

# AKSHAT DOCTOR

Mechanical Design Portfolio

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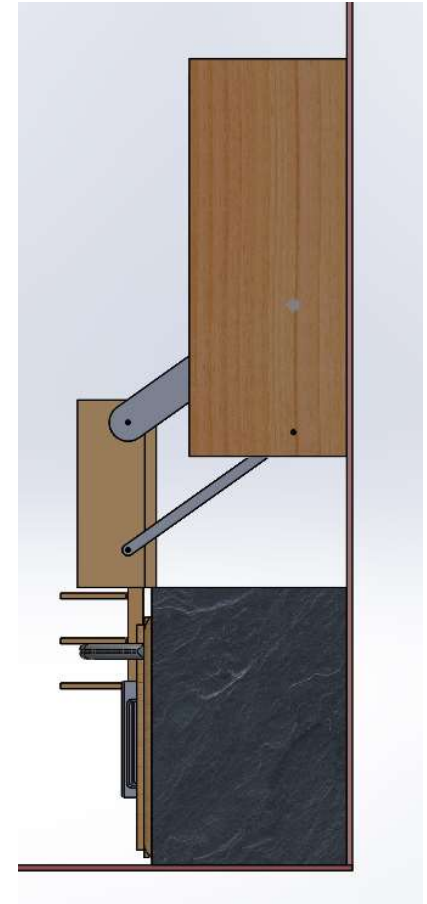
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# MECHANICAL SECTION

# Accessibility Shelving Unit

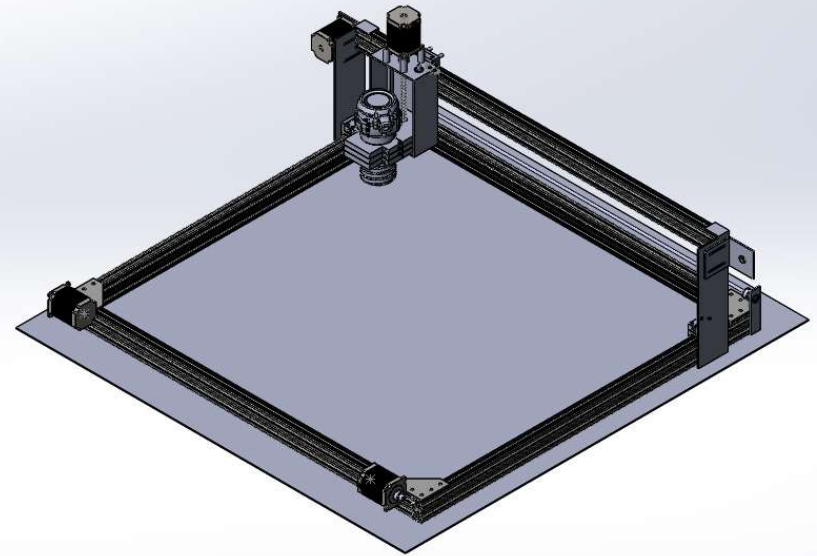
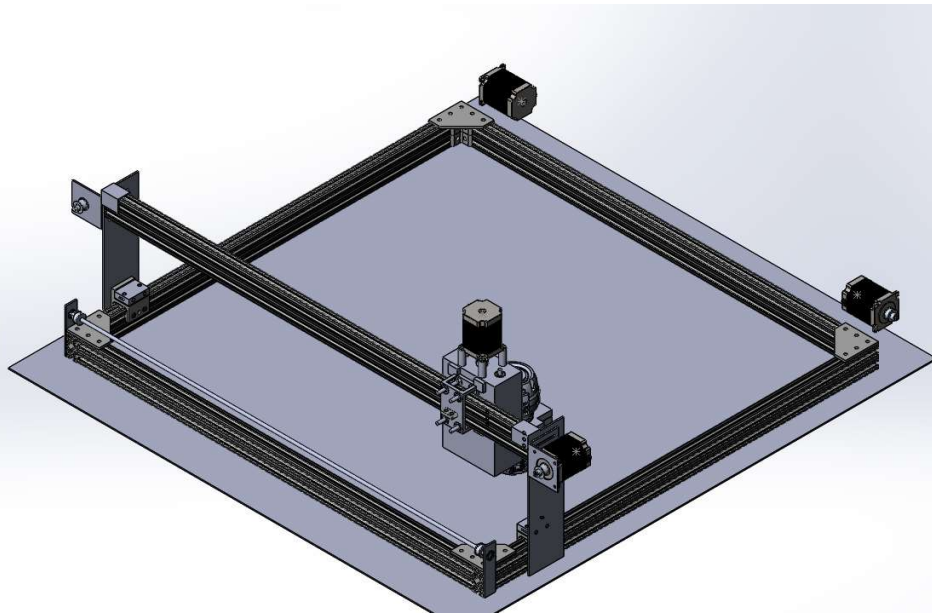


- Used **SOLIDWORKS** to design a shelving unit that can pivot down and extend for users who are unable to access high standing shelves
- Design features a **4-bar** rotating arms along with a belt driven **linear** descent system for the shelves



