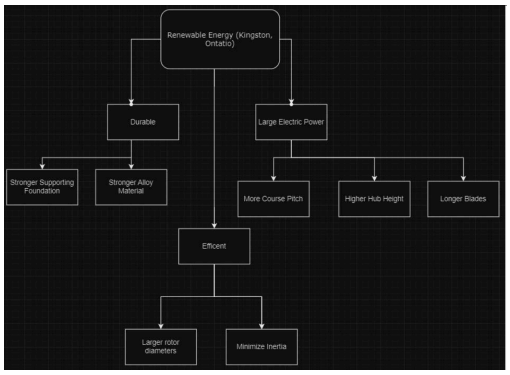
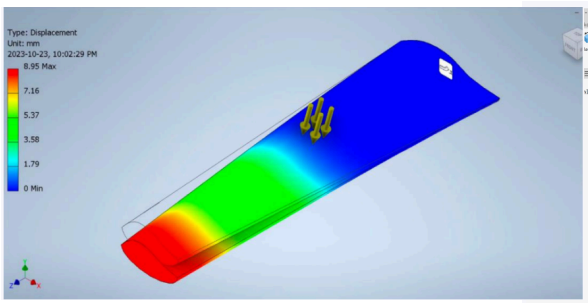
MARK ATALLA

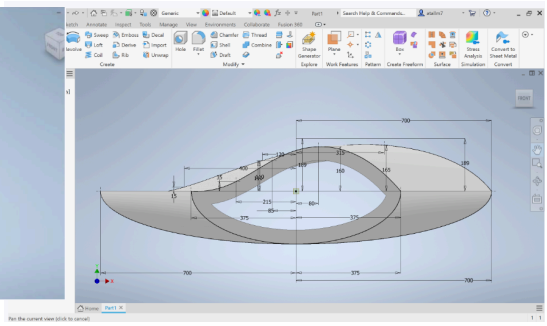
ELECTRICAL ENGINEERING STUDENT

atallm7@mcmaster.ca
linkedin.com/in/mark-atalla7
https://atallm7.github.io/portfo/
416-700-0537

RENEWABLE TECHNOLOGY CHALLENGE PROJECT 1







What?

- Designed a wind blade to address Guatemala's weather and maintenance constraints.
- Performed a **needs analysis** to initiate the design process

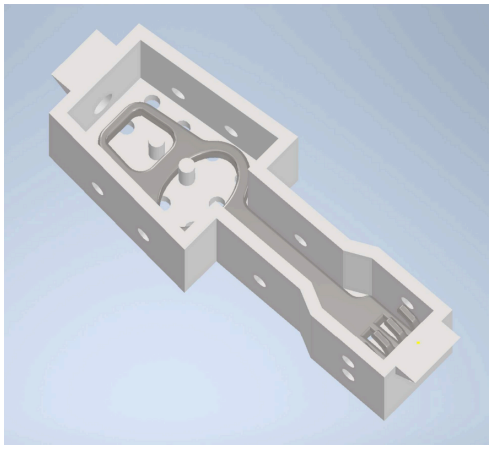
How?

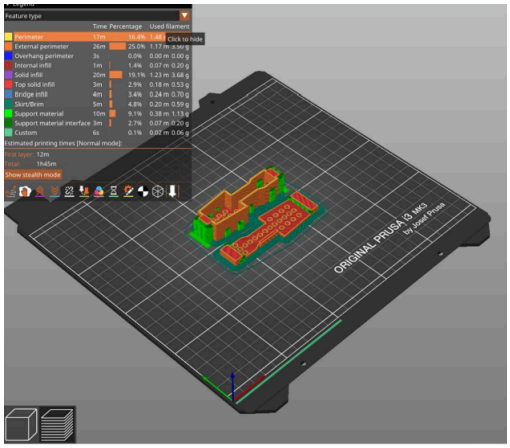
- Used **stress analysis** features in **Autodesk Inventor** to design this
- Focused on selecting durable materials, optimizing blade design, and implementing efficient energy storage systems.

