

# Mapping a Physical Environment

## CM0343 - Project Plan

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### Project Aims & Objectives

- \* The initial stage of the project will involve background research into both the hardware required for the robot (methods of locomotion and remote control of the robot), methods of keeping track of the robots location and position in a physical environment and finally methods of building up a physical map from the data collected. This research will be the primary focus of the interim report.
- \* The second stage of the project will be assembly of the robot. From the research and information accumulated in the first stage, the appropriate hardware will be purchased and assembled. This stage will also form part of the interim report as well as part of the final report.
- \* The thrid stage of the project will be the implementation of the software and control systems. The software will need to be able to take data from the robot and either save it for later analysis (offline) or construct a map as the system runs (online). This will depend largely on whether the robot has onboard sensors to detect obstacles in its path, aside from the primary camera used to collect the data for constructing the map. If the robot does have such sensors then an offline solution should suffice. However if no such sensors are provided, the robot will need to be able to use the data it collects to avoid obstacles, in which case an online solution will be required. In this event the software will need to run in real time and be sufficiently fast enough to be able prevent the robot from crashing in to obstacles.
- \* The fourth stage of the project will be in actually collecting data and building the map. This stage will act as a means of a large scale test of the system. This stage should run in unison with the third stage so that changes to the software can be made without too many concerns over time constraints and deadlines.

## Interim Report

The Interim Report will outline all of the research and information collected during the background research and how decisions were made on what techniques and tools to use. Using this information, initial design ideas will be proposed along with a final design idea which will form the basis of the robot to be constructed. These designs will comprise of a mixture of schematics.

## Final Report

The Final Report will highlight any subsequent research found after submission of the Interim Report and how these additional items of information effected the development of the robot. The report will then go on to discuss the construction of the robot, including potential test scenarios (as found from the background research), outlining the requirements for the software systems, implementation of the robots onboard software, the control systems on the computer that will be used to collect data and issue commands to the robot (such as move forwards, turn right, etc). The report will also include test results and an outline of the data collected, before progressing to evaluate and discuss future work for the project that could be potentially undertaken.

## Time Plan

The following tasks correlate to the above Aims & Objectives.

- 1: Background Research  
*Semester 1: Weeks 2 - 5*
- 2: Design & Production of Robot Hardware  
*Semester 1: Weeks 3 - 7*
- 3: Interim Report  
*Semester 1: 2 - 11*
- 4: Implementation of Robot Software & Control Systems  
*Semester 2: Weeks 1 - 8*
- 5: Testing & Data Collection  
*Semester 2: Weeks 2 - 9*
- 6: Final Report  
*Semester 2: 1 - 11*