Seneca College - School of Electronics & Mechanical Engineering Technology (SEMET)

ETD555 – Engineering Technology & Design Team Design Project

Project Proposal

Submitted to:

Rakesh Kantaria

ETD555NBBL

By:

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Project Title:

Development of a Smart Motor Control System Using LabJack UE9

1. Problem Statement

What is the Problem to be Solved?

For automation and robotics to be efficient, precise, and safe, DC motors must be precisely controlled. Traditional motor control methods, however, are sometimes too costly and complex for smaller applications. A cost-effective and user-friendly motor control system with speed and direction adjustments and crucial safety features like a reset button and emergency stop is required. For many applications, the system should be easy to use, secure delicate components, and function dependably for both simple and complex operations.

1. Project Outline

1.1. Summary

This project will develop a motor control system that uses LabJack UE9 to connect to a PC to operate a +12V DC motor. Anaconda Python 3.6 will be used to program the system, which will let users digitally change direction and pace. An emergency stop button, and a reset switch are examples of safety measures. The separation of

low-power and high-power circuits will be handled by optical isolation to safeguard components.

1.2. Scope Statement

The scope of the project includes:

1. **Hardware Design**:
    - Create a motor driver circuit that works with the LabJack UE9.
    - Include optical isolation to safeguard the LabJack equipment.
    - Install safety measures, such as reset, and emergency stop buttons.
2. **Software Development:**
    - Program the system using Python for digital/analog I/O operations.
    - Configure LabJack UE9 to handle motor control tasks.
3. **Testing & Demonstration:**
    - Conduct thorough testing to confirm system functionality.
    - Perform a live demonstration in Lab A4070.
4. **Documentation:**

- Provide a Bill of Materials (BOM), PCB layouts, and complete schematics.
- Perform performance analysis based on test results and record the findings.
- Create a final project report that addresses design choices, difficulties, enhancements, and suggestions for the future.

2. Team Responsibilities

Task	Assigned Member
• Do some research on LabJack UE9 programming. • Create Python code to regulate the motor's direction and speed. • Verify that the LabJack and PC are communicating with one other.	**Aavash Gurung**
• Design the circuit for the motor driver. • Select the appropriate parts for motor control, such as MOSFETs. • Work on incorporating optical isolation and other safety measures.	**Susmita Shrestha**
• Design the motor control system's PCB layout. • Check that the circuit layout is accurate and ready for assembly. • Assist with the construction and testing of the PCB.	**Aayush Shrestha**
• Install safety measures, such as reset, and emergency stop buttons. • Conduct debugging and system testing. • Write the completed report, containing the results, instructions, and schematics. • Get the final presentation ready.	**Entire Team**

3. Meeting Minutes

First Meeting:

Date: February 12, 2025

Time: 12 PM – 1:30 PM

Location: Computer Commons (C-Block)

Attendees:

Aavash Gurung, Aayush Shrestha, Susmita Shrestha

Discussion:

- Reviewed the project's goals and deliverables.
- Discussed the limitations and technological needs.
- Assigned research duties to team members.
- Outlined the required elements and financial factors.
- Next stages for design, development, and testing were planned.

The next Meeting is Scheduled for February 19, 2025, at noon.