

## MOTIVATION

This project aimed to automate the inspection process for a biomedical company, reducing human intervention and improving time efficiency in production. The goal was approached by using the Dobot Magician robotic arm, programmed for precise and repeatable part handling. The robot operates on a strategically designed table layout that prioritizes error prevention and ensures optimal functionality.



Figure 1: Dobot Magician robotic arm.

## SYSTEM DIAGRAM

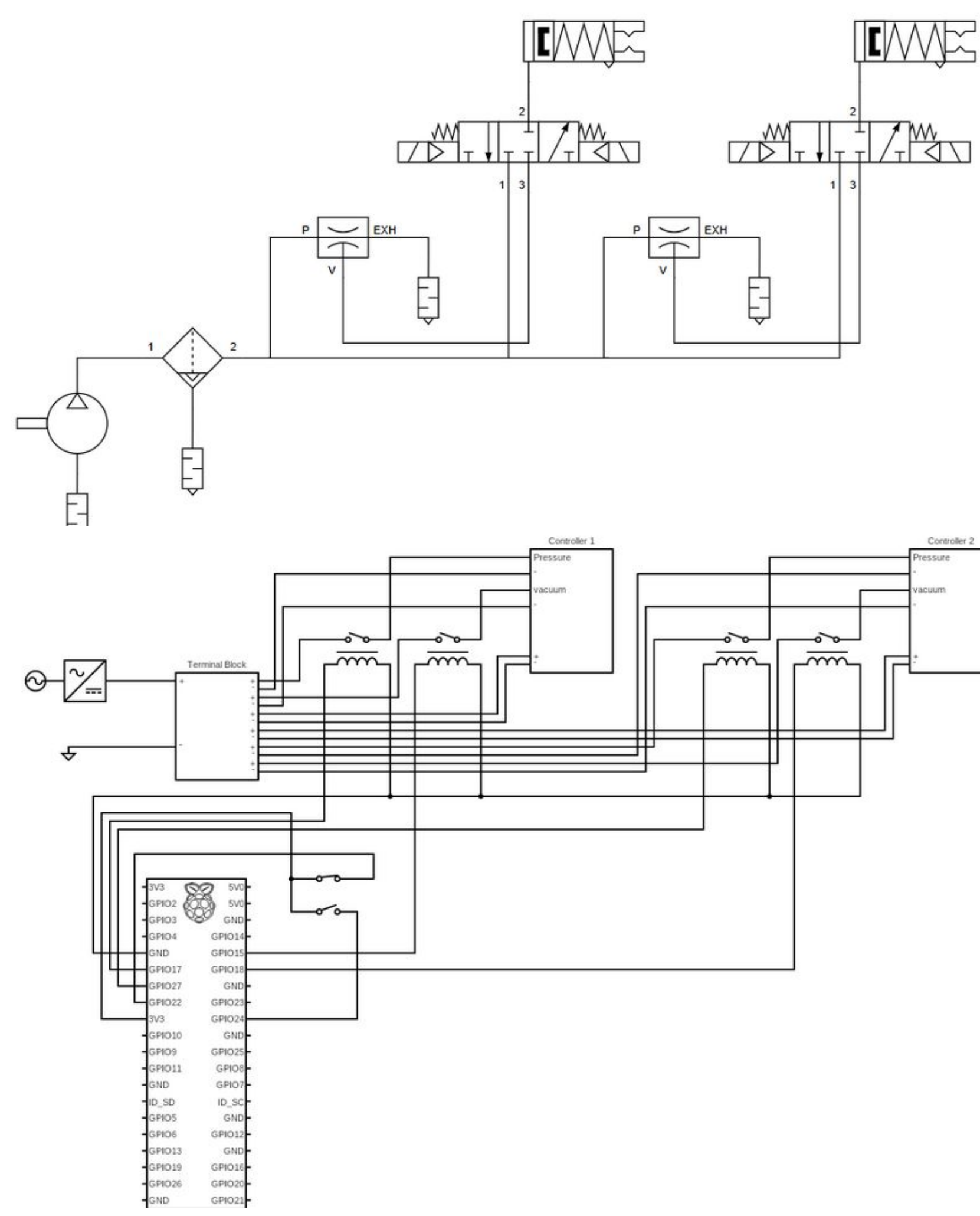


Figure 2: Pneumatic system design to control the grippers (top part), electric circuit design to control signals using a raspberry pi 5 tablet (bottom part).

## FULL ASSEMBLY

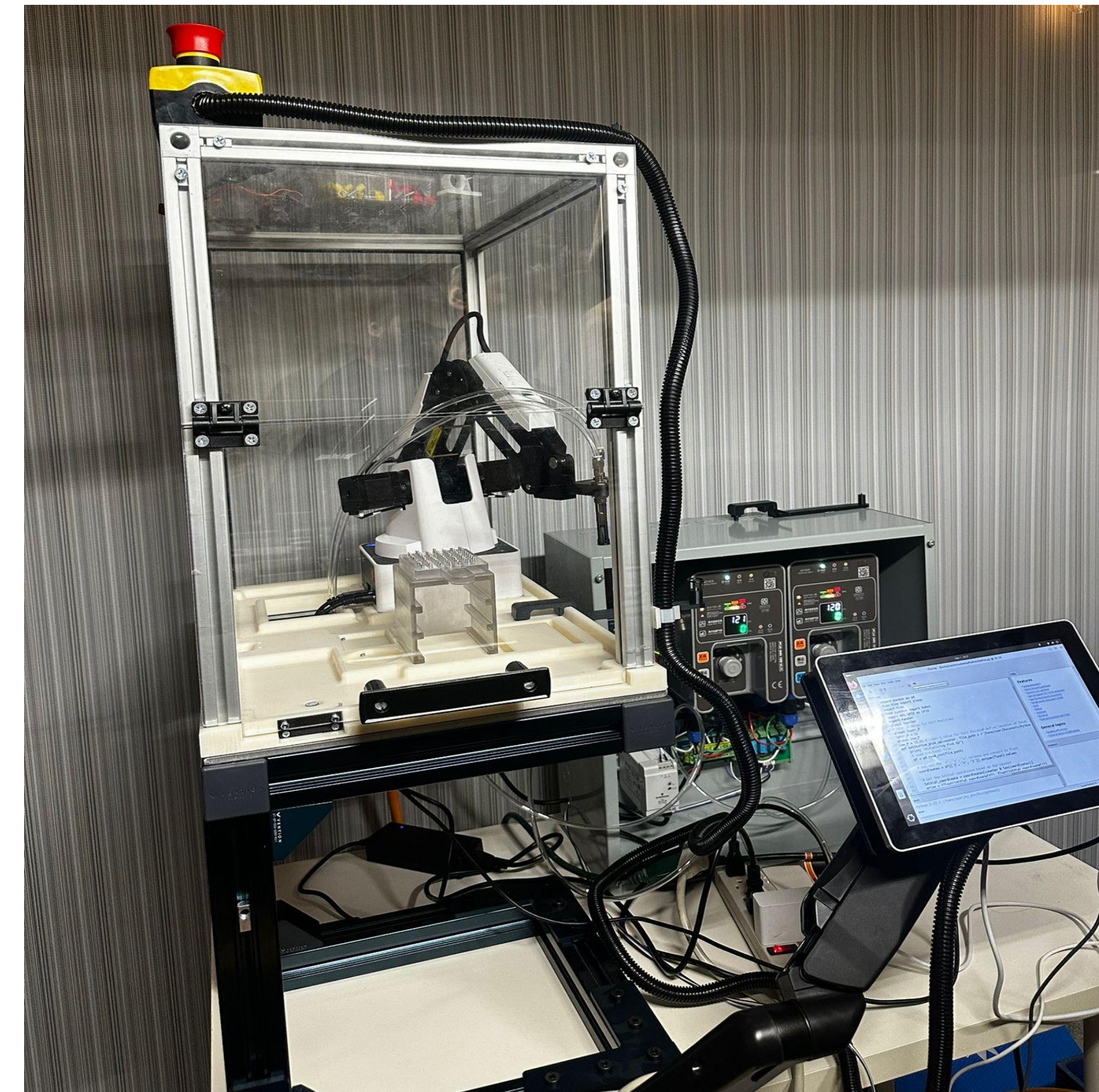


Figure 3: Full Assembly control with Raspberry Pi

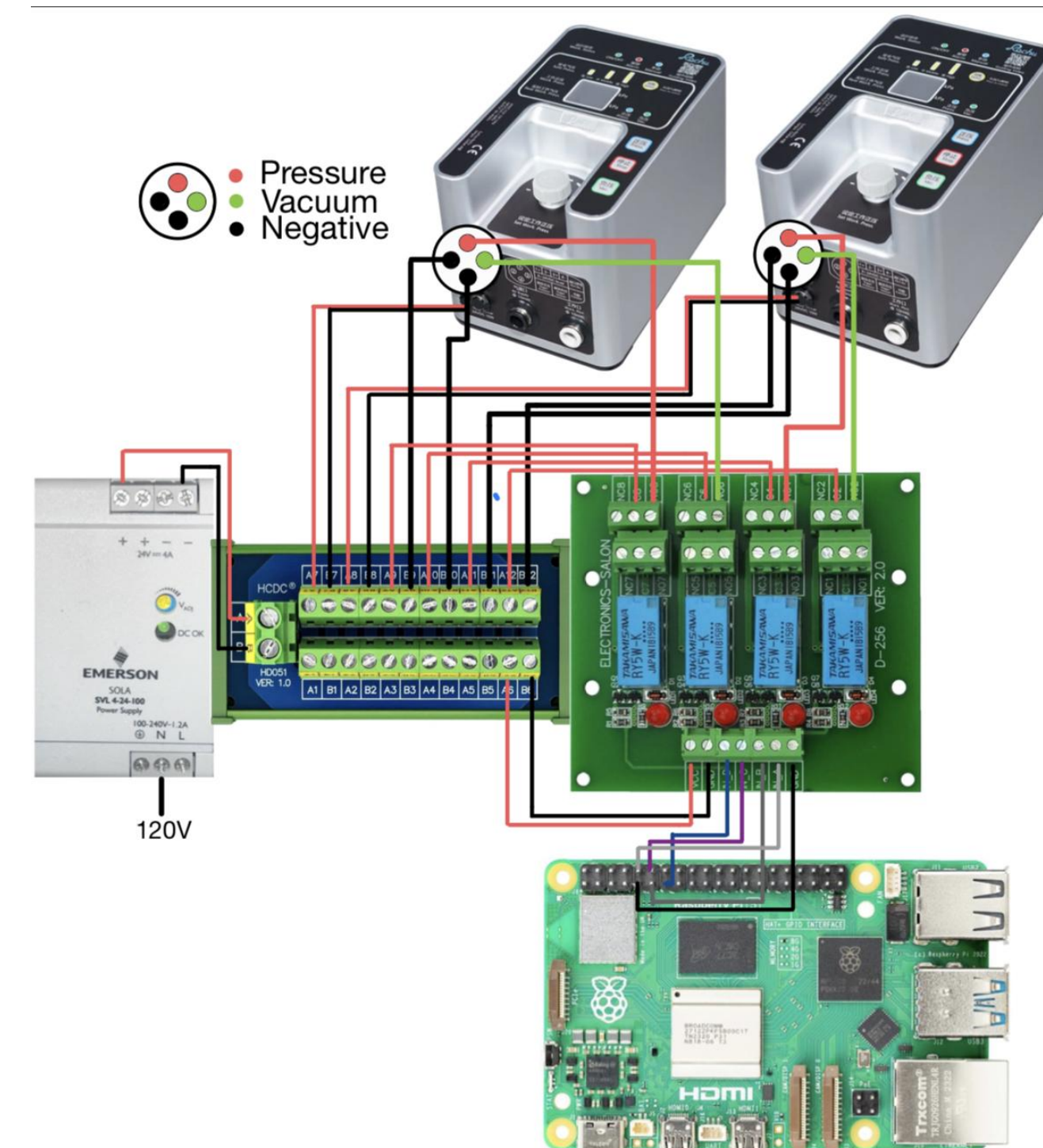


Figure 4: Pneumatic and electric system assembly

## CONCLUSION

The robotic arm purpose is to pick and place parts, retrieving them from the buffer fixture. Having the components printed out of biocompatible materials and smooth surfaces, ensures the parts will not get damaged. The pneumatic system delivers precise pressure and vacuum, to open and close the grippers. The Python code operates the robot movement, and pneumatic controllers, providing control over the system.

## FUTURE STEPS

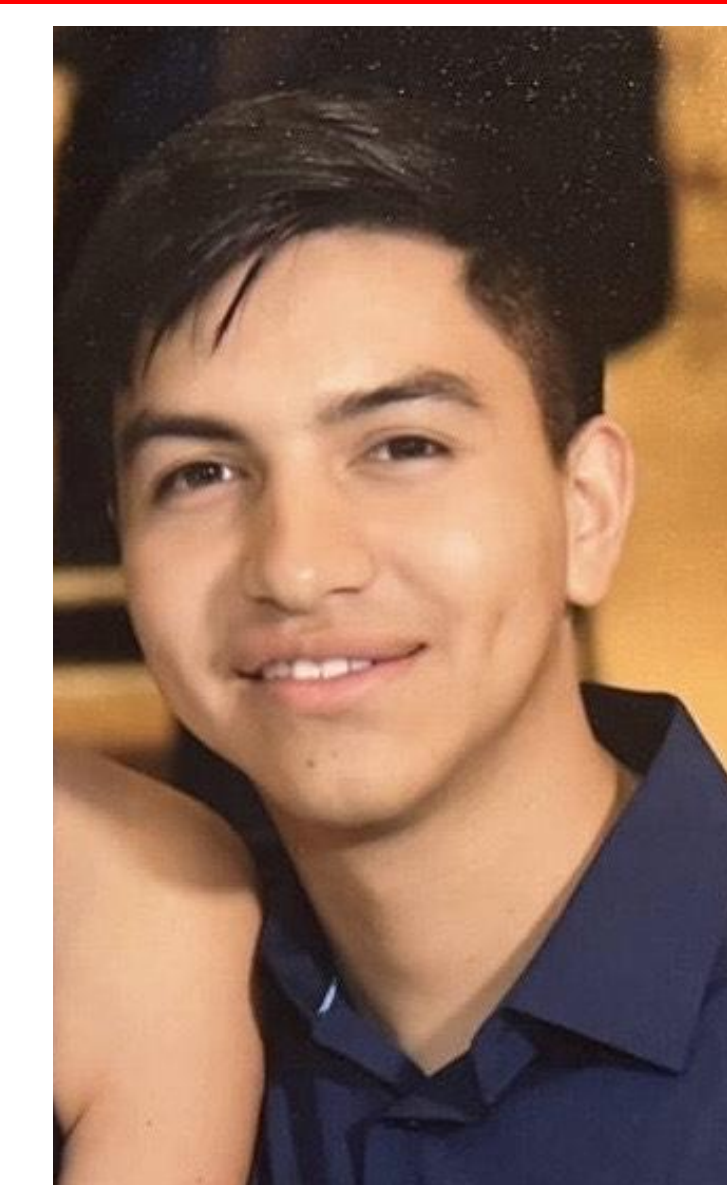
Automation of quality inspection provides the facility higher utilization factor of their quality inspection. Using Python scripts a raspberry pi running on Ubuntu was the primary element of the project. A visual flow-based programming tool for network-aware hardware devices known as Node-RED was used to implement the flow and script on a dashboard controlling the whole system. The next steps are to implement a calibration sensor to ensure the robot can pick up the parts. Implement a camera for system feedback to verify parts have been picked up or dropped off.



## THE TEAM



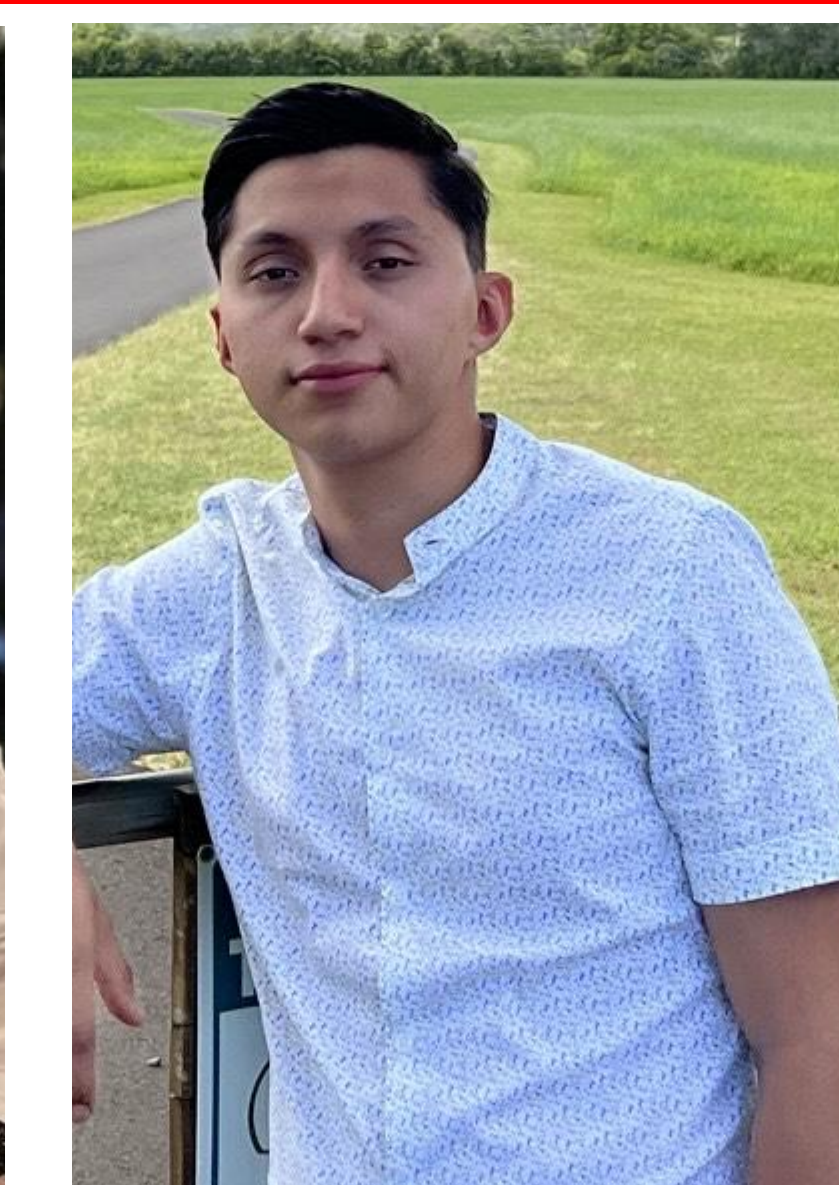
Donovan Orozco



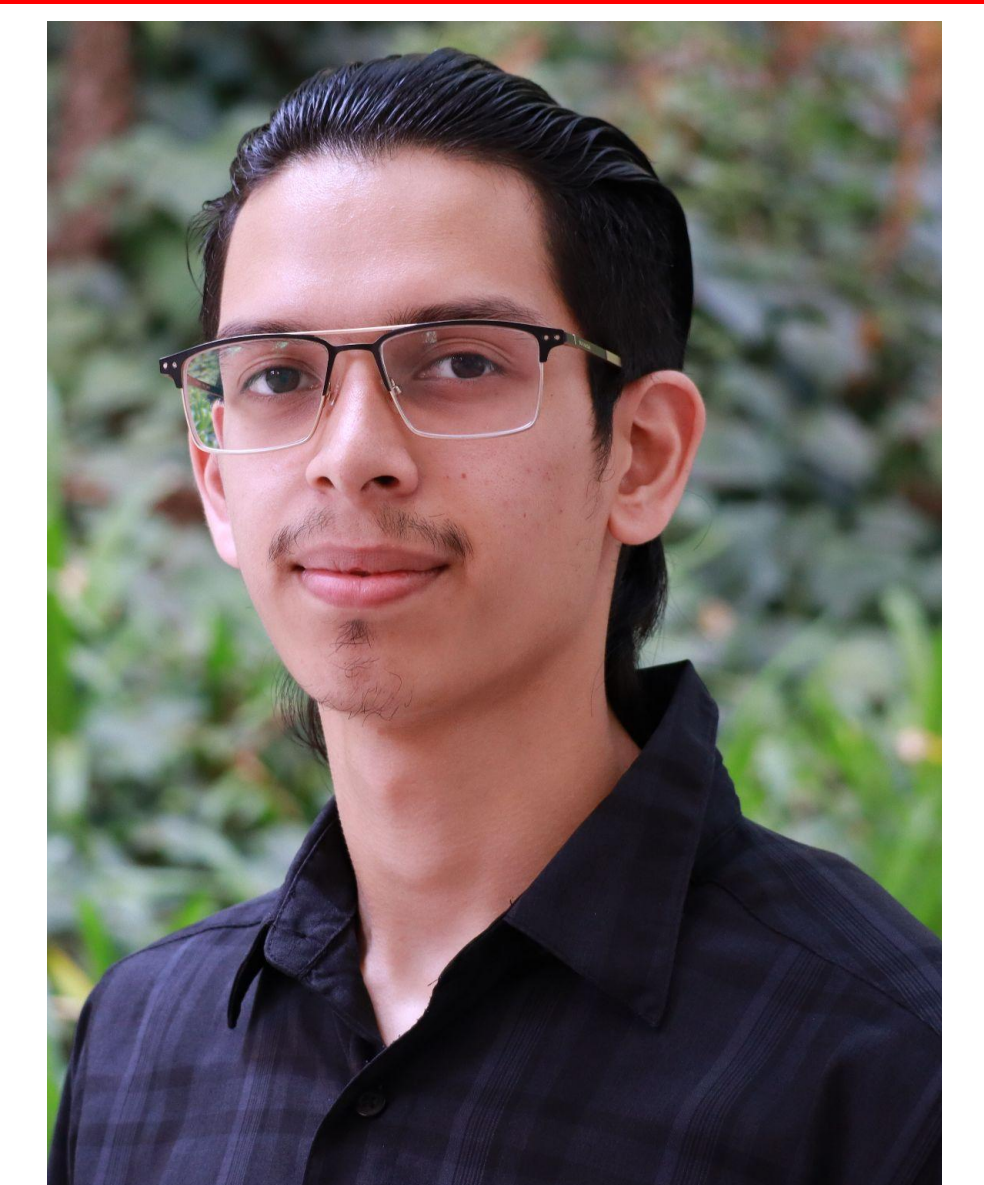
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