Camilo Artigas

Product Design | Robotics | Hardware

Aspiring Mechatronics Engineer
cartigas@uwaterloo.ca | Website | LinkedIn | GitHub

Skills

Mechanical: Solidworks (CSWA), Ansys, GD&T, DFMA, FEA, 3D Printing, Machining, Root Cause Analysis, Actuators
Software: Python, C++, Arduino, MATLAB, Git, HTML, ROS2, PID Control, NumPy, Matplotlib
Electrical: Altium, Circuit Analysis/Design, Serial, PWM, Stepper and Servo Motors, Sensors

Experience

Mechanical Design Intern
Sep. 2024 – Dec. 2024

Sheartak Tools Ltd. *Waterloo, ON*

- 3D modelled 10+ spiral cutterheads in SolidWorks, drafting technical drawings using GD&T and to ensure all critical tolerances were met.
- Performed 6 cutterhead installations on planers and jointers in less than 7 hours, installing 50+ carbide blades per cutterhead while prioritizing safety at all times.
- Developed Python scripts with OpenPyXL and NumPy to automate the migration of 500+ products to a new website, saving 30+ hours.
- Optimized the cutterhead installation time of 20+ customers by drafting 5 detailed installation manuals.

Mechanical Designer & Project Manager
Aug. 2024 – Present

Waterloo Aerial Robotics Group *Waterloo, ON*

- Led the design of the drone's landing gear in SolidWorks for the 2025 competition, angling its legs to ensure concentricity with bucket for water retrieval; implementing depth limiters, anti-tipping bars and carbon fiber members.
- Optimized main drone assembly in PDM by implementing parametric modelling, allowing team members to change the parameters in real time, saving 10+ hours.
- Designed mount for an optical flow sensor, CV and IR camera, aligning them with the drone's direction of flight, saving weight and eliminating all vibrations.
- Designed an air speed sensor mount, leveraging Ansys CFD to optimize placement for improved measurement accuracy.
- Manufactured 5+ aluminum parts for fixed-wing aircraft using mill and lathe, meeting all tolerances.

Projects

Cycloidal Actuator | *SolidWorks, 3D Printing, DFMA, Python, Stepper Motors* **July 2024 - Present**

- Designed 130+ part assembly in SolidWorks, achieving a gear ratio of 23:1 with cycloidal speed reducer.
- Developed Python script that outputs instant visualization of the cycloid, reducing modelling time by 50%.
- 3D printed a backlash free functional prototype, projected to machine all parts after testing torque.

3-DOF Robotic Arm | *SolidWorks, 3D Printing, DFMA, Python, Arduino, Servo Motors* **Apr. 2024 - July 2024**

- 3D printed the robot with tight tolerances by iteratively designing it in SolidWorks and employing DFMA.
- Achieved smooth movement in the x, y and z axes by deriving the arm's inverse kinematics and implementing ramp libraries. This was facilitated by the use of 3 servo motors and 2 four-bar linkages.
- Established serial communication between Python GUI and Arduino IDE, achieving precise movement within workspace.

Autonomous Plant Watering Robot | *SolidWorks, 3D Printing, C++, Sensors* **May 2024 – Aug. 2024**

- Designed a 3D printed peristaltic pump with 20% occlusion to reliably water 6 plants under 1 minute.
- Designed a 3D printed rack and pinion mechanism, lifting the hose while converting rotation to linear motion.
- Achieved autonomy through the integration of an ultrasonic sensor, motor encoders and C++ scripts.

