



Hyper Loop

Zhan su, Taiting lu, Ye lin, Runze liu, Hongming yu
 Professor Keyue Smedley
 Department of Electrical Engineering and Computer Science

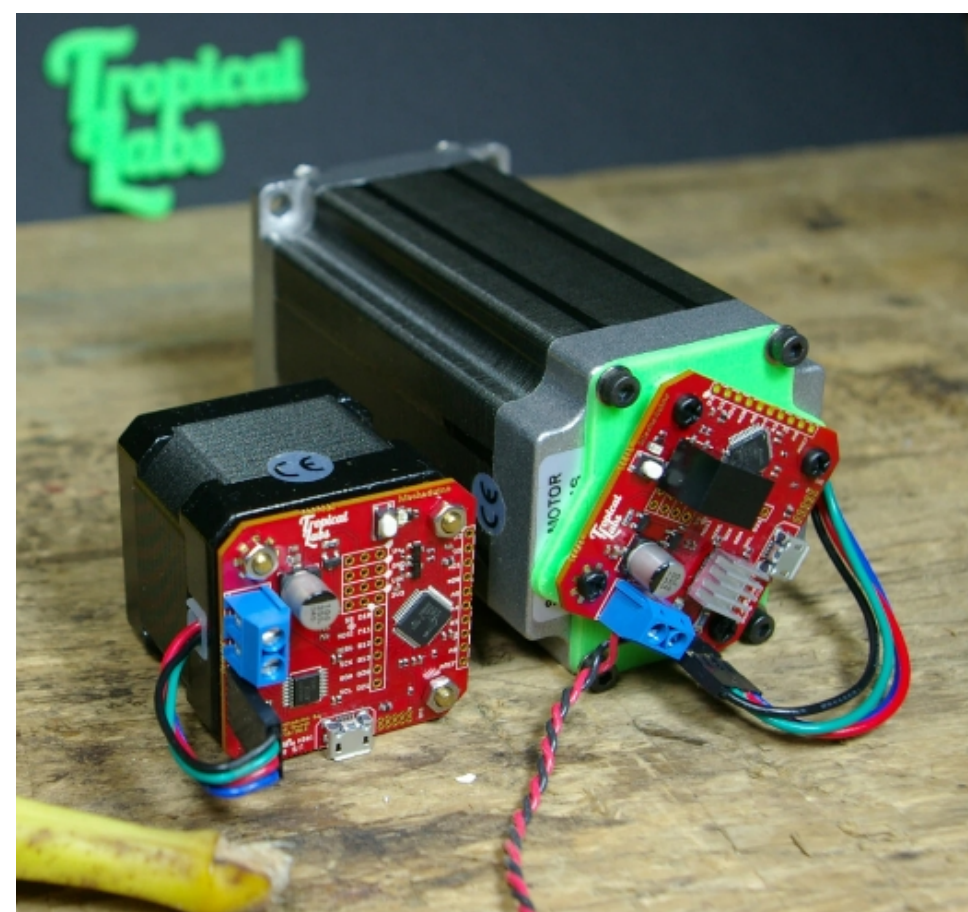
Background/Purpose

This project is aiming to design and build a Robotic Arm which is able to pick and place items on the table and by their color and shape.

- The robot arm is based on XYZ system and powered by 3 closed-loop step motors.
- The image processing part includes a web camera and a computer. The camera will detect color and shape of items and give feedback to the robot arm how to move each item.

Materials

- **Hardware:** step motor, stm32f1xx, h-bridge driver, magnetic encoder, webcam and a laptop, Arduino.
- **Software:** Keil5, Eagle, Opencv, Arduino IDE



Process

servo motors	Design a closed-loop controlled step motor which is able to operate position control. The magnetic encoder on the back of the motor will give feedback to the stm32 micro processor to track the rotor position and correct the error. This enhanced step motor will make system more durable.
Keil5 and Arduino IDE	These two software will be used to program servo motors and the main controller of the robot arm.
Opencv	The image captured by web camera will be passed to Opencv. The program is able to detect the color and shape of each item. Then the program will tell the arm to move items.

Timeline

Fall Quarter:

- Week 1-3: Choose all the components, software to use, make proposal, read references and apply for funding.
- Week 4-7: Design robot arm
- Week 8-10: Test web camera and Opencv

Spring Quarter:

- Week 1-3: first prototype (build the arm)
- Week 4-7: connect robot arm to opencv and make it able to sort items. Record progress and fix bugs.
- Week 8-10: Preparing the presentation material, writing final report and poster

Responsibility

- Taiting Lu: design and build the robot arm
- Zhan Su: design, build and test the servo motor. Microprocessor and computer interface.
- Ye Lin: webcam setup and OpenCV programming.
- Runze Liu: OpenCV programming and microprocessor and computer interface.
- Hongming Yu: webcam setup and OpenCV programming.

Reference

- *Introduction to Servo Control & PID Tuning* by Motion Engineering Inc
- *Series in Computer Vision: Volume3 Computer Vision in Robins and Industrial Applications* by Dominik Sankowski & Jacek Nowakowski