

ROB 310 Term Project Proposal Winter 2024

WORK IN PROGRESS THRU 3/20/2024

Team name:

Teammate 1: Zijie Chen (chenzj)

Teammate 2: Yicheng (Frederick) Jiang (valeska)

Teammate 3: Jiamu (Danny) Liu (dliujm)

1. Propose Project Concept

Describe your project in detail. What is the intended function of your project / what is it supposed to do? How will your design accomplish that intended function? What prerequisite knowledge will you need to implement your project?

Proposal Components:

1. 2d motion direction control (remote control the mbot with wireless communication chips)
2. Quasi-precise control
3. Intention prediction on 2d motions (extension)

This project aims to develop an innovative control system for the mBot, utilizing Electromyography (EMG) signals for 2D motion direction control. Incorporating wireless communication technology, the project seeks to achieve quasi-precise remote control over the robot's movements, with an extension feature of predicting user intentions for smoother, more intuitive operation.

Prerequisite knowledge:

1. EMG schematics
2. PCB design
3. PID
4. Signal filtering
5. Dynamics
6. Electromechanical system
7. Deep learning

After determining how your design will accomplish the intended use case, consider the resources that you'll need to fabricate this product. Will you be able to buy all your parts, or will they need to be manufactured in house? You'll need to factor in the lead-time for parts or materials you order online.

2. Project budget

For this project, each group will be allocated \$100 to spend. You are limited to the following suppliers (no McMaster Carr):

1. [Amazon](#)
2. [Mouser](#)
3. [Digikey](#)
4. [Pololu](#)
5. [Grainger](#)

You must compile and submit a [Bill of Materials \(BOM\)](#) which contains all of the parts and materials you plan to purchase. We will be using this BOM to order your parts for you. **The BOM is due by April 10, 2024.**

3. Establish Project Timeline

See Table 3.1 for a rough outline of the project timeline. Please fill in the sections labeled “**FILL THIS OUT**” before submitting this proposal document. You should specify the individual tasks that you will complete that week to ensure that your project is completed on time.

Table 3.1. Term Project Timeline.

Week	Objectives	Deliverables
3/17-3/23	Pick teams, pick projects, work on project proposal	Finalize Project Proposal
3/24-3/30	Finish project proposal and start design	Finalize details for the proposal; possible design concepts; materials needed for EMG
3/31-4/6	Continue design	EMG schematics, PCB design
4/7-4/13	Finish design, order parts no later than this week , start fabrication	EMG signal processing
4/14-4/20	Finish fabrication, start testing	Control the system with processed EMG signal
4/21-4/23	Finish testing, present project	Testing overall system & presentation

4. Division of Labor

Specify which teammate will be in charge of finishing each respective deliverable outlined in Table 3.1. Use Table 4.1 to assign tasks to teammates. Feel free to change the division of labor throughout the project, this is just intended to get you in a “project management” mindset.

Table 4.1. Division of Labor Table.

Deliverable	Who is completing it	When must it be done by?
EMG signal processing	Zijie Chen	4/13
PCB design	Yicheng Jiang	4/13
System control with EMG	Jiamu Liu	4/20
Testing	Zijie Chen & Yicheng Jiang & Jiamu Liu	4/23

5. Project Ideas

Here are some ideas for projects that might inspire you. Feel free to use them directly, or modify them into a project that is more interesting to you.

1. Control a robot manipulator with a muscle flexing EEG/EKG/EMG
2. Optical flow sensor for MBot - compare to odometry from encoder and IMU
3. Range finder for MBot - compare to odometry from encoder and IMU
4. Force-controlled robot gripper using load cells and force feedback - can you pick up a marshmallow without deforming it?
5. Design a thermistor based contact sensor
6. Develop an optical data communication system for the MBot
7. Acoustic communication/sensing
8. Design a BLDC motor driver
9. Flow.io integrated into a sensing system
10. Soft sensors or soft robotics