Education

University of Waterloo
Sep. 2023 – Present

Candidate for a Bachelor of Applied Science in Mechatronics Engineering *Waterloo, ON*

Relevant Coursework: Dynamics, Mechanics II, Data Structures and Algorithms, Materials Science, Circuits I, Calculus II

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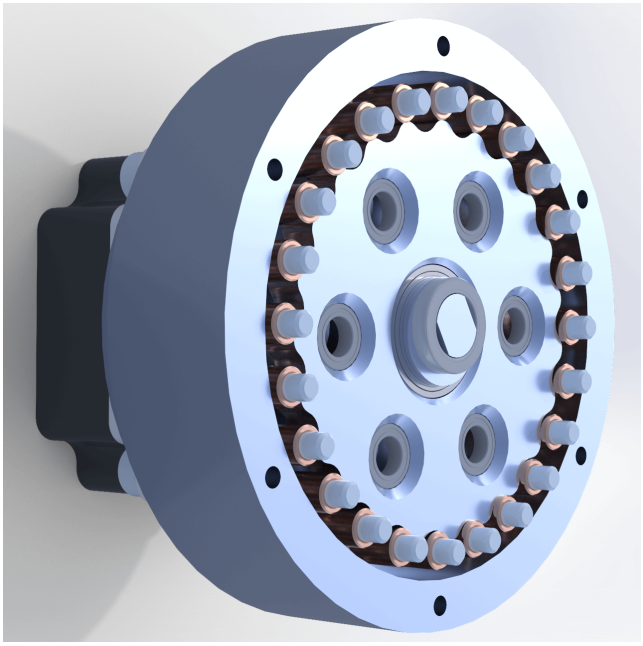
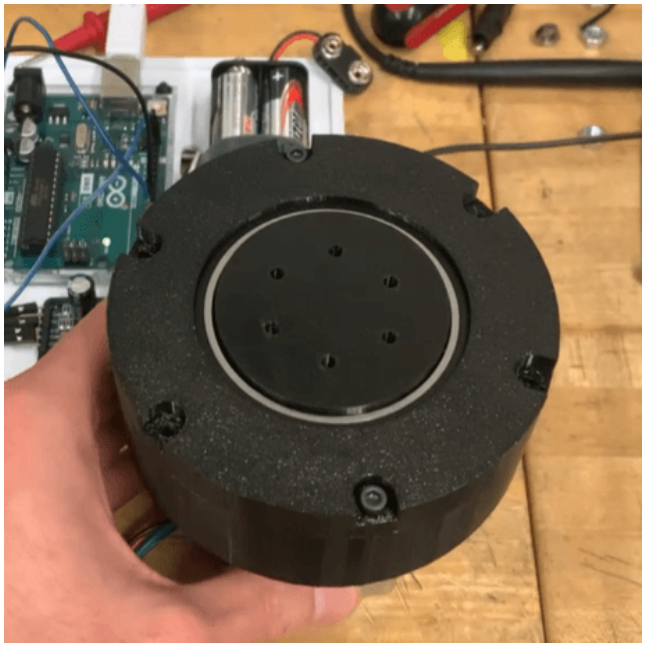
Cycloidal Actuator

Designed a 130+ part assembly achieving a gear ratio of 23:1 using a cycloidal speed reducer. Developed a Python script for instant visualization of the cycloid, reducing design time by 50%. Successfully 3D printed a backlash-free prototype. Currently planning to machine all parts after testing prototype's torque. (Code)



SolidWorks Model



Functional Prototype → WATCH HERE

Angled Landing Gear @ WARG

Designed landing gear tailored towards WARG's competition challenge: water retrieval by landing on a barrel. Implemented parametric modelling, saving 10 hours. Added key features such as: optimal angle, anti-tipping bars and depth limiters. The landing gear was successful every time it was tested.

SolidWorks Overview

Landing Gear in Action → WATCH HERE

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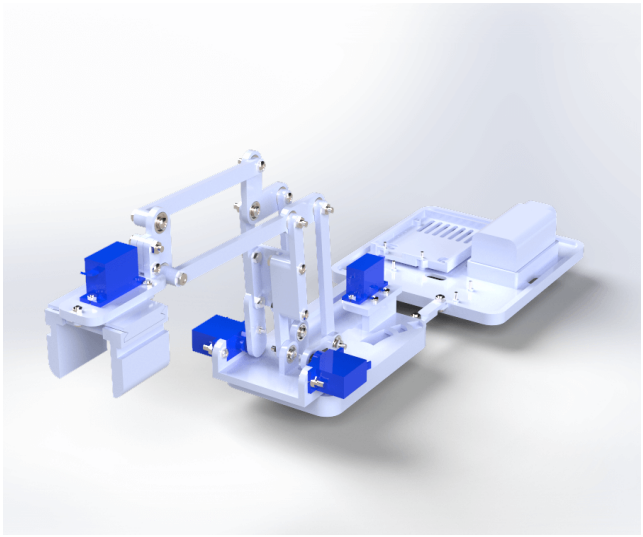
3-DOF Robotic Arm

