

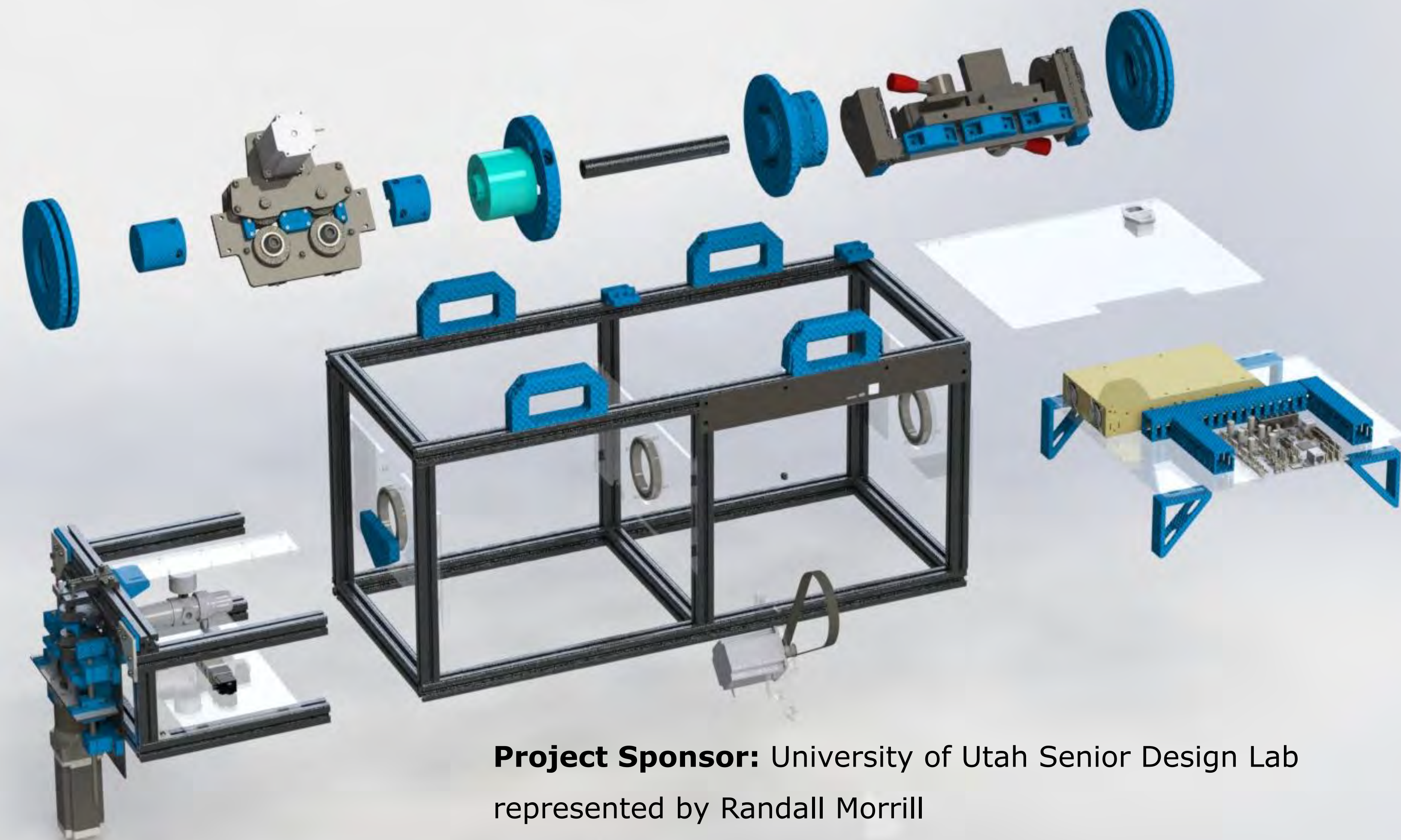
3D CNC WIRE BENDER

OBJECTIVE

Build a CNC (Computer Numerical Control) wire bender for students to use in the Senior Design Lab



Team Members: Josh Parrott, Hunter Klinglesmith, Blair Felts, Ethan Christus, Anderson Boyer, and Seth Carroll



Project Sponsor: University of Utah Senior Design Lab represented by Randall Morrill

