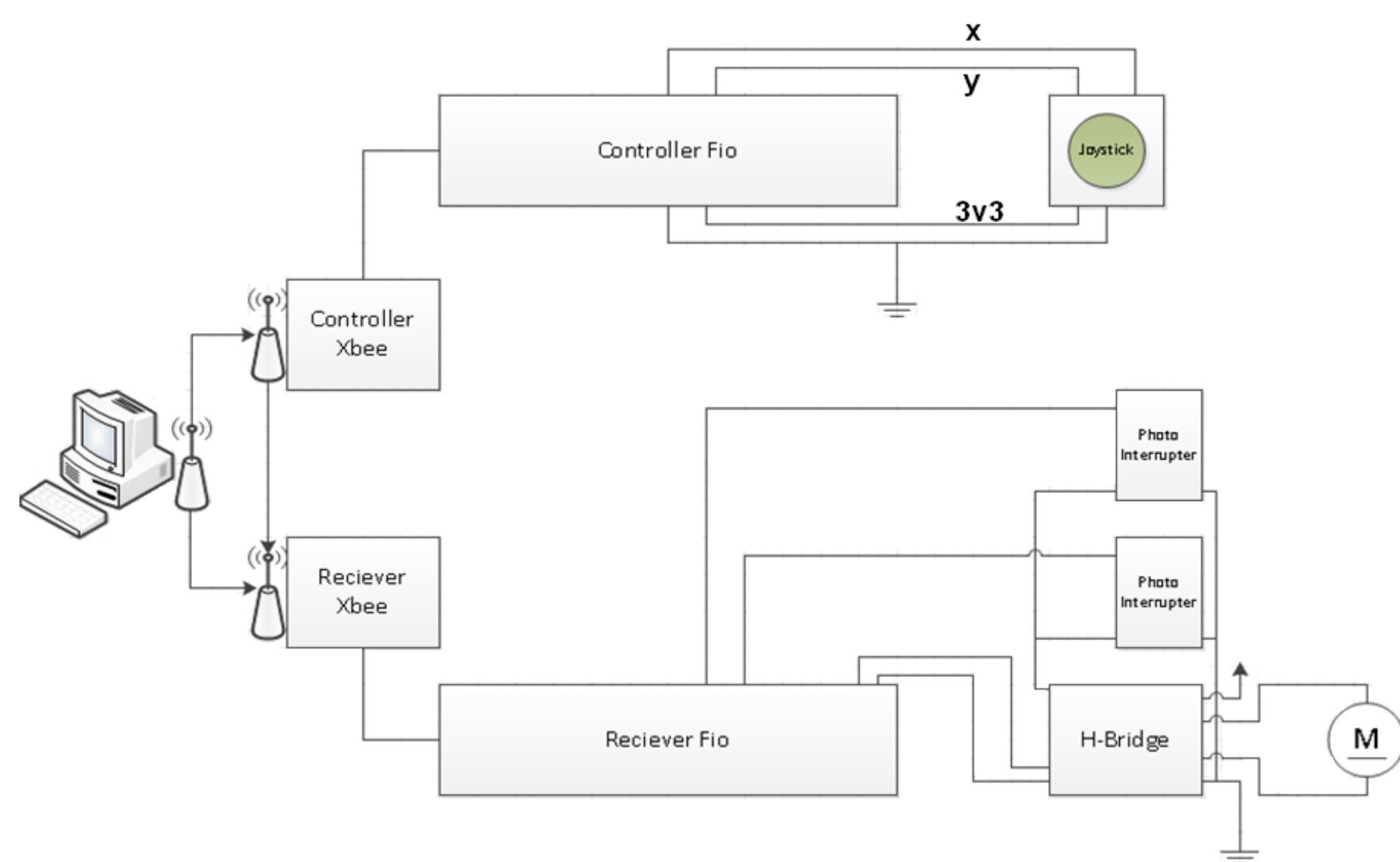


System Overview



Abstract

The goal of this project was to design a wall mounted robotic arm for a quadriplegic man named Doug, so that he can cook independently at home. This wall mounted unit will move over the kitchen workspace. The design team was responsible for creating a controller interface with which Doug could operate the arm.

Microcontroller

The Arduino Fio was selected to do the processing for both the controller and receiver. It features twelve general purpose digital input output pins, six of which are capable of generating pulse width modulated signals. It also has eight analog input pins, each with a ten bit analog to digital converter attached. It allows for very precise measurement of its environment via analog sensors. The combination of a built-in Xbee wireless radio socket and integrated Li-Polymer battery plug and charge circuit made it a perfectly cost effective solution.

