

Automatic Tool Changing Mechanism for Industrial Robotics Arms

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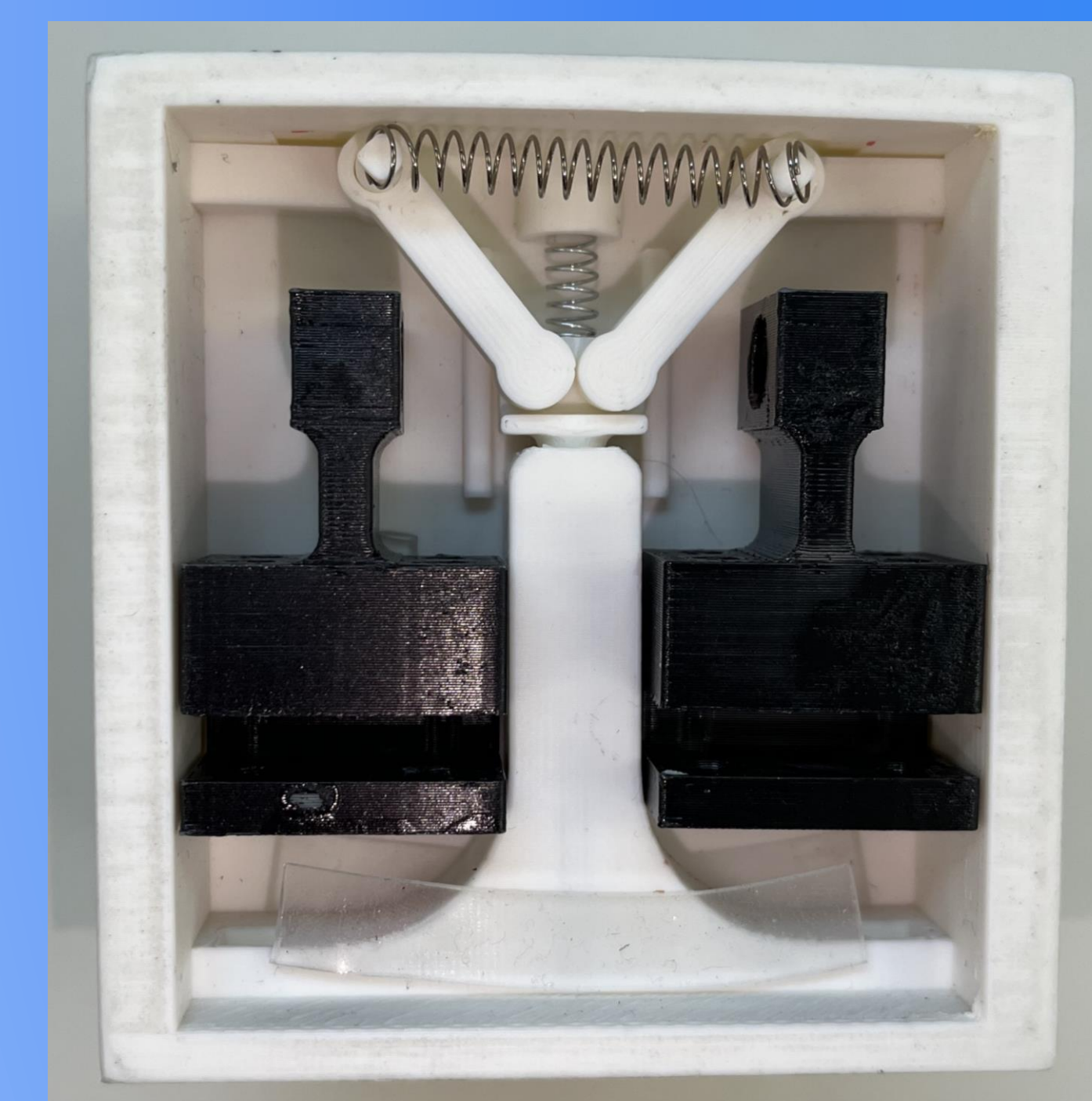


I. Introduction

The goal of this project was to Develop a tool-changing mechanism for industrial robotic applications that could significantly undercut the cost of fabrication compared to what is currently available for the industrial market. The vast majority of tool-changing mechanisms currently available operate using pneumatics which requires the use of machining and tight tolerances to operate properly. In order to reduce fabrication costs for the tool changer developed in this project a linkage mechanism was developed that could be 3D printed. In the 7 weeks' time provided to work on the project the mechanical and electric components of the system were completed, while the software development and integration with exterior robotic systems will be left up to future work.

