQ - NAV-2.2.3].***
4. A parameter to determine the method of transit must be given at the inception. ***[REQ - NAV-2.2.4].***
5. The system must be notified when other sub-system is about to initiate ***[REQ - NAV-2.2.5].***

2.3 CONSTRAINTS

There are certain constraints in the process of designing and implements the navigation system regarding hardware, software and engineering resources.

REQ - NAV-2.3.1: As per the **Project Description (v 1.2F)** "The water path has constant width."

Hardware: See ***CON - GEN; 3*** for Hardware constraints

Software: See ***CON - GEN; 4*** for Software constraints.

Resources: See ***CON - GEN; 6*** for Budget constraints.

See ***REQ - GEN; 2.2.1*** for the dimensions of the playing field.

2.4 USER FUNCTION

The system is autonomous, hence the interaction with the user is not necessary and moreover it is not permitted. See ***REQ - GEN; 2.4.1.***

2.5 PERFORMANCE

The system shall have following performance:

- Navigate between 2 points within the reasonable error of ±5 mm. ***[REQ - NAV-2.5.1].***
- Be able to pause and resume ***[REQ - NAV-2.5.2].***
- Show the status of the system ***[REQ - NAV-2.5.3].***

3. COMPATIBILITY

3.1 COMPONENT RE-USED

A series of software components are reused to minimize the budgets. The use of these components will not bring additional cost to the project. They are shown below:

1. *Odometer*, *navigation* programs are reused for the system. They are developed internally during the lab phrase by Bill Zhang
2. *OdometerDisplay* program that show the positioning information is reused. It is provided and developed by the teaching assistants at Faculty of Engineering, McGill University

3.2 COMPATIBILITY WITH THIRD PARTY PRODUCTS

According to the **Project Description (v 1.2F)** provided by the client. There are no third party products is required for this system regarding both software and hardware

4. GLOSSARY OF TERMS

1. Odometer refers to a program to compute and update the value of x, y coordinates and the heading of the robot
2. Navigation program refers to a program that drives between 2 points
3. Odometer Display refers to a program that visualize the positioning information of the robot