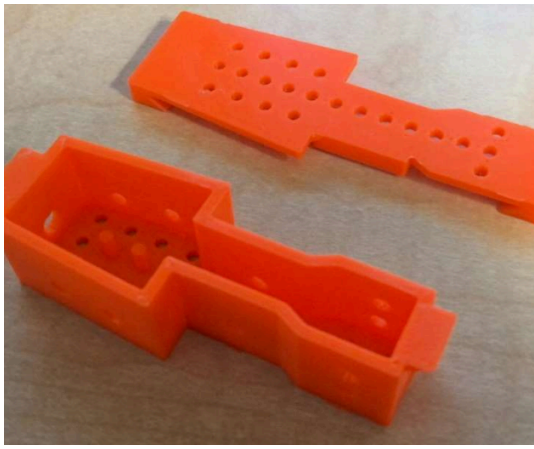
Results

- Enhanced design for **longevity and low maintenance costs,** providing a consistent electricity supply.

GET A GRIP PROJECT 2







What?

- The team was tasked with **designing** a tool-holding container and a program to command a **robotic arm** for precise tool transport.

How?

- **Designed** a custom container for a retractor tool, with holes for **sterilization** and **internal extrusions** to prevent sliding during transport.
- Iterated the design to meet weight (350g) and print-time constraints.
- Developed an **algorithm** to control a robotic Q-arm for efficient tool pickup, rotation, and drop-off.
- Utilized **coordinates and sensors to ensure precise placement in the autoclave.**

Results

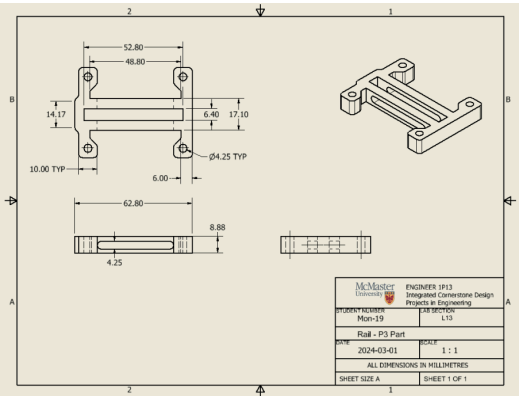
- The final design met all functional requirements, **enabling automated tool transport and sterilization,** enhancing efficiency for space missions.

MARK ATALLA

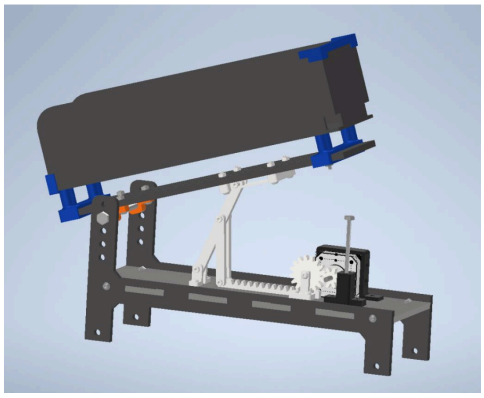
ELECTRICAL ENGINEERING STUDENT

atallm7@mcmaster.ca
linkedin.com/in/mark-atalla7
https://atallm7.github.io/portfo/
416-700-0537

REVENGE OF THE RECYCLING SYSTEM PROJECT 3




```python
def return_home():
  n = True
  bot.activate_line_following_sensor()
  while n == True:
    sensor_reading_line = bot.line_following_sensors()
    bot_position = bot.position()
    print(bot_position)
    if 1.45 < bot_position[0] < 1.55 and 0.000730 < bot_position[2] < 0.000760:
      #If the robot is within a specific range of coordinates, it stops and completes t
      n = False
      bot.stop()
      bot.set_wheel_speed([0, 0])
      print("Return home complete")
    if sensor_reading_line[0] == 1 and sensor_reading_line[1] == 1:
      bot.set_wheel_speed([0.03, 0.03])
    elif sensor_reading_line[0] == 1 and sensor_reading_line[1] == 0:
      bot.set_wheel_speed([0, 0.03])
    elif sensor_reading_line[1] == 0 and sensor_reading_line[0] == 1:
      bot.set_wheel_speed([0.03, 0])
    else:
      n = False
      bot.stop()
      bot.set_wheel_speed([0, 0])
      print("Off course. Stopping travel")
      #If the robot goes off course, it stops, prints a message, deactivates the line f
bot.deactivate_line_following_sensor()
bot.stop()
bot.forward_distance(0.1)
```



What?

