Rewired & ReARMed - Future Work

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Introduction

This document is meant for the next team who ends up with the robot. We wanted to be able to share our thoughts and concerns with the project in the future.

System Startup Notes

- For any test or demo code, position the **Theta1** arm slightly clockwise of the home sensor before startup. The **Theta2** arm should also be slightly clockwise of the home sensor; the robot will drift counterclockwise into the sensor during initialization.

Encoder and Sensor Wiring

- Encoders on **WD12A** are wired to pins 3, 1, and 5. Future teams may need to supply +12 V to pin 19 and GND to pins 2, 4, and 6 (to be verified).
- On **WD13A**, encoders are wired to pins 7, 9, and 11.
- For Theta1 and Z-axis gripper sensors, a temporary software pull hack was used; a proper pull resistor circuit is recommended.
- Stepper motor sensors (**R+ Area** and **Rhome**) on WD08B are currently non-functional; further troubleshooting is required.

Safety Recommendations

- Implement an **emergency shut-off switch** between TB1R and ground; TB1R to ground enables power to the manipulator.
- Improve initialization routines and safety logic in software.

Circuit Limitations and Recommendations

- Current op-amp circuit is limited to 5 V output. Avoid exceeding this due to unknown servo potentiometer settings.
- Recommend creating a proper PCB instead of continuing with prototype boards.

Wiring and Connectors

- Existing wiring with Deutsch connectors was reused. Spare Deutsch pins are provided for future wiring.
- If possible, design improved wiring harnesses and connectors.

Servo and Encoder Issues

- Encoders may be causing servo drift in Theta1 and Theta2 due to undervoltage (red servo light indicator).
- If encoder fixes do not stop red lights, investigate possible overcurrent, undercurrent, overvoltage, or undervoltage conditions.

Removed Legacy Hardware

- Removed MTCB, CPU, and FEC boards. The relay board can be removed, but TB1R is attached to it.

Future Software Goals

- Optical encoders should enable precise position control (e.g., Theta1 = 61, Theta2 = 120 should move directly to that position).
- Develop a touchscreen GUI tablet similar to the original (now obsolete) controller.

Priorities for Future Teams

Computer Engineering:

1. Get encoders working.
2. Get stepper limit sensors working.
3. Install emergency shut-off switch.
4. Improve circuit design and wiring.
5. Mount Arduino Opta units to DIN rail and robot.

Secondary:

- Troubleshoot servos if encoder fixes fail.

Computer Science and Software:

1. Develop GUI.
2. Assist CpE team with encoder position grid/matrix.

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