

My Portfolio

MECHANICAL ENGINEERING AT THE UNIVERSITY OF Ottawa

Ahmed Yassine Ben Ayed

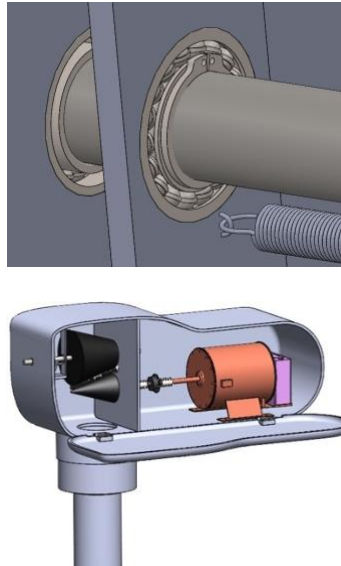
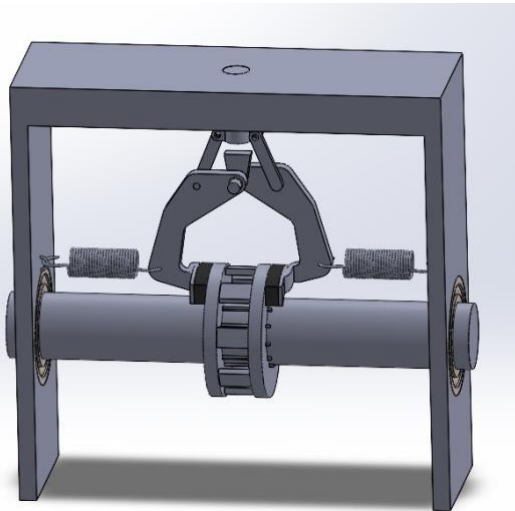
Summary

I am a 3rd-year Mechanical Engineering student at the University of Ottawa with strong interests in **automation systems (PLC, Arduino, embedded control)** and **CAD design**.

I enjoy working on engineering projects that combine **hands-on design with project leadership**, where I can contribute both technically and by guiding a team towards successful deliverables.

This portfolio highlights a selection of my most relevant **academic, professional, and personal projects**. Each project page follows a clear *What / How / Results* structure with visuals, and **all project titles are clickable links** to the corresponding GitHub repositories containing documentation, CAD models, and code.

Wind Turbine Nacelle



What?

- Designed a reliable nacelle for a horizontal-axis domestic wind turbine (client: Eole).
- Targeted Ontario's weather conditions and domestic energy needs.
- Delivered a complete report with CAD models, calculations, and assembly drawings.

How?

- Developed subsystems:
 - **CVT speed regulation system** for smooth adaptation of rotor speed to generator.
 - **Fail-safe braking system**
 - **Yaw control** with ring gear and pinions.
 - **50 kW permanent magnet generator + LiFePO4 battery** for storage.
- Integrated bearings, shafts, couplings, and optimized materials (fiberglass, steel).
- Modeled in SolidWorks, with detailed CAD and 2D drawings.