# DIY CNC Project

- Used **SOLIDWORKS** to model a 4ft by 4ft CNC Router/Laser Engraving machine using custom plywood parts along with Commercially Off the Shelf(COTS) products



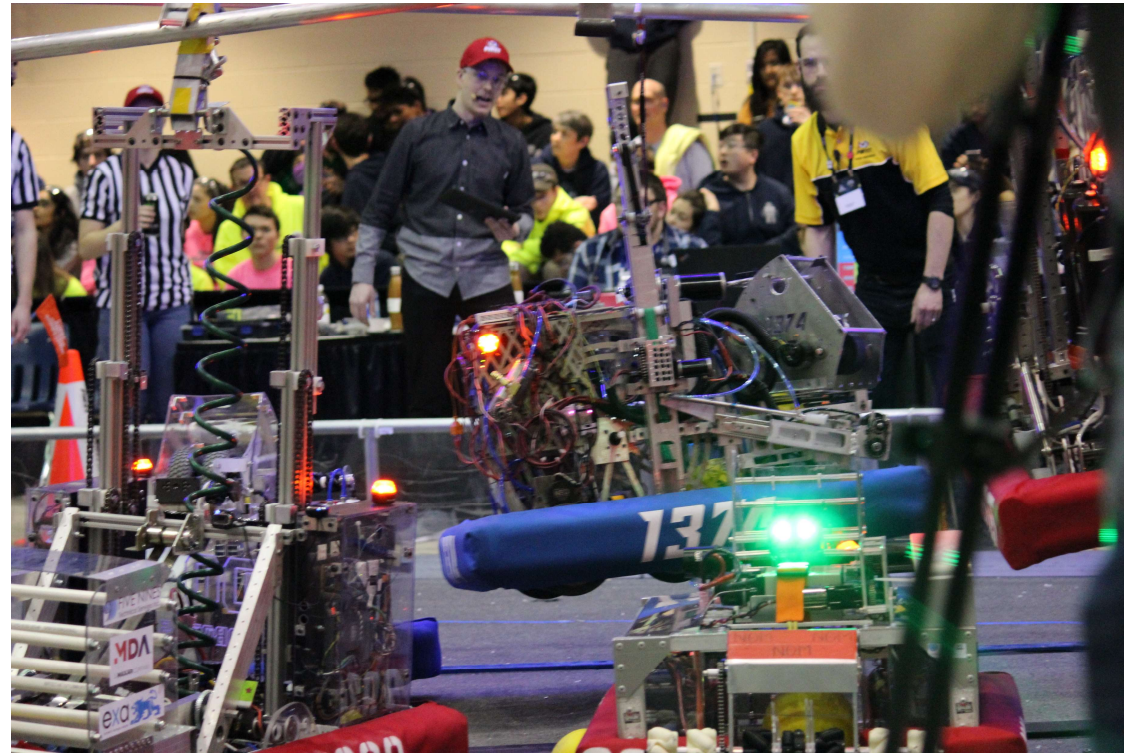
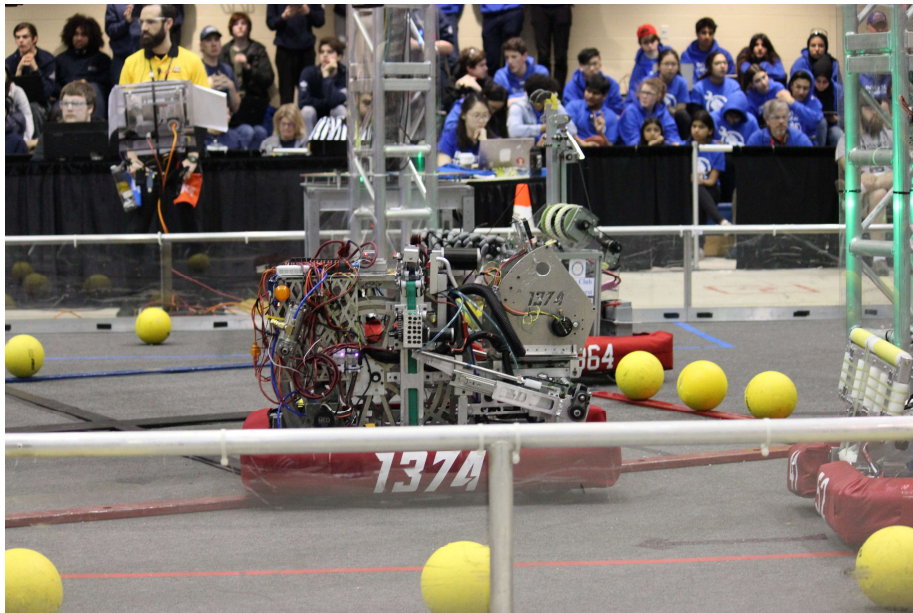
- The **X-Axis** and **Y-Axis** are driven using belts and a **NEMA 23** stepper motor
- The **Z-Axis** is driven by a **NEMA 23** and a lead screw attached to a **DeWalt Router** holder