II. Motivations

- Previous design attempts were functional but bulky
- Only 2 “pins” were used to lock tool changer in previous design which did not evenly displace load
- Power and control signals were not able to be passed from the tool changer to the tool in previous design



Created by Shaibel Das, Matthew Berry

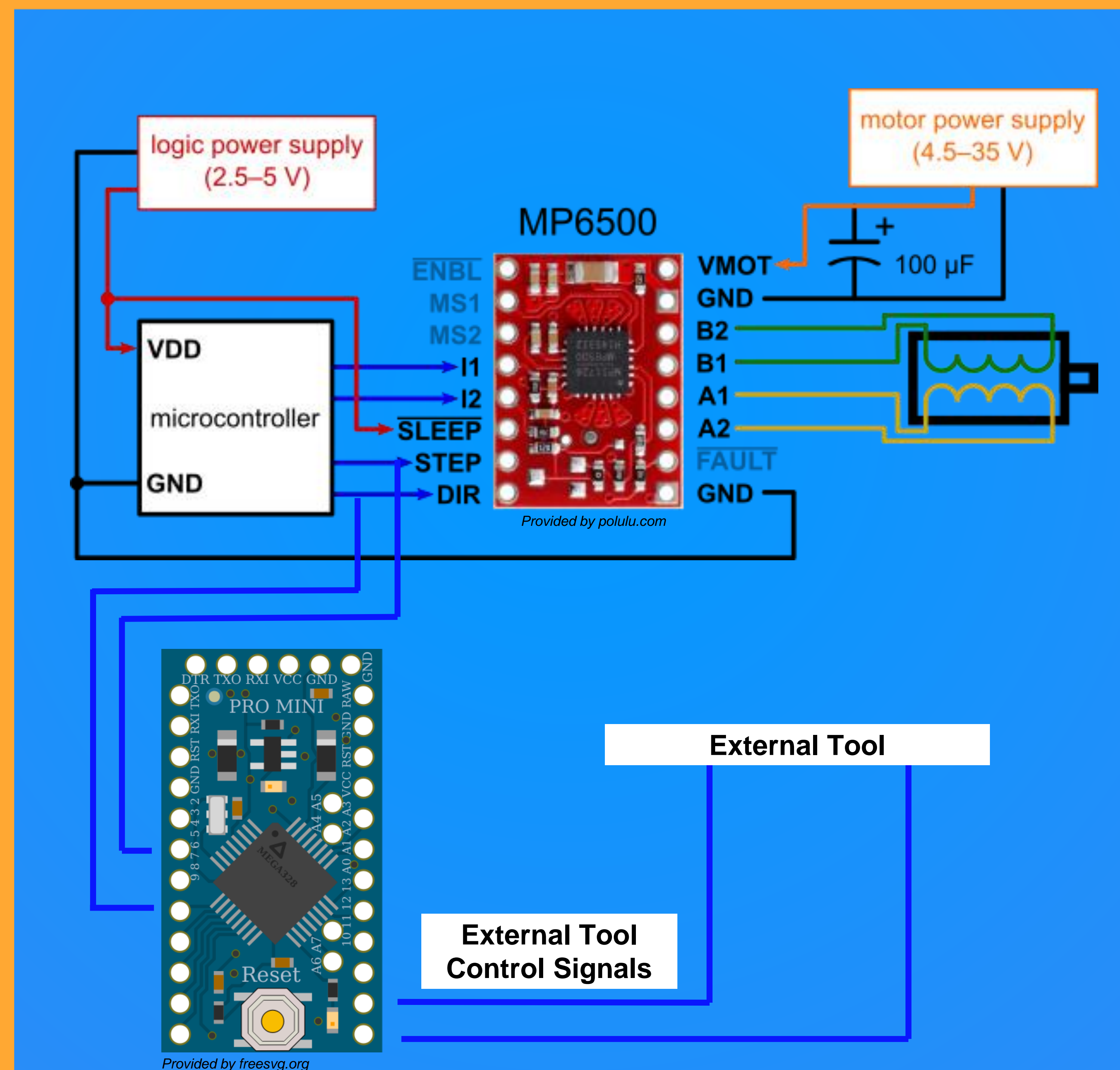
Previous tool changer design attempt



Created by Carlos Rivas

Newly designed tool changing mechanism

III. Electrical Design



IV. Mechanical Design Iterations



- Majority of design iteration work went into the interior of the tool changer (top left)
- Multiple geometry adjustments had to be made to the linkage mechanism (top right)



- Space had to be added to fit all necessary electronics into the drill (top left)
- Tool changer attached to drill (top right)

V. Future Work

The accomplishments of this project include the mechanical and electrical design for the tool changer, but future work is still necessary:

- ABB Robotic Arm integration via Robot Operating System (ROS) network
- Use of Raspberry Pi, OpenCV computer vision library to enable computer vision on tool changer, allowing quicker calibration/less human interaction for intended robotic tasks
- Develop various tools that will work with the new tool changer port

VI. Acknowledgements and References

This work was supported by State of Idaho appropriated funding for the Center for Advanced Energy Studies (CAES) and the SF REU Site Award #2051090 for Advanced Manufacturing for a Sustainable Energy Future; this research utilized equipment at CAES provided by the Idaho National Laboratory (INL) under the Department of Energy (DOE) Idaho Operation Office (an agency of the U.S. Government Contract DE-AC07-05ID145142; ISU Robotics Laboratory

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