CAPABLE

Bend 3D geometries and springs

ECONOMICAL

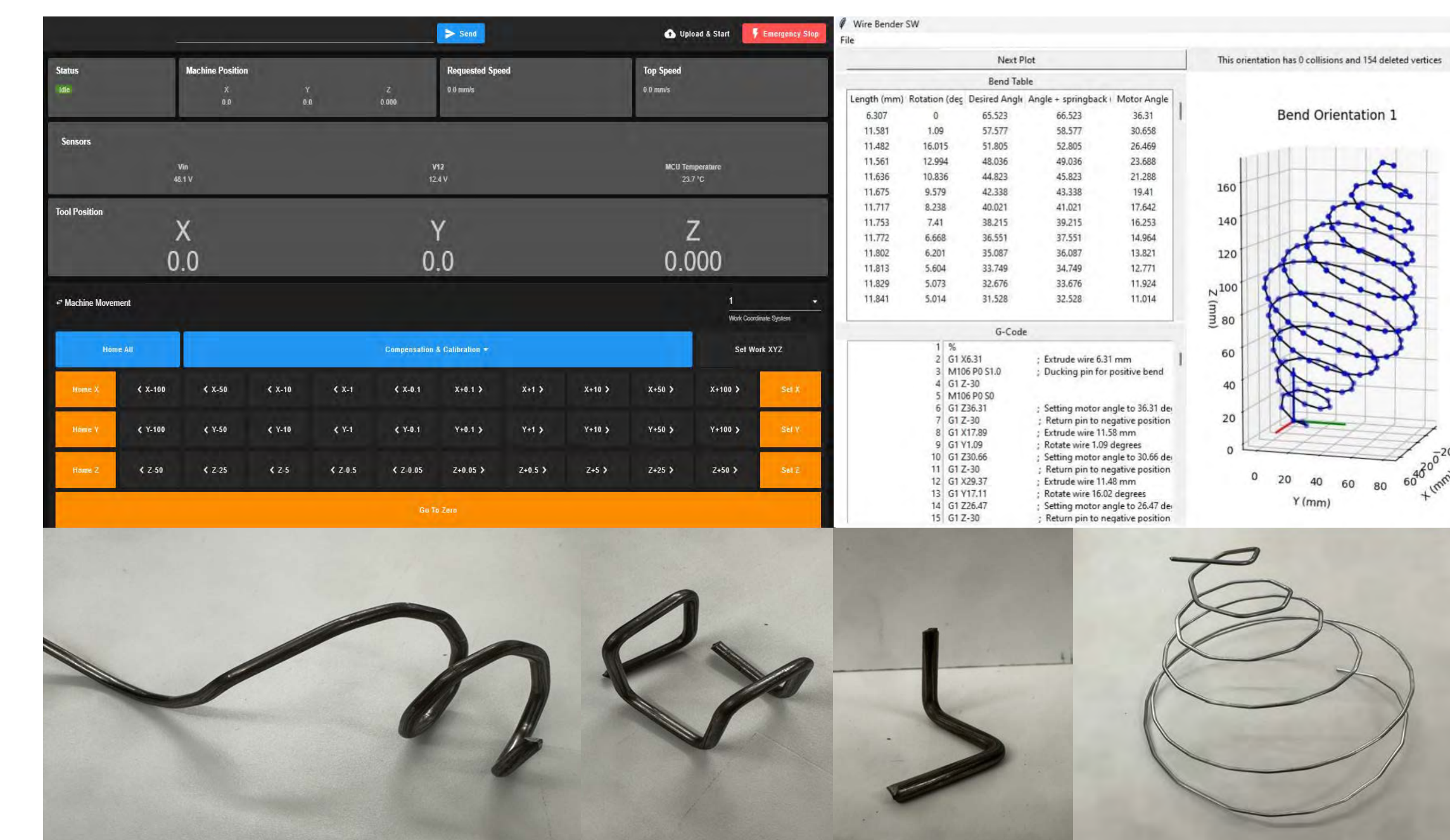
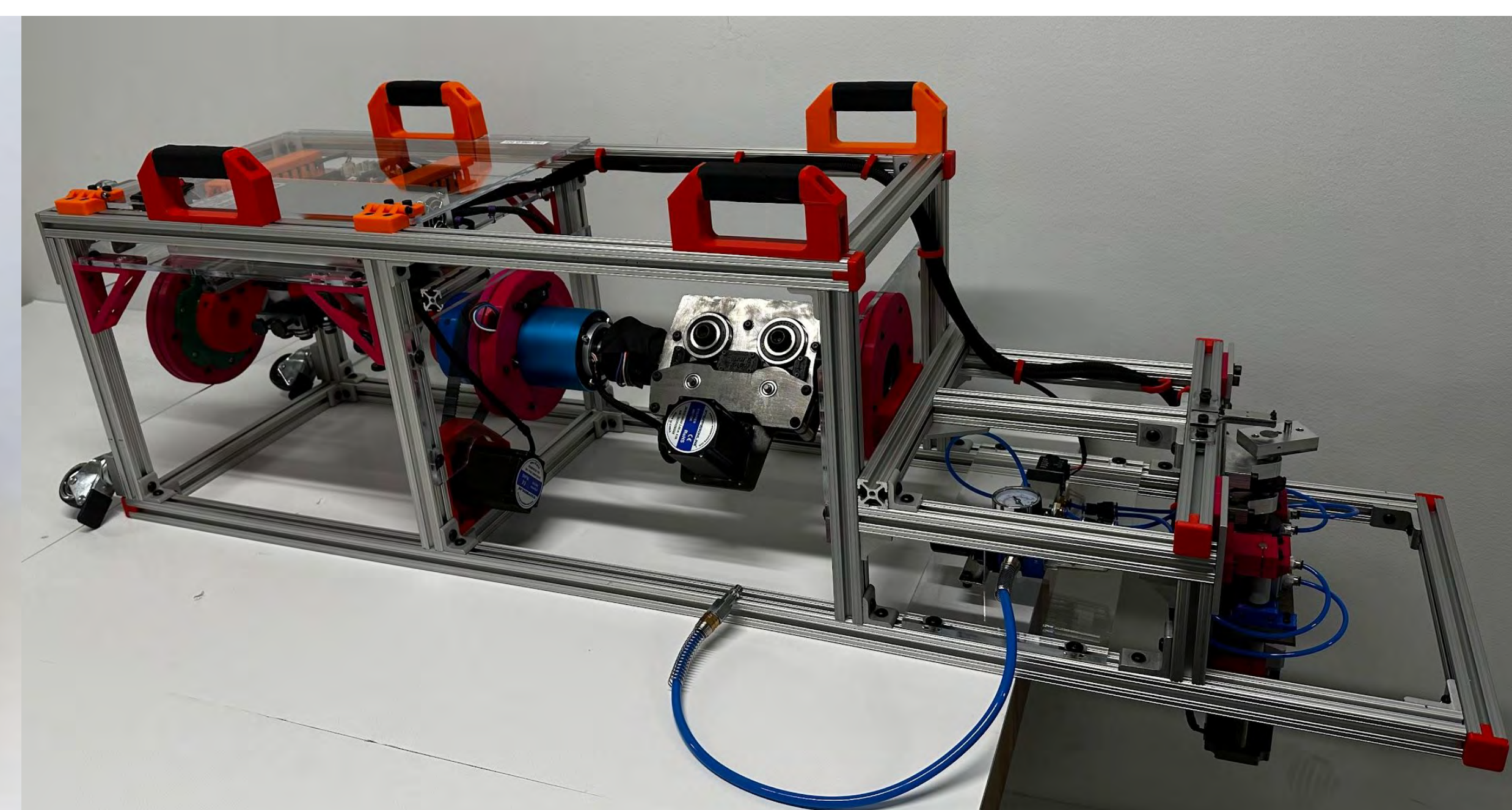
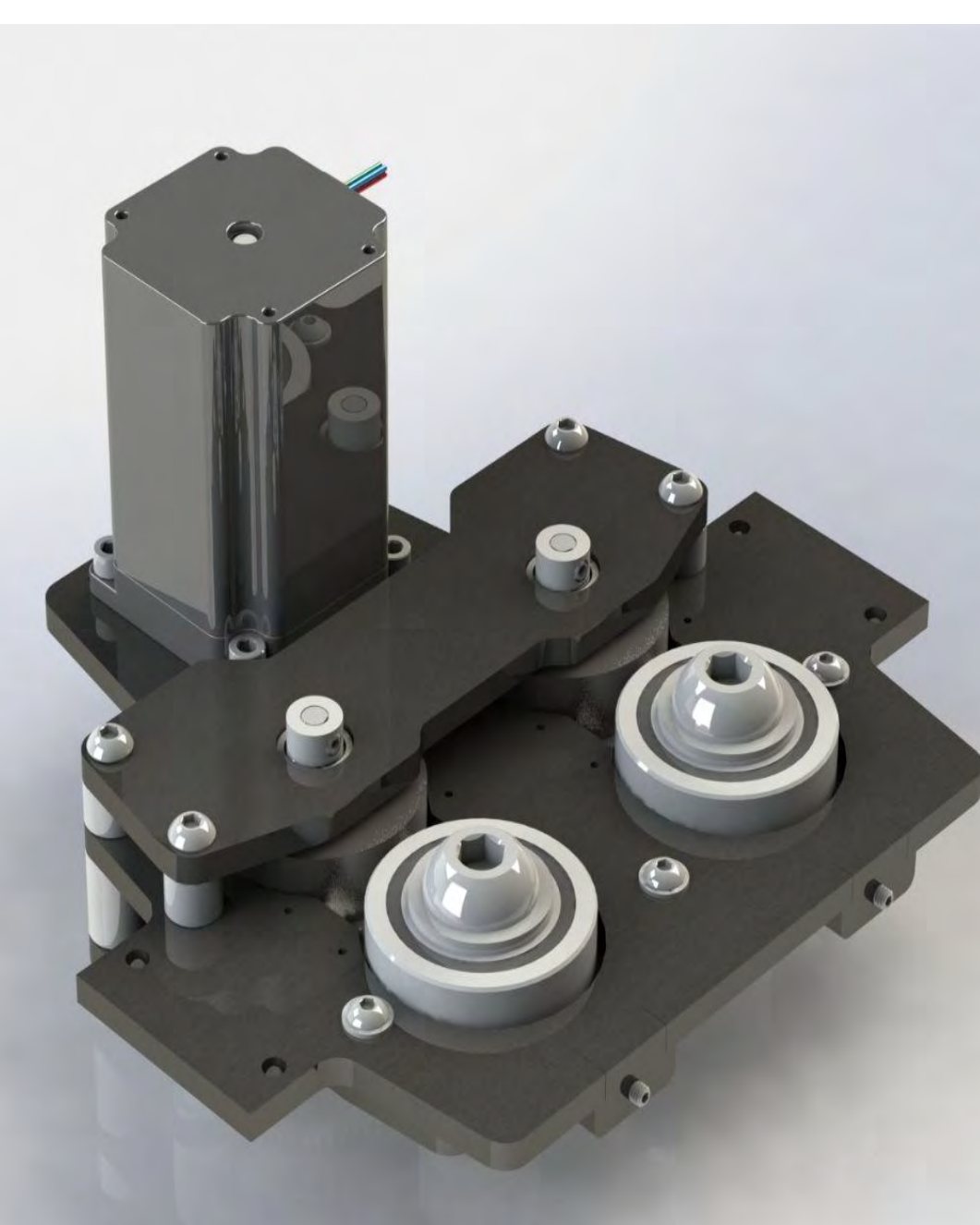
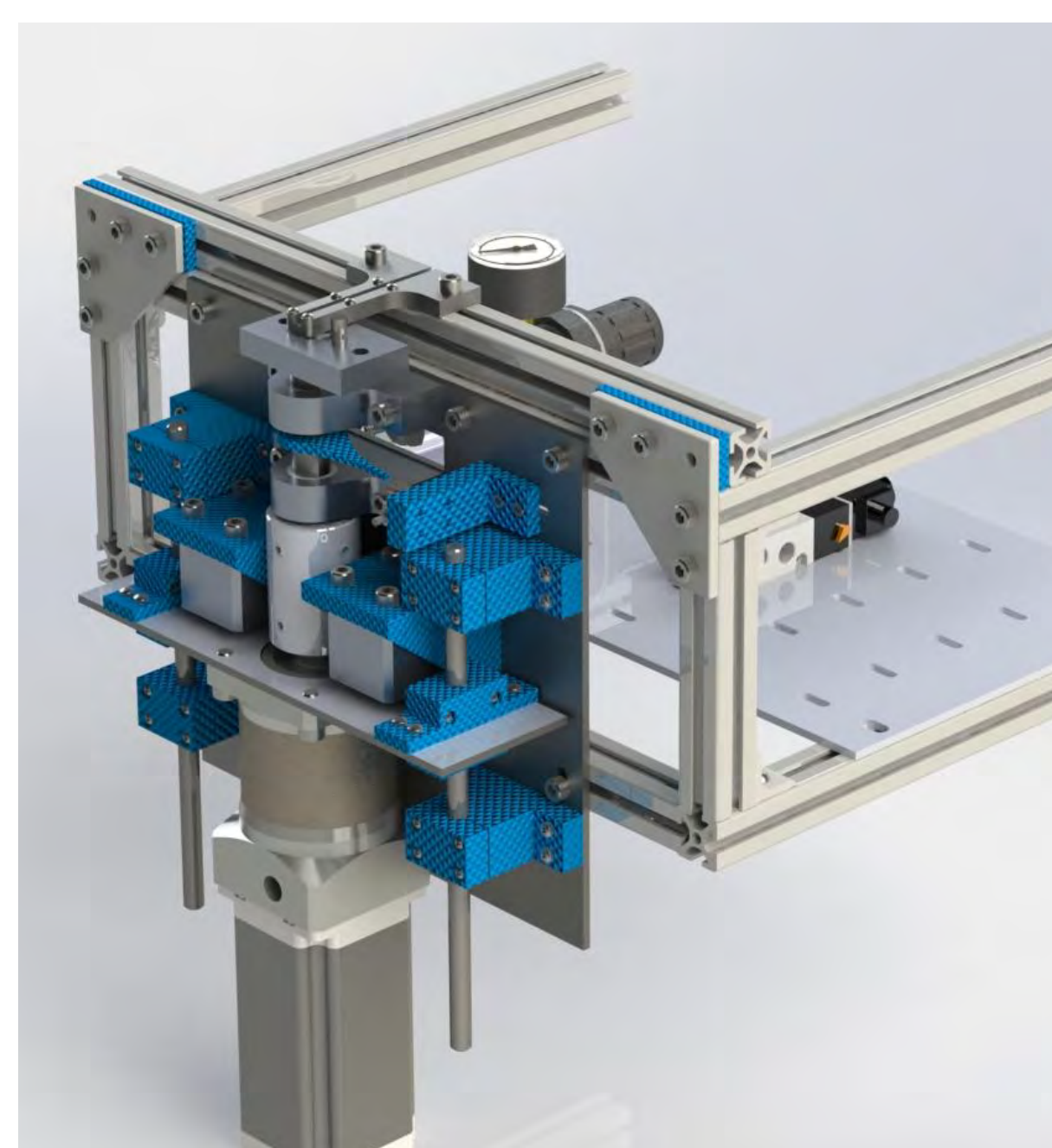
2D CNC wire bender price (\$3000)

PORTABLE

Small, lightweight, and on wheels

EASY

Simple interface for students and hobbyists



METHODS

Physical Model

- Feed mechanism pulls wire through straightener and feeds into bend area
- Feed and straightener rotate providing third bend axis
- Variable pin locations provide range of discretization resolutions
- Pneumatic controls raise and lower the bend head to bend in both directions
- Modular bend dies and adjustable wire feed for multiple wire sizes

Programming

- SOLIDWORKS macro generates CSV file
- User interface imports wire design from CSV file
- Calculates feed length, rotation angle, and bend angle from a set of points
- User interface displays potential collisions with machine
- Converts calculated parameters to G-code
- Duet web interface uploads G-code to Duet3D control board

RESULTS

- Bends wire in 3 dimensions with discrete bends
- Capable of bending to 180°
- Able to bend wire sizes between 0.5 mm and 3.5 mm diameter
- Able to bend hardened steel wire (i.e. spring steel or music wire)