Requirements Document

Project: Liberty
Task: General description of requirements

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1.0 TABLE OF CONTENTS

2.0 CAPABILITIES

2.1 PURPOSE

The purpose of this project is to create an autonomous vehicle capable of playing one-on-one game of Capture the Flag. The vehicle shall be capable of localization (see ***REQ - LOC),*** navigation (see ***REQ - NAV***), traversing both on the shallow river and using a zipline (see ***REQ - ZIP***), finding a flag and capturing it (see ***REQ - CPT***), and returning to the starting position.

2.2 SCOPE

REQ - GEN - 2.2.1: The playing field of the game has a surface area of 12 by 12 tiles with one tile being a square of dimensions 30.48 x 30.48 centimeters as depicted in figure 1 (see *5.0 References*). Each line has a width of ± 2 mm.

The system shall :

REQ - GEN - 2.2.2: capture the flag and return to its initial corner within at most 5 minutes.

REQ - GEN - 2.2.3: withstand 4 complete rounds playing the game.

2.3 CONSTRAINTS

See ***CON - GEN; 3.0.1 & 3.0.2***

See ***REQ - GEN; 2.2.1; 2.2.2 & 2.4.1***

2.4 USER FUNCTIONS

REQ - GEN - 2.4.1: The system shall operate autonomously after the first initial input from the user. The user shall not interact with the system at any other time during the game.

2.5 OPERATING ENVIRONMENT

REQ - GEN - 2.5.1: The zip line consists of a metal cylinder 48 inches long bent on both ends to form a "N" shape (See figure 1 in references in document ***REQ - ZIP; segment 5.0***). The beginning and end platforms of the zip line structure have black lines drawn on them for localization. The supporting poles to the zip line.

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

2.6 PERFORMANCE

See 2.6 in ***REQ - CPT, REQ - ZIP, REQ - LOC, REQ - NAV,*** and ***REQ - WIF.***

3.0 COMPATIBILITY

3.1 COMPONENT RE-USE

The implementation of software used in labs 1 through 4 maybe be reused in this project, see details in 3.1 of documents: ***REQ - CPT, REQ - ZIP, REQ - LOC, REQ - NAV,*** and ***REQ - WIF.***
However regarding the hardware implementation a new design is necessary especially concerning the zipline traversal (see ***REQ - ZIP).***

3.2 COMPATIBILITY WITH THIRD PARTY PRODUCTS

The system is compatible only with Lego products. Any additional created part must fit the Lego standard for construction. Regarding software, the Lejos environment provides a possible interface for other third party products for data analysis and debugging, however this will not be strictly required.

4.0 GLOSSARY OF TERMS

Game: The 5 minutes duration starting from the initial input from the user until the end of the clock. During this period each vehicle must perform all the required tasks.

5.0 REFERENCES

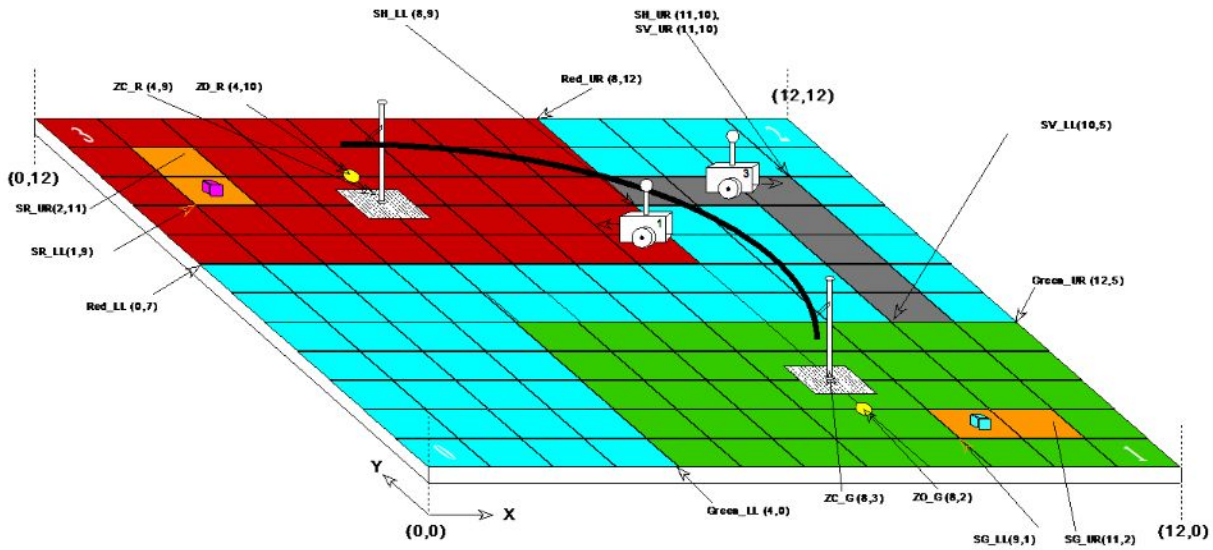

Figure 1: Example of the 12 by 12 playing field layout. Zones and zip line placement are given at the start of the competition.