# CALIFORNIA STATE SCIENCE FAIR
# 2016 PROJECT SUMMARY

**Name(s)**

Ryan M. Beam

**Project Number**

**J0303**

**Project Title**

## Utilizing Human Motion for Intuitive Control of Robotic Joints

**Abstract**

**Objectives/Goals**

Design goal is to create an inexpensive and intuitive motion-based controller for a robotic arm.

**Methods/Materials**

Using components such as an Arduino Board, RC Servos, Potentiometers, and a 3D printer, created an arm-mounted controller that converts the rotation and movement of human joints into signals that control corresponding actuators on a robotic arm.

**Results**

By creating several prototypes over the course of several months, I was able to achieve my goal of making an intuitive and inexpensive human-motion based controller. Most recent prototype successfully captures the wearer's shoulder and elbow movement, and costs less than $50, including the additional servo-driven arm I made to demonstrate my controller's effectiveness.

**Conclusions/Discussion**

My most recent prototype serves as an adequate proof of concept that I can achieve my desired goal while remaining within my desired criteria. It takes advantage of the most advanced computer for controlling humanoid robots, which is the human brain, and essentially cuts out the middle man that is the conventional remote control. It allows a human to make the motions they want a robot to make, without needing to translate the desired movements into any sort of commands. My controller still has plenty of flaws, but none that I think cannot be fixed given more time and resources, for example, a future prototype could use more precise potentiometers, hydraulic actuators instead of RC servos, and PCBs instead of breadboards. It is concluded that a controller for robotic joints that is inexpensive and intuitive to use is possible.

**Summary Statement**

I created an inexpensive, arm-mounted remote control that captures human movement, and based off of this input, controls a corresponding robotic arm.

**Help Received**

I designed, programmed, 3D printed and assembled my project by myself.