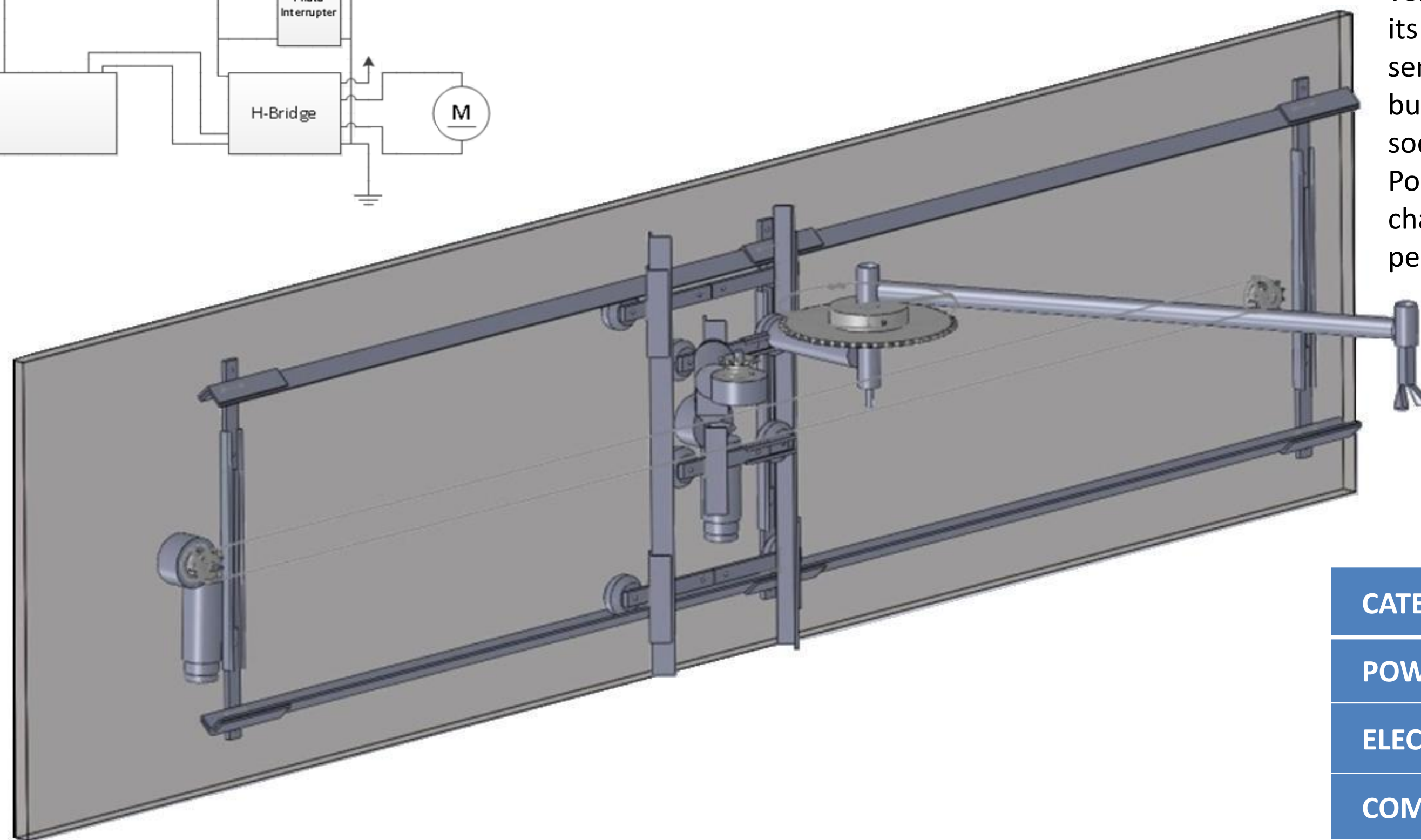
System Features

Mechanical Arm

- Lift and carry a heavy pot of water
- Designed for robustness and durability.
- Gripper and hooks for picking up kitchenware