# Next Steps

- Add electronics and wire routing system for different axis
- Review design with engineers/technicians

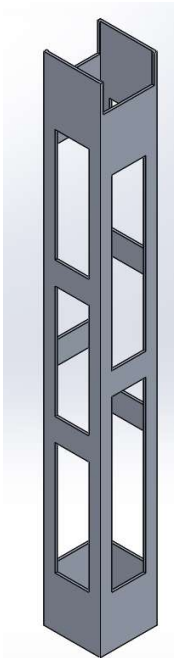
# FRC Team 1374 Robot: Climber System

- Designed a climbing system for a robotics competition using **SOLIDWORKS**
- Constructed & Maintained the climber throughout the 8 week competition period

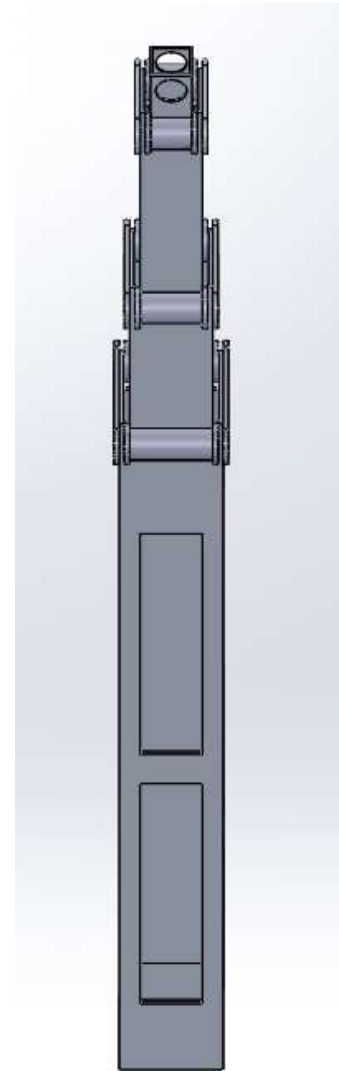


# Design of Climber: Tubing

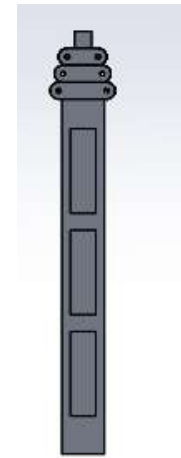
- Used four sets of Square 6061 Aluminum Tubing (2.5x2.5in, 2x2in, 1.5x1.5in and 1x1in) to create a telescopic arm
- Delrin rollers used on the outside to carry belt rigging and align tubes as structure rose



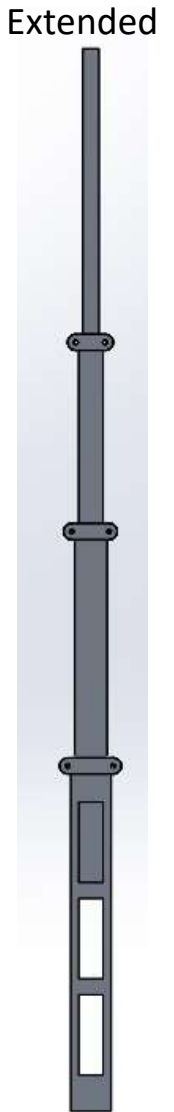
- Used **HSMWorks** to generate toolpaths and G-Code for slots on tubes
- Used **Plasma Cutter** to create slot profile



Roller View



Compressed



Extended

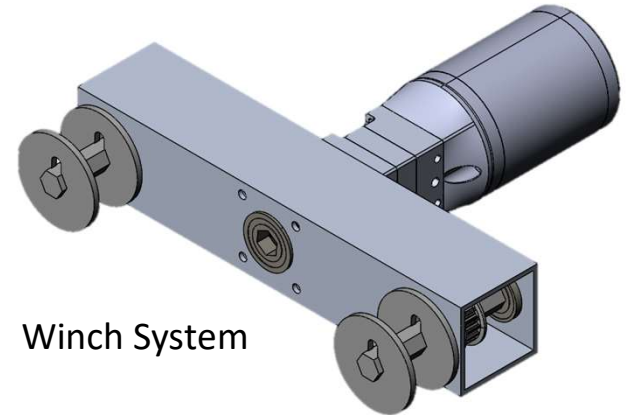


# Design of Climber: Winch System



Winch Caps

- The winch system utilizes a 100:1 brushed DC motor
- The gearbox is attached to an axle that contains the winch caps
- A pin is placed between caps to hold the belt in place between itself and the axle



Winch System





These are videos of the climber working. For the YouTube video, start at 2:08 and watch the robot with a blue bumper and the number "1374"

# Construction

- This climber system was built using a **CNC Machine, Vertical Mill, Lathe, Bandsaw, Drill Press, Plasma Cutter, Horizontal Cut-off saw** along with many hand tools