Designed and programmed a robotic arm by deriving its inverse kinematics, achieving smooth movement along the x, y, and z axes using servo motors. Established serial communication between a Python GUI and Arduino IDE for precise control. (Code)

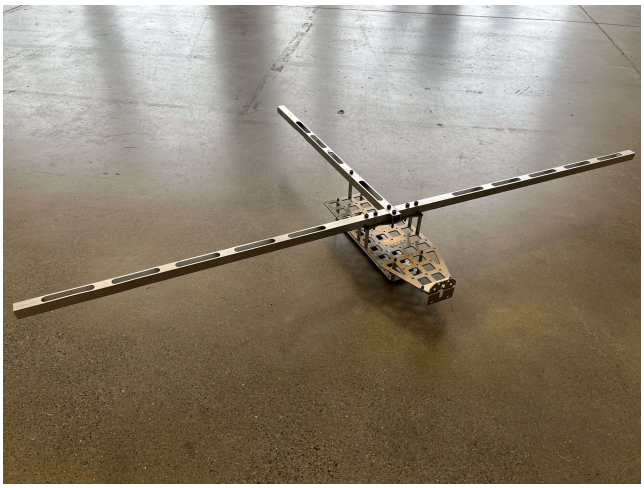


SolidWorks Model

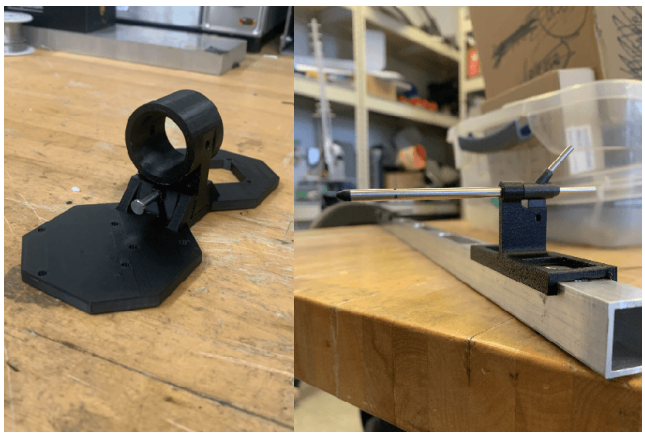
Robotic Arm Controlled with GUI → WATCH HERE

Manufacturing & Prototyping @ WARG

Leading the manufacturing of a fixed wing aircraft at WARG, using mills, lathes and 3D printing. I've also had the opportunity to design weight-saving, vibration-free sensor mounts such as an air speed sensor mount and a mount containing an OFS, IR and CV Camera.