Controller Interface

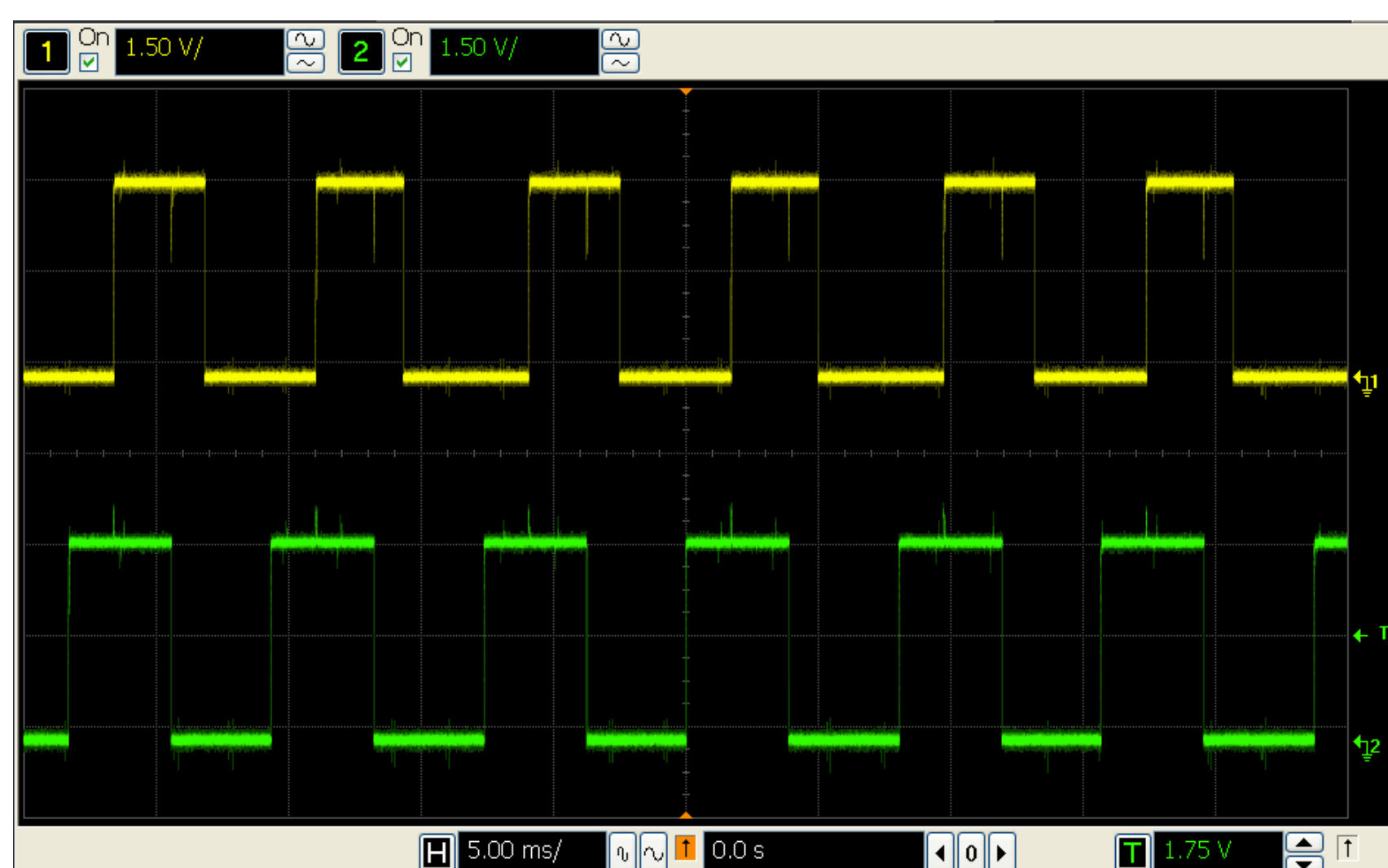
- Feedback system to sense position
- Variable Speed and within safe limits
- Three joystick design programmed for Cartesian movement of Robotic arm.



Budget

CATEGORY	COST
POWER	\$280.05
ELECTRONICS	\$201.35
COMPONENTS	\$110.86
TOTAL:	\$592.26

Motor Feedback Waveform



Input

Three analog joysticks provide the user input to the controller, which is detected by the microcontroller analog input pins. This data is translated into pulse width modulated signals to control the speed of the motors in the arm. Pairs of optical interrupter circuits are attached to digital input pins on the receiver providing feedback about the speed, position, and direction of each motor. The combination of these inputs allows the arm to manipulate its environment safely.



Back from left: Daniel Phan, Thomas Manner, Ali Alsatarwah, Ka Kei Yeung
Front: Doug