- A new automated system integrates material detection algorithms with a mechanical sorting mechanism **to enhance recycling accuracy, efficiency, and sustainability within strict design constraints.**

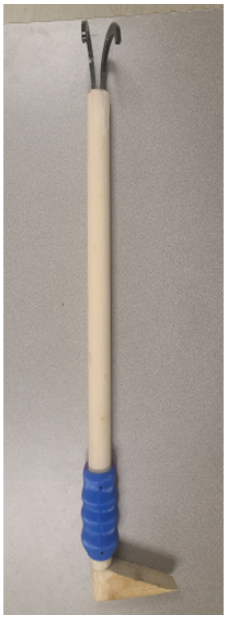
How?

- Utilizes a two-bar linkage powered by a rotary actuator and a rack-and-pinion assembly with a 2:1 gear ratio for increased torque.
- **Virtual modeling in Autodesk Inventor.**
- Includes **functions for autonomous container sorting via Q-Bot and Q-Arm, utilizing sensor-based line** following and material identification.

Results

- The system successfully met design constraints, with the **mechanical and software components enabling precise and efficient recycling automation.**

POWER IN THE COMMUNITY PROJECT 4



What?

- The task was to **design** a device to **help** a client **with spine bifida** while ensuring e**ase of use, reliability, and low cost.**
- We ended up designing a door opener to help her open door that are not **wheelchair accessible.**

How?

- A **lightweight** wooden rod with **two hook-like prongs for pulling various door handles** (lever or knob) and a door stopper at the opposite end.
- Includes a **grip for comfortable** operation and to minimize physical effort.

Results

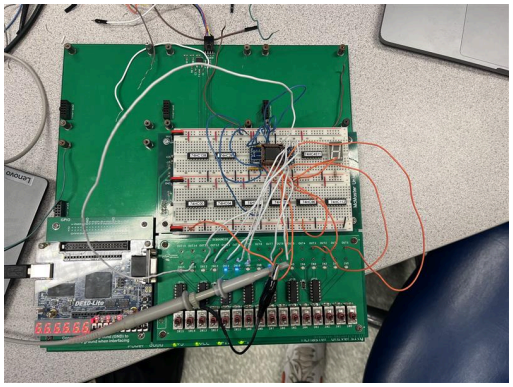
- The prototype **reduces physical strain** by extending reach and holding doors open, making door entry **safer** and **easier** for the client.

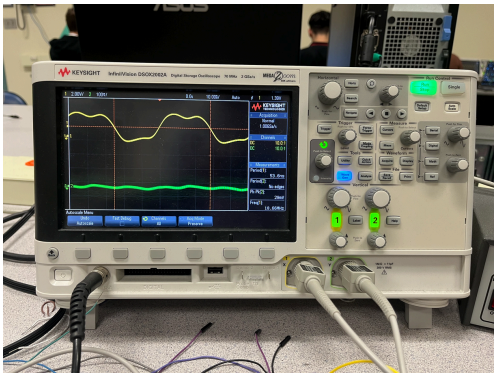
MARK ATALLA

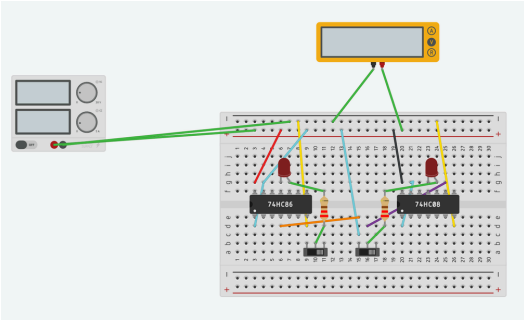
ELECTRICAL ENGINEERING STUDENT

atallm7@mcmaster.ca
linkedin.com/in/mark-atalla7
https://atallm7.github.io/portfo/
416-700-0537

HARDWARE DIGITAL CIRCUIT LABS







What?

