

Salih Al-Tak

Engineering Portfolio

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Summary

ABOUT ME

I'm a dedicated fourth-year mechanical engineering student at McMaster University, currently on a co-op term at Stackpole International. My academic journey has fueled my unwavering passion for the world of automotive engineering, and my real-world experience at Stackpole further enriches my perspective.

In addition to my professional pursuits, I thrive on staying active and engaged. Exploring the outdoors, traveling, and immersing myself in diverse cultures are passions that invigorate me and enrich my life experiences.





ENGINEERING



Volunteering
Solutions

VOLUNTEER - INTERN - TRAVEL

EDUCATION AND EXTRACURRICULARS

- **McMaster University**
 - Bachelor of Mechanical Engineering (Co-op)
 - Relevant Courses: Manufacturing Engineering, Thermodynamics, Fluids Mechanics, 3D Modelling and Printing, Heat Transfer, Machining, Engineering Mechanics, Statics and Mechanics, Kinetics and Dynamics, Programming.
- **McMaster Society of Mechanical Engineering**
 - Third Year Representative
- **Volunteering Solutions**
 - Sports Development Program Member in South Africa

Ergonomic Snow Shovel

• What?

- Developed an innovative Ergonomic Snow Shovel device prioritizing safety, affordability, and ergonomic design.
- The device incorporated motors and actuators to help mitigate the stress on the user's back while ensuring safe snow release



• How?

- Leveraged iterative application of **DFA** and **DFM** principles to optimize cost, ergonomics, and efficiency during the de-sign phase.
- Conducted thorough calculations to verify the material and motor capabilities, ensuring they could effectively withstand the weight of the snow load.

