



H&H Distillery Bottling Table



School of Engineering + Technology

Problem Statement

- Develop a way to transition Cultivated Cocktail's various bottles from the air and alcohol cleaning phases to the filling and capping phases of their manufacturing process. The goal is to create a one-stop solution that will allow the labor of one person to: place a bottle in the loading station, move to an air rinse, then alcohol rinse station, a station with a robotic arm to flip the bottles to right-side up, and lastly to a station to be filled with a precise measure of product. The table must fit within a 36" x 48" area and be moveable with a forklift. The goal is to produce more than 900 bottles in 40-man hours, since this is the current rate of production for H&H Distillery.

Requirements

- 36" x 48" Footprint (✓)
- Moveable with Forklift (✓)
- Air Rinse (✓)
- Proofing Alcohol Rinse (✓)
- Flip Bottles Right Side Up (X)
- Precise Fill Bottles (✓)
- FDA Approved Components (✓)

Electrical

```

// CC, DM, V3
// CC Drive Motor (CAPSTONE 2020 TEAM 11) V2.
// Author: Scott Peirce
// MIT License
// MIT License
// MIT License

//Includes required to use Roboclaw library
#include <Roboclaw.h>
#include "Motor.h"

//Serial port for debugging
SoftwareSerial serial(CB, 12);
Roboclaw roboclaw(serial, 10000);

//Define address #s
byte limitSwitch = 2; // pin for limit switch
byte limitSwitch2 = 4; // pin for limit switch
const int buttonPin = 3; // input pin for push button
volatile byte state = LOW; // state for motor
//volatile byte state2 = LOW; // state for pump motor
volatile byte limit = HIGH; // state for limit switch
volatile byte limit2 = HIGH; //state for second limit switch

void setup() {
  roboclaw.begin(30000); //Open roboclaw serial ports
  pinMode(buttonPin, INPUT_PULLUP); //Pushbutton declared as input
  pinMode(limitSwitch, INPUT_PULLUP); //Limit switch to set to digital input and ground
  pinMode(limitSwitch2, INPUT_PULLUP); //second limit switch set to digital input
  attachInterrupt(digitalPinToInterrupt(buttonPin), buttonPressed, CHANGE);
  attachInterrupt(digitalPinToInterrupt(limitSwitch), limitReached, FALLING);
  attachInterrupt(digitalPinToInterrupt(limitSwitch2), limitReached2, FALLING);
}

void loop() {
  //void limitReached() {
  //void limitReached2() {
  //void buttonPressed() {
  if (digitalRead(buttonPin) == LOW) {
    roboclaw.forward(address, 65); //Motor1 turns at half speed;
    state = !state;
  }
  if (digitalRead(limitSwitch) == LOW) {
    roboclaw.forward(address, 65); //Motor1 turns at half speed
  }
  state = !state;
}
void limitReached2() {
  state = !state;
}
}
  
```

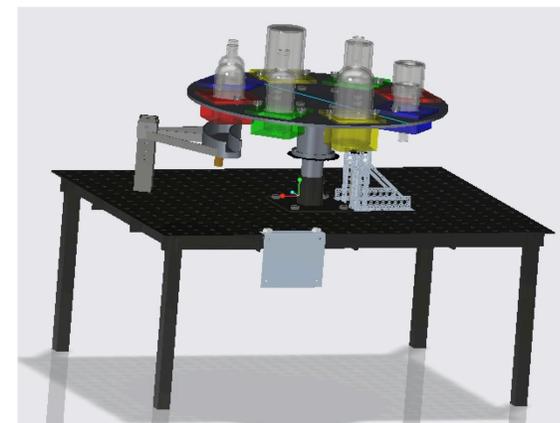
- The variables declared and libraries called at the begging of the code are needed to set the inputs and outputs that will be used in the commands to control different stations of the table.

Final Design/Results

- The final design used concepts from the previous year's team, as well as ideas from this team. This year's team was given a bin of materials that were picked from last year's team. The base table was welded together then sent off for powder coating. The powder coating was done by CMT Metal Finishes in Waynesville, NC. They applied a coating that will be wear-resistant to high-proof alcohol. The team then finished designing and assembling all components for the four stations. The electrical members of the team constructed an Arduino program that spins the table-top, stops in the designated area, rinses the bottles, and fills the bottles with the desired alcohol amount.



• Final Assembly of Bottling Table



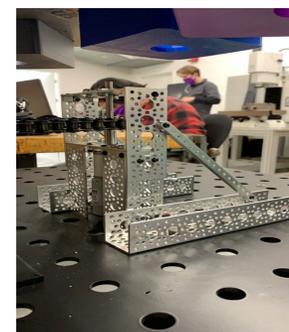
• Final CAD Model of Bottling Table



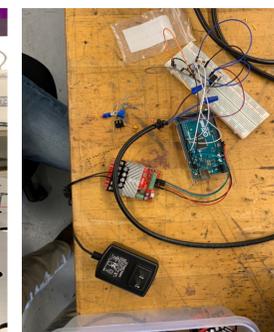
• Bottle Nest



• Drive Hub



• Motor Assembly

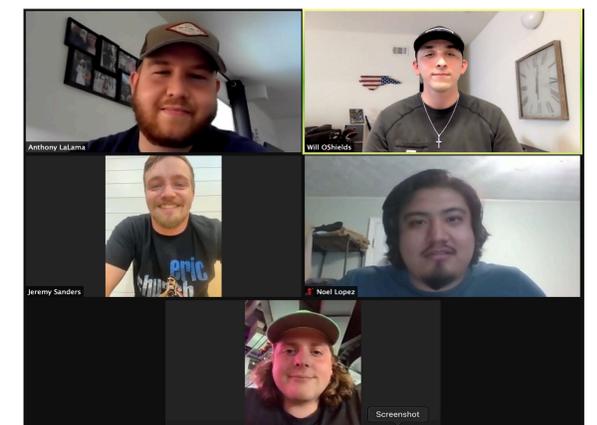


• Test Wiring

Summary

- Fabrication began in the Fall of 2020 but was slow due to limited in-person meetings.
- At the final state of the project, all concepts were achieved except the bottle flipping mechanism due to feasibility constraints.
- Collaboration with H&H Distillery has proved to be very helpful during the project.
- The bottle flipping mechanism was not completed due to time constraints. The design has been completed and all necessary parts will be passed to the sponsor to order and assemble.

Team & Acknowledgements



- **Team Members:**
- Anthony Lalama ET
- Will O'Shields ET
- Luke Huffman ET
- Jeremy Sanders ET
- Noel Lopez ECET
- Faisal Al Hamamm EE
- **Mentor:**
- Scott Peirce, Ph.D., P.E.
- **Sponsor:**
- Taylor Howard/ H&H Distillery