- This project involved designing, assembling, and testing a digital circuit system using **integrated circuit**s (ICs), breadboards, and other hardware components. The goal was to implement and validate a functional logic circuit and measure its performance with electronic test equipment such as **oscilloscopes**.

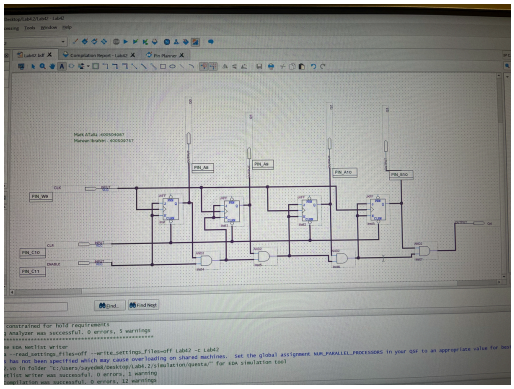
How?

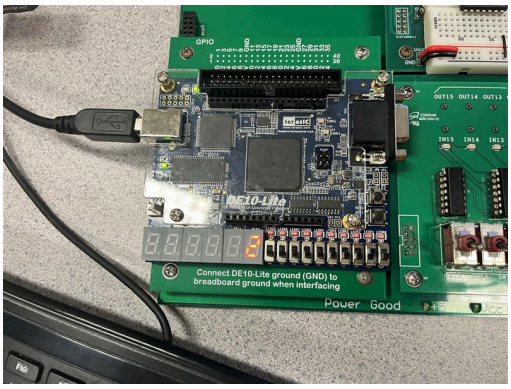
- Utilized a **breadboard** for prototyping and interconnected multiple components, including ICs and jump wires, to implement the desired logic circuit.
- Set up **dual-channel** monitoring to observe and compare different points in the circuit, ensuring accurate signal integrity.

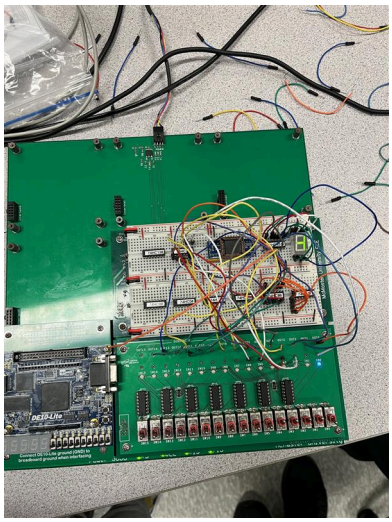
Results

- Enhanced proficiency in using test equipment such as **oscilloscopes** and **debugging** tools, as well as in creating **detailed schematic**s for documentation purposes.
- Verified accurate signal propagation and stability through oscilloscope readings, confirming proper logic gate operation and voltage levels.

QUARTUS LABS







What?

This project focused on designing, programming, and implementing a digital logic system using an **FPGA (Field-Programmable Gate Array)** platform. The task involved using Quartus software to create and simulate a digital circuit, programming the FPGA, and validating the results through a physical prototype.

How?

- Integrated **GPIO** pins and utilized onboard LEDs and displays to debug and monitor circuit operations.
- Performed **simulations** within the software to validate the design and ensure it met functional requirements without errors.
- Connected the FPGA to an external breadboard circuit for further testing and debugging.

Results

- Gained practical experience wit**h Quartus software, FPGA programming, and hardware debugging**, along with efficient use of prototyping tools like breadboards and peripheral components.
- Successfully programmed and implemented the **digital circuit** on an FPGA board with accurate functional output.