# Blue Arm Documentation

## Intro

A few years ago, CUP bought the blue arm (Lewan Soul 6dof arm). It has 6 degrees of freedom and it acts like the precise arm. It has 6 servos, a serial interface, and a connection to a wall outlet.

## Purpose

The precise arm designed by the MechE team is currently being redesigned, so we needed something to work with (and demo for Intel). The Intel Realsense camera takes a picture of an object. The Object detection team processes the data and plots a path to pick up that object. CS sends a target angle array to the Arduino (via Serial 1) in degrees. The Arduino takes this array as an input, converts the angles into something the Blue Arm will understand, and sends the updated commands to the blue arm (via Serial 2). The Blue Arm receives these commands and moves the servos.

## Two Modes Overview

We can run the blue arm in two modes: Arduino-only and Jetson-to-Arduino. The first mode is Jetson-to-Arduino. In this mode, the Arduino is connected to both the arm and the Jetson; so the Object Detection Algorithms on the Jetson are controlling the arm. This code can be found in the LeArmsInterrupts.ino file in the C1C0-ECE repository on GitHub. The Arduino receives the target angle array from the Jetson using the R2P protocol.

In the Arduino-only mode, we **do not** connect the serial 1 port to the Jetson. The Arduino hard codes a path to the blue arm. This code is located in the LeArm_Arduino_Interface.ino file in the C1C0-ECE repository on GitHub. Use this mode for hardware testing the arm before interfacing with CS or debugging.

For example, say you are testing the arm with Object Detection and the arm isn't moving. Unplug the serial 1 line, run the arduino-only file, and confirm that all of the servos are working. This file can be used to determine if a bug is a hardware issue or a software issue.

## Wiring and Hardware Connections

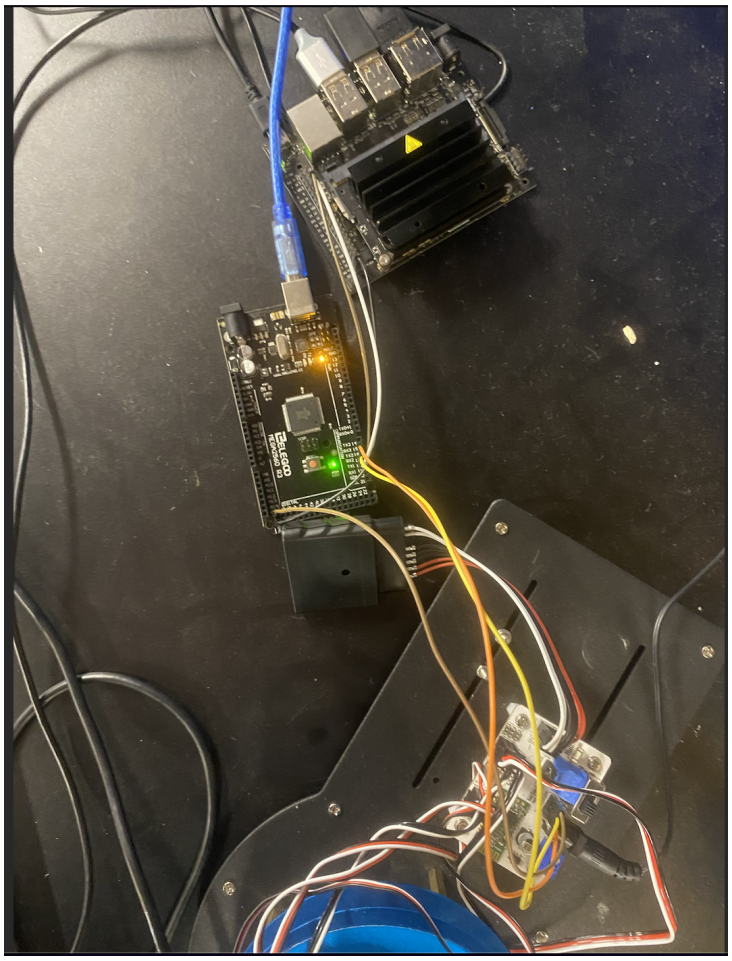

*Figure 1. Hardware Connections between Jetson, Arduino, and Blue Arm. The Jetson (top) is connected to the Arduino board (middle) via a TX/RX line. The brown wire connects pin 8 on the Jetson (TX) to RX 1 (pin 19) on the Arduino. The white wire connects pin 10 on the Jetson (RX) to TX 1 (pin 18) on the Arduino. The Arduino and the Jetson have a shared Ground (any GND pin on the Arduino to any GND pin on the Jetson). The Arduino is powered by a laptop through the thick blue USB-B cable. The Arduino is connected to the arm via the Serial 2 lines. The orange wires connects the RX on the blue arm to the TX 2 (pin 17) on the Arduino. The yellow wire connects the TX on the blue arm to the RX 2 (pin 18) on the Arduino. The Arduino and the blue arm share a common ground. Any GND pin on the Arduino can be connected to the GND pin on the Blue Arm. Do not wire the 5V pin on the blue arm.*