Fixed Wing Frame



Monster Mount & Air Speed Sensor Mount

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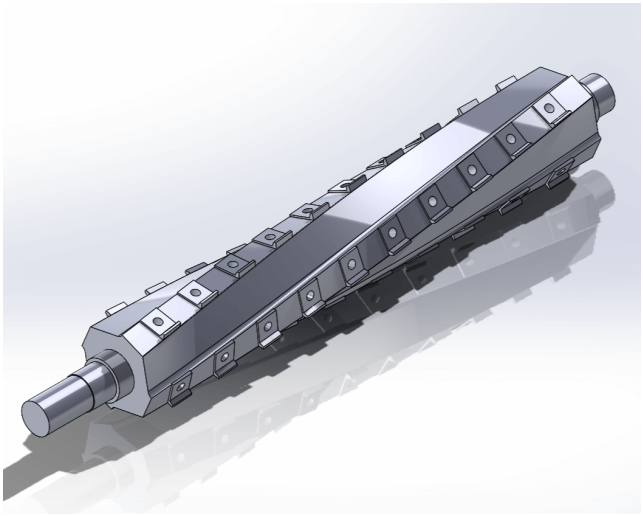
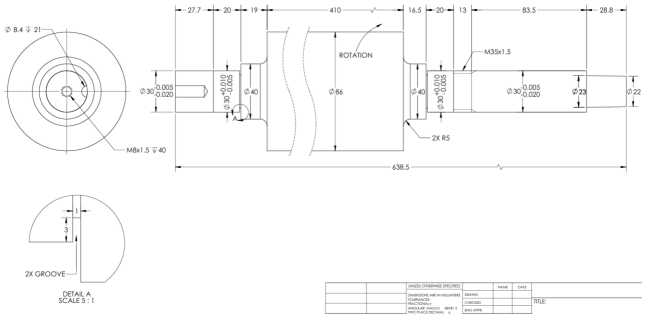
GD&T and Modelling @ Sheartak

During my internship at Sheartak, I had the opportunity to model several spiral cutterheads, creating engineering drawings for them capturing key features and tolerances.



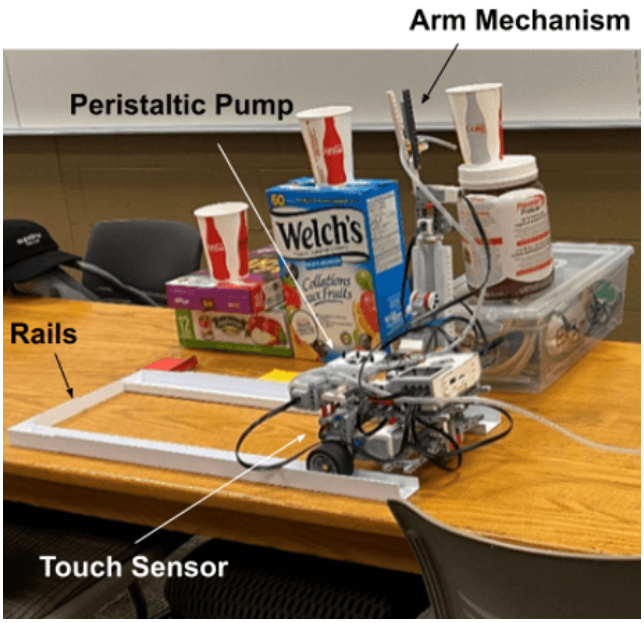
Spiral Cutterhead Solidworks Model



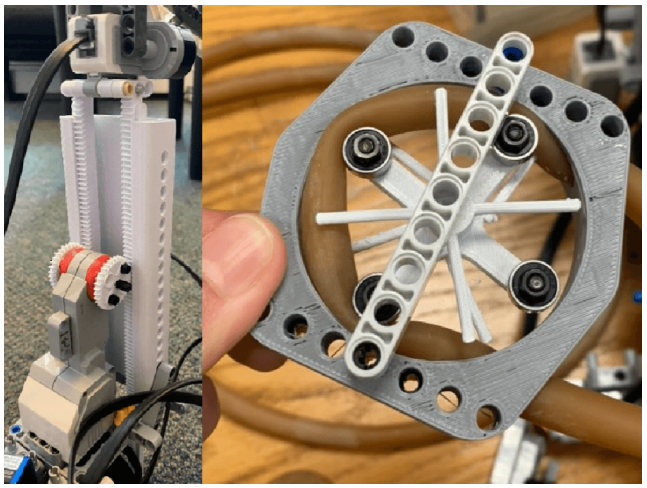
Engineering Drawing

Autonomous Plant Watering Robot

Designed a 3D-printed peristaltic pump with 20% occlusion, capable of watering 6 plants in under a minute. Built a rack-and-pinion mechanism to convert rotational motion into linear movement for lifting hoses. Achieved full autonomy by integrating an ultrasonic sensor, motor encoders, and C++ scripts.



Robot Watering Plant



Rack and Pinion Mechanism & Peristaltic Pump