Results

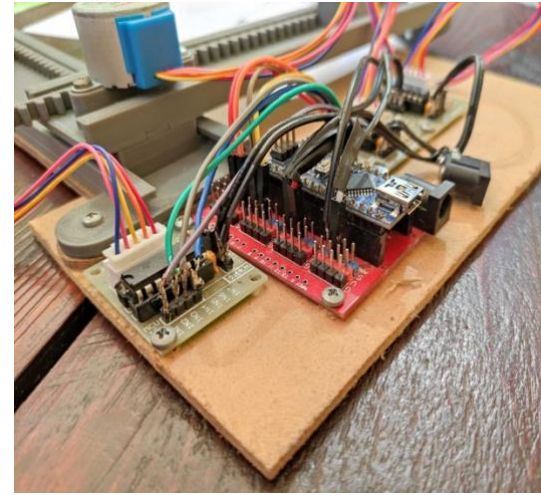
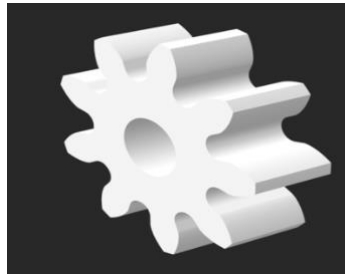
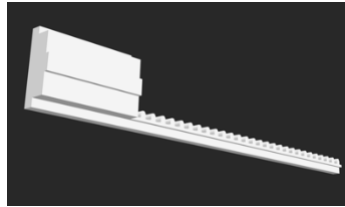
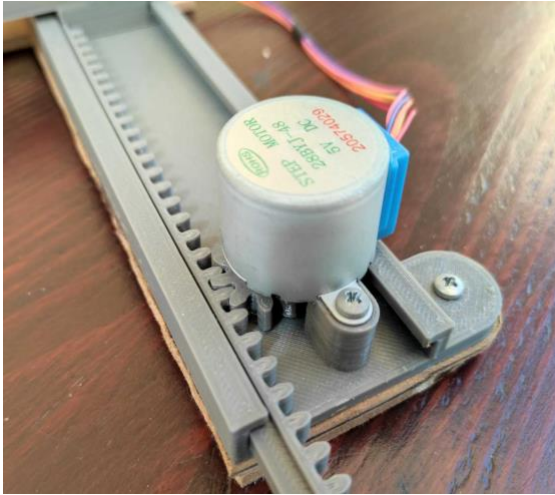
- Produced a full design meeting client requirement for efficiency, durability, and maintainability.
- Optimized robustness and ease of assembly/maintenance with local materials.

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2D Mini Printer



What?

- Designed a prototype linear actuator using a 28BYJ-48 stepper motor, Arduino Nano and SolidWorks.
- Intended for precision motion applications (e.g., CNC mini-systems, automated mechanisms).

How?

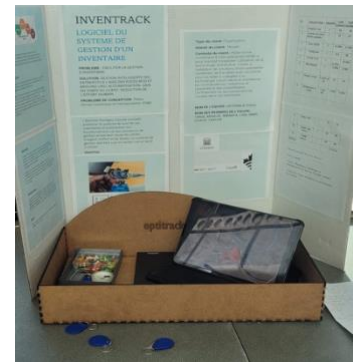
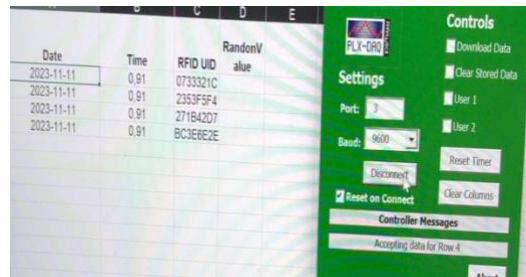
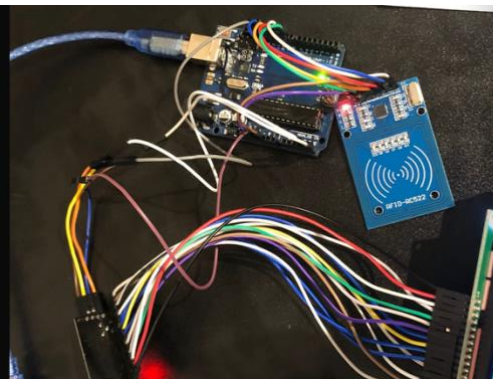
- Built with 3D-printed components (rack, pinion, sliding rail, holders) on a wood/MDF baseplate.
- Controlled via Arduino + ULN2003 driver, enabling step control and calibration routines.

Planned Improvements

- Prototype partially functional; identified issues in **smoothness**.
- Next iterations will integrate **end-stop detection**, improved 3D-printed tolerances, and optimized Arduino code for smoother motion.

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Inventory Management System - Inventrack



What?

- Designed and implemented an **RFID-based inventory system** to automate check-ins and check-outs.
- Developed as part of a university project with **Shared Services Canada** as client.

How?

- Built using Arduino UNO, RC522 RFID reader, tags, LEDs, and buzzer for real-time feedback. RC522 RFID reader.
- Integrated with **Excel via PLX-DAQ** for live data logging (date, time, UID) and visualization.

Results

- Fully functional demo presented with **poster + live system**.
- Improved **traceability** and reduced **manual errors** in inventory management.
- Reduced project costs by **55%** through optimization strategies.

