

Helpful Robot Proposal Lab

16-311: Introduction to Robotics

Contents

Learning Objectives	1
1 Problem Statement	2
2 Required elements	2
2.1 Introduction [5 points]	2
2.2 Requirements and Constraints [10 points]	2
2.3 Overall Design Depiction [10 points]	2
2.4 Subsystems [10 points]	2
2.5 Trade Study 1 [15 points]	3
2.6 Trade Study 2 [15 points]	3
2.7 User Interface [5 points]	3
2.8 Implementation [30 points]	3
What To Submit	3

Learning Objectives

1. Combine concepts from the semester of 16-311.

1 Problem Statement

Propose a robot that could help in a pandemic and implement one aspect of it.

This is an individual lab unless you would like to collaborate on the overall robot idea. Each group member must write their own report and do their own implementation.

As technology has improved, robots have been developed for a wide range of applications. For this assignment, you are tasked with proposing a robot that could help in a pandemic. You choose how exactly the robot helps. It could be in a hospital, completing every day tasks, improving mental well-being, etc. For the purpose of this assignment, a physical robot is requested.

You will generate a report that explains your robot and its subsystems and includes trade studies for key components.

2 Required elements

These sections can be in any order.

2.1 Introduction [5 points]

Explain the problem that you are targeting and your proposed solution.

2.2 Requirements and Constraints [10 points]

List the requirements and constraints of your robot. Be specific.

2.3 Overall Design Depiction [10 points]

Draw a model of your robot and point out key features.

2.4 Subsystems [10 points]

Decide on some division of your into subsystems. Explain the requirements/constraints of each subsystem. These should be based on the overall requirements/constraints you came up with and should be specific enough to inform your trade studies.

2.5 Trade Study 1 [15 points]

Choose some aspect of your robot (for example the central computer, a motor, a communication aspect) and present at least 2 different parts or protocols as options. Be specific about each option (for example include links or images). Explain which one you would choose and why.

2.6 Trade Study 2 [15 points]

Same requirements as above for a different aspect of your robot.

2.7 User Interface [5 points]

Explain how the operator(s) and end user(s) will interact with your robot. Are there any risks that your robot might hurt someone or something? How will you mitigate this risks? How will your robot default in a failure state?

2.8 Implementation [30 points]

Implement one aspect of your robot. You could construct a mechanism, code up some functionality, create a specific circuit diagram, model the entire robot with cardboard, etc. Validate this functionality and explain that process in your writeup. How did you verify that this portion met your requirement(s)?

What To Submit

Submissions are due on Gradescope by the date specified in the Syllabus.

1. Compile your answers and images into one .pdf and submit on Gradescope.