Requirements

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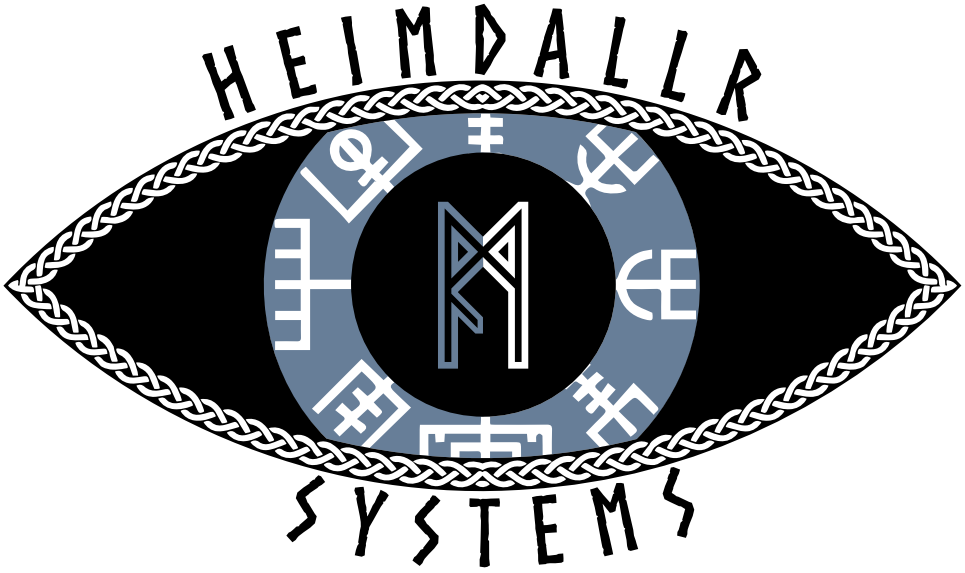

ME 407
Robotics Preliminary Design
Embry-Riddle Aeronautical University

EMBRY-RIDDLE
Aeronautical University

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1.0 Introduction

Modern security and surveillance and have provided protection of people and property. Police and military are required to search and assault both known and unknown locations, risking the lives of police and military personnel. Project Heimdallr was conceived to prevent the unnecessary loss of life that exploration and surveillance of hazardous environments can cause. Project Heimdallr will be a mobile system, capable of being operated remotely or functioning autonomously in both indoor and prepared outdoor terrain.

2.0 Statements of Fact

These statements are hard-set facts and functions that the system must adhere to, regardless of design decisions.

2.1 The system will be mobile, able to move and operate on its own.

This is intended to be a statement of fact because the system should be more portable than a network of static security cameras. The system should be able to function in spaces that could be hostile and would be unable to be wired with cameras.

3.0 Design Requirements

The list of goals that the system will need to, or is desired to, problems outlined in the problem statement. The purpose of these requirements is to define what the system shall do to solve these problems in a reasonable and desirable manner.

3.1 The system shall be able to communicate (i.e. send and receive data) with a remote access terminal.

3.2 The system shall be able to report its current location when requested.

3.3 The system shall report changes in its known environment.

Changes in the system's known environment are defined as previously detected objects changing position, appearing, or disappearing.

3.4 The System shall be capable of operating autonomously.

An autonomous system is a system that can operate solely on internal or self-control but is not limited to external input such as input data given to sensors and without requiring continuous direction from a human operator.

3.4.1 The system shall navigate to predetermined locations in its environment.

This will allow for the system to be given a general operating path to patrol. With this patrol pathway, the system can provide information, such as a video feed of areas located in security camera blind spots, to an operator.

3.5 The system shall be capable of recording a survey of its surroundings.

This will allow the system to scout unknown locations and provide information about these locations to an operator.

3.6 The system shall be capable of allowing a human operator to assume manual control of the system.

3.7 The system shall be able to avoid obstacles.

An obstacle is defined as an object that would prevent the motion of the system through the object.

3.8 The system shall be able to operate inside buildings.

3.9 The system should be able to operate on prepared surfaces.

The outdoor environment where the system will be designed to operate is the area immediately around Embry-Riddle in Prescott, Arizona. The following requirements clarify the exact types of outdoor terrain the system will operate on.

3.9.1 The system shall be able to traverse asphalt roads.

3.9.2 The system shall be able to traverse lawn grass.

3.9.3 The system shall be able to traverse indoor flooring.

Indoor flooring is defined by common indoor surfacing materials, such as carpet, concrete, linoleum, tile, hardwood.

3.10 The system shall have a self-contained electrical power supply.

The intent of this requirement is to ensure the system operates using an on-board electrical power supply, rather than being connected to a stationary generator, wall-socket, overhead catenary, 3rd rail, or other fixed energy source.

4.0 Design Goals

These design statements specify optional, but desired, traits for the system to possess.

4.1 The system should be able to move up and down stairs.

4.2 The system should be able to open and close doors.