

Group M2.05 – Lighthouse Bend Ez Cap Punching Machine

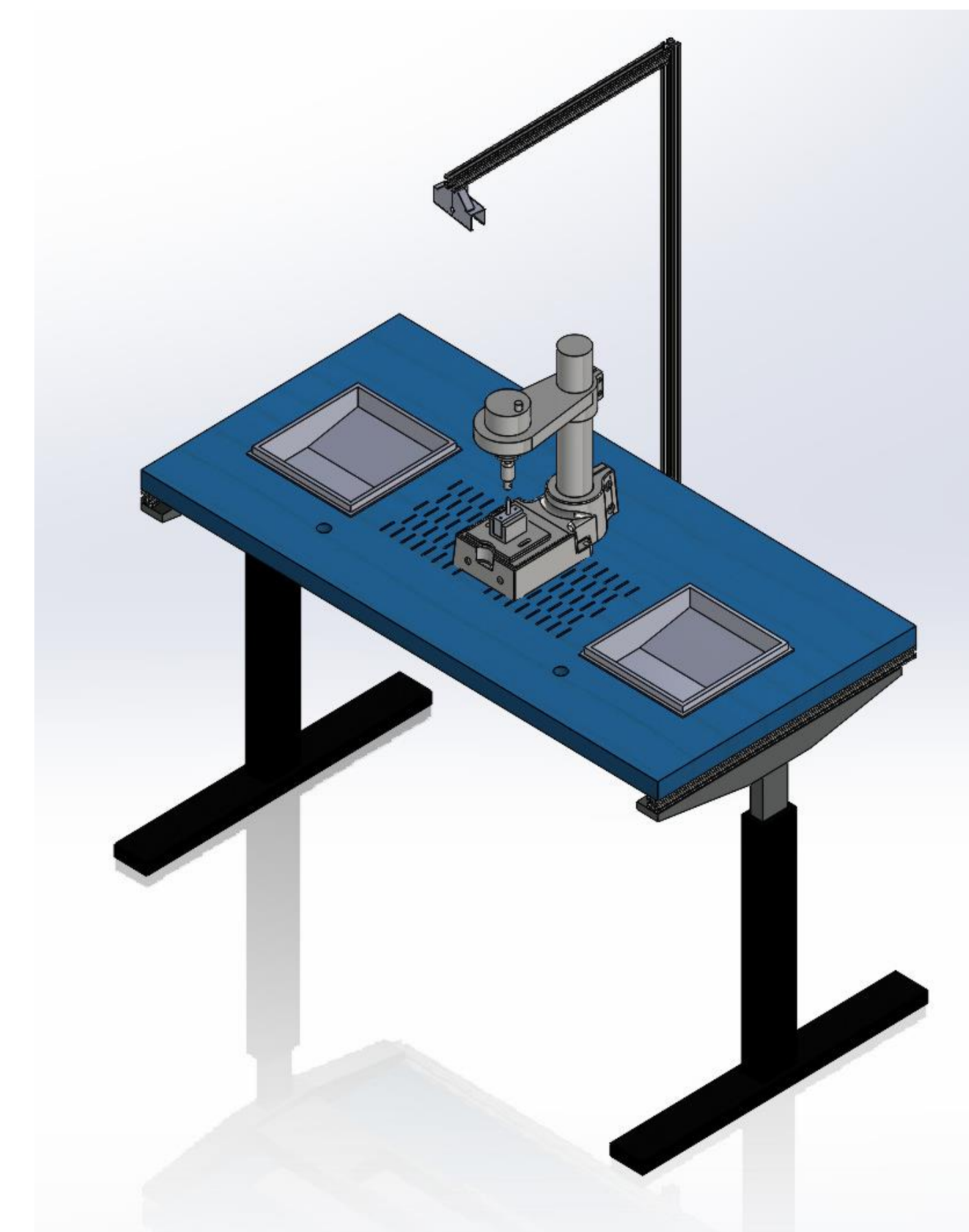
Treyton Strong, Kareem Abuqasem, Joey Huttenhower
 West Texas Lighthouse for the Blind



Product Description

The Lighthouse Bend EZ Cap Punching Machine Project aims to enhance the safety of the cap punching process by implementing a comprehensive safety system. This involves redesigning the system with a new controller, replacing buttons for easier operation, reducing the risk of fatigue and injuries.

Additionally, the project includes revamping the workbench to streamline the process and create a cleaner work area.



Process and Design

Pneumatic Press and Prototype Table Setup

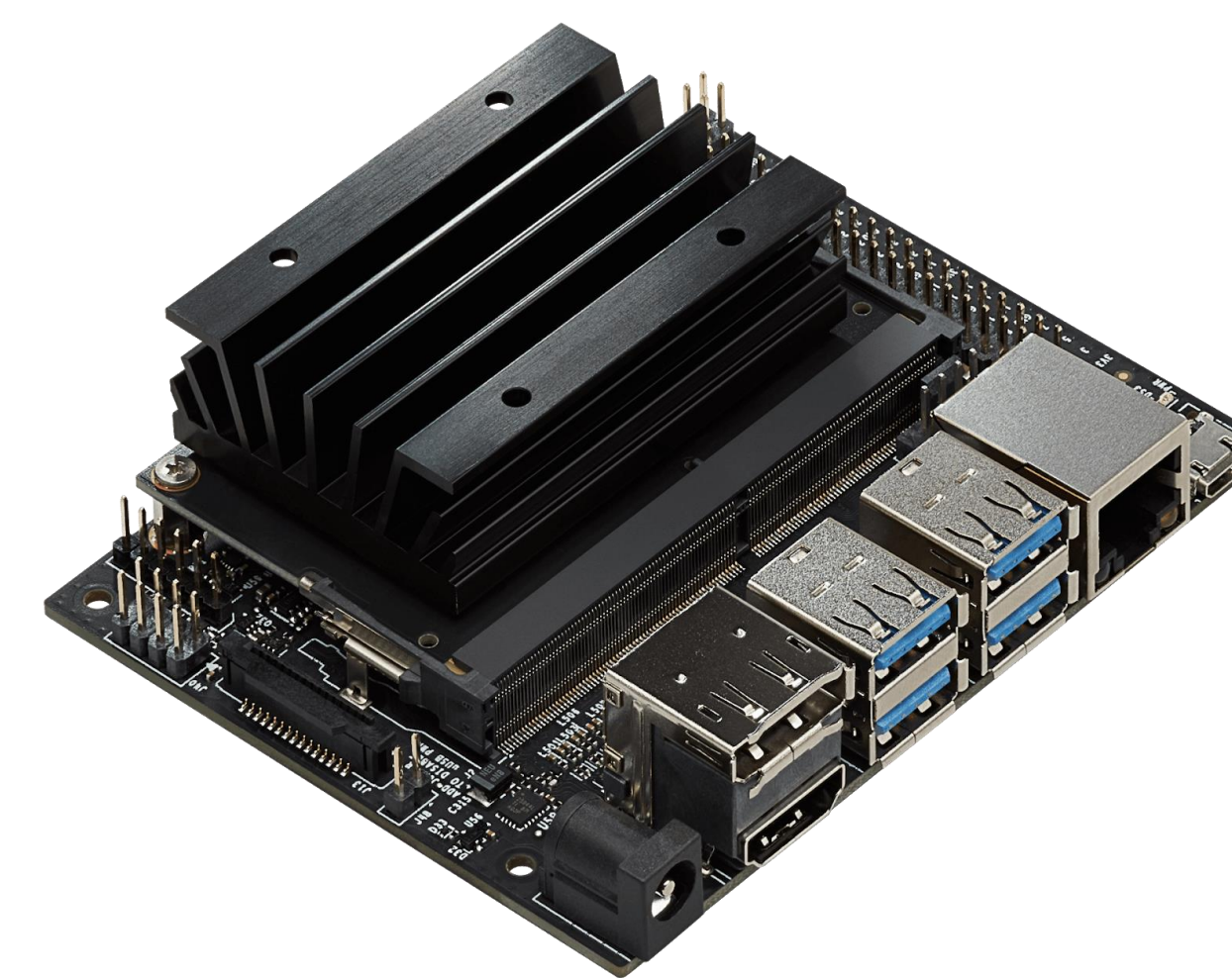
- Press used to puncture pen caps
- Closer workspace to minimize wasted area
- Buttons will be almost flush to table for minimized obstructions

Safety Logic

- When contact point on hand is in area button can be pressed
- Both contact points must be in area, and both buttons must be pressed to actuate press
- Both buttons must be pressed with 3 seconds of each other to actuate, or both buttons must be released to actuate again

NVIDIA Jetson Nano

- Micro controller that is being used to run all the safety parameters
- Works very well with AI programming



Challenges

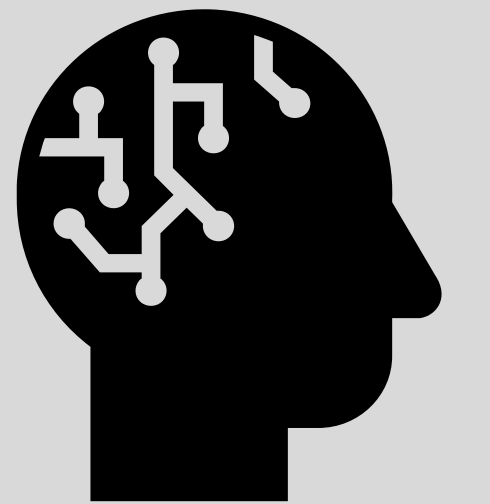
- Ensuring individual parts work as a cohesive system
- Drastically improving safety without compromising efficiency
- Maintain familiar operation for visually impaired operator
- Debugging safety logic code

Future Projects

The team structured the project to support and seamlessly integrate future innovations and enhancements.

Future projects include:

- Feeder system (currently being developed by senior design 1 team)
- Automation



Acknowledgements

West Texas Lighthouse for the Blind
 Center for High Performance Systems (CHiPS) Lab
 Dr. James Davidson
 Joshua Glaze
 Abhimanyu Sharotry

Meet the Team!



Customer Needs

- Improve safety
- Sustain or enhance operational efficiency.
- Enhance the workbench for optimal functionality
- Contribute to the establishment of a standardized setup.

Group M1.05 – Lighthouse Bend Ez Cap Punching Machine

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 West Texas Lighthouse for the Blind



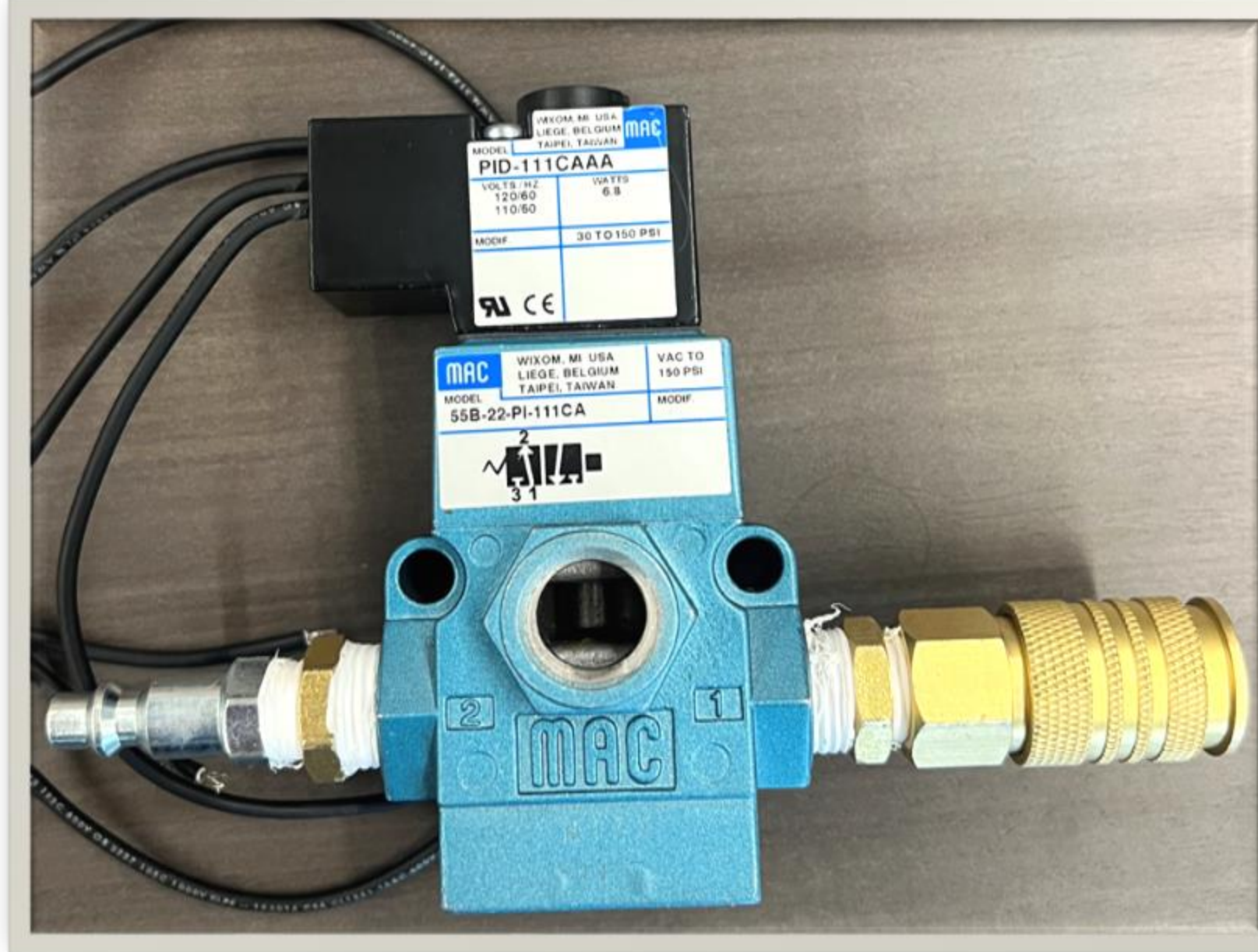
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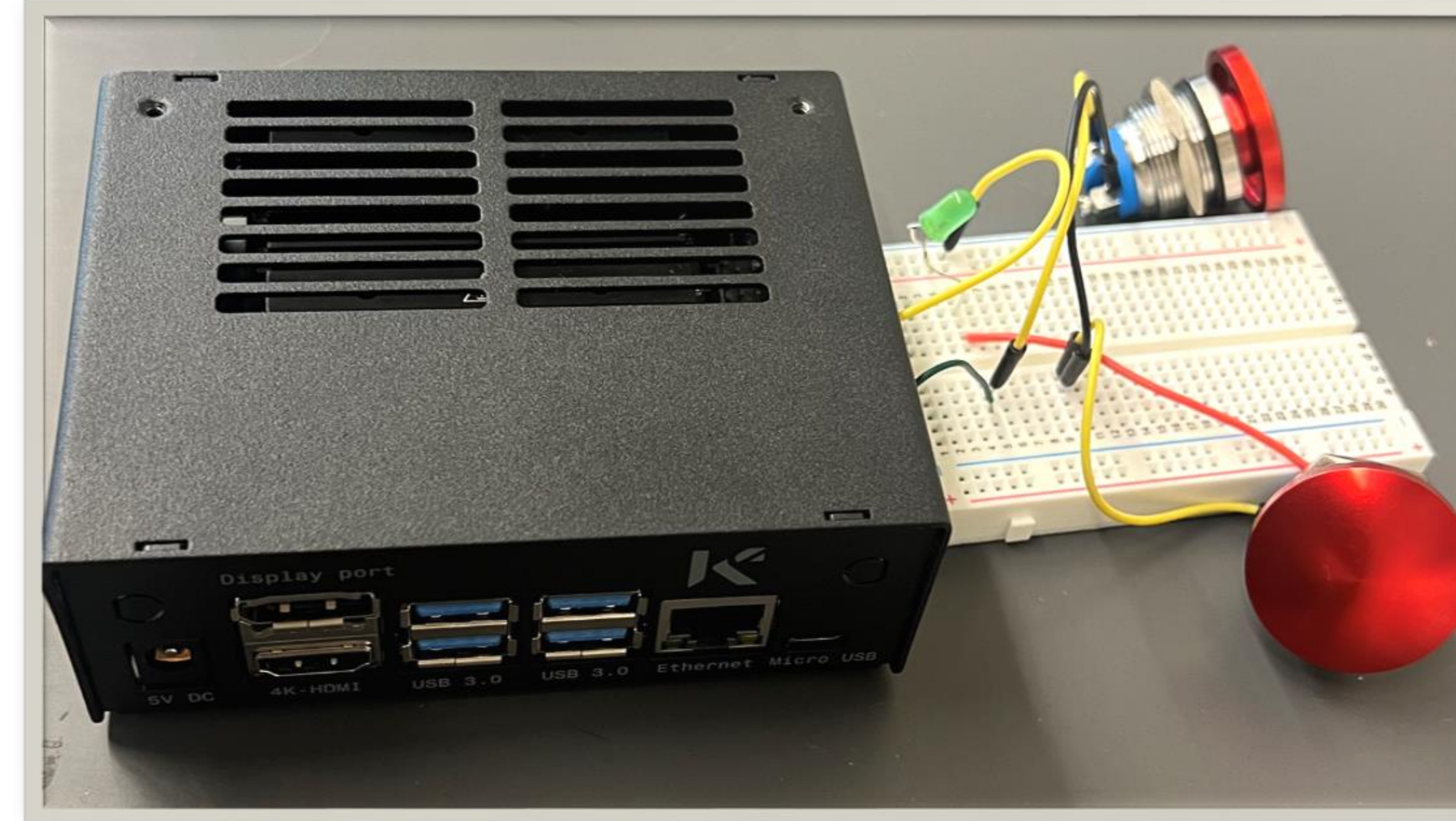
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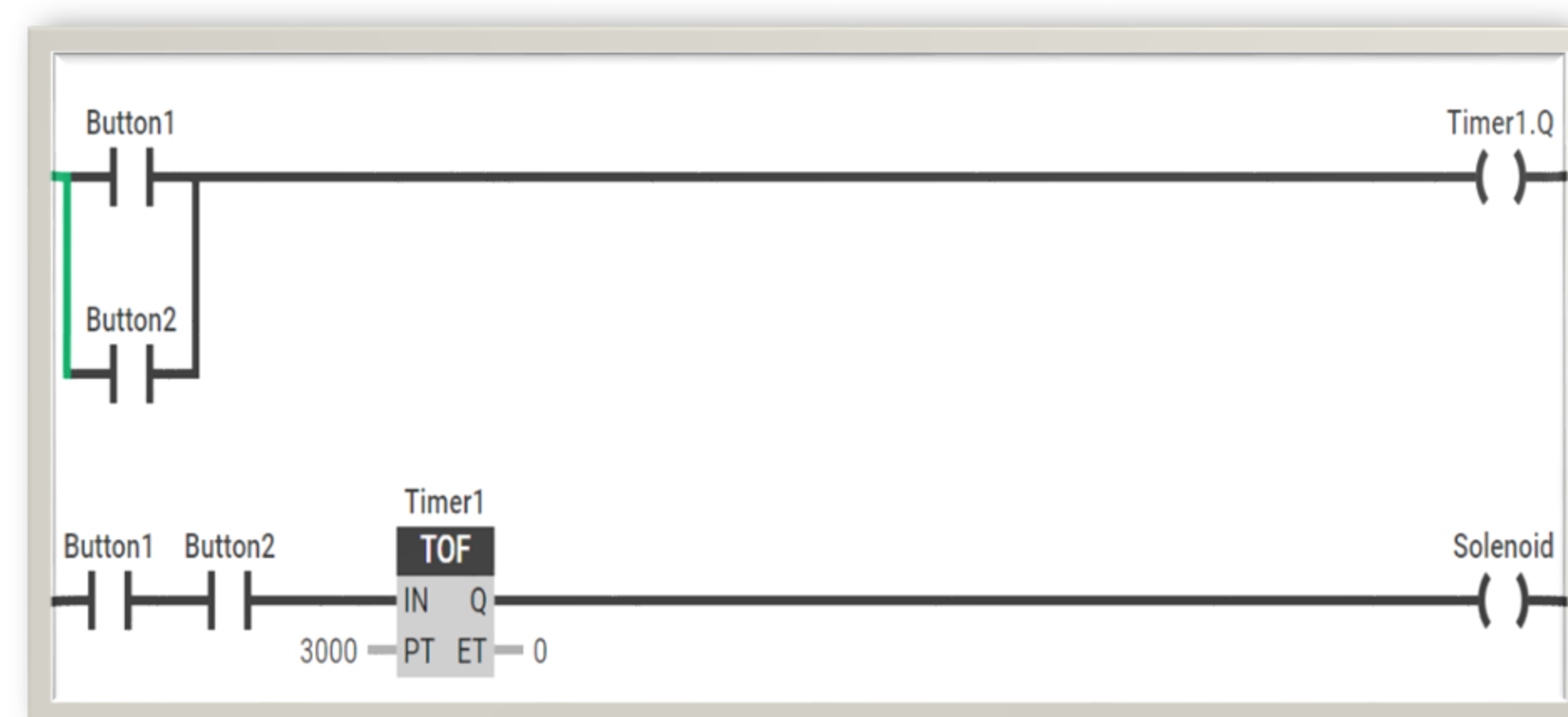
Process and Design



- Solenoid Valve**
- Connects to pneumatic press
 - Regulates air pressure



- NVIDIA Jetson Nano**
- Creates and applies ladder logic for button safety
 - Future use with AI programs.



Pneumatic Press and Prototype Table Setup

- Press used to puncture pen caps
- Closer workspace to minimize wasted area
- Buttons will be almost flush to table for minimized obstructions

OpenPLC Ladder Logic

- When button 1 or button 2 is pressed our timer will start to count down from 3 seconds
- When both buttons are pressed and the timer is still on the solenoid will activate
- Once the timer ends buttons must be released to restart the timer



Future Goals

- Maximize workbench efficiency by eliminating any unnecessary or wasted space.
- Design workbench for effortless and efficient cleanup
- Develop a feeding system to easily grab caps in correct orientation
- Incorporate an advanced AI program to detect operator hands, enhancing safety measures and further preventing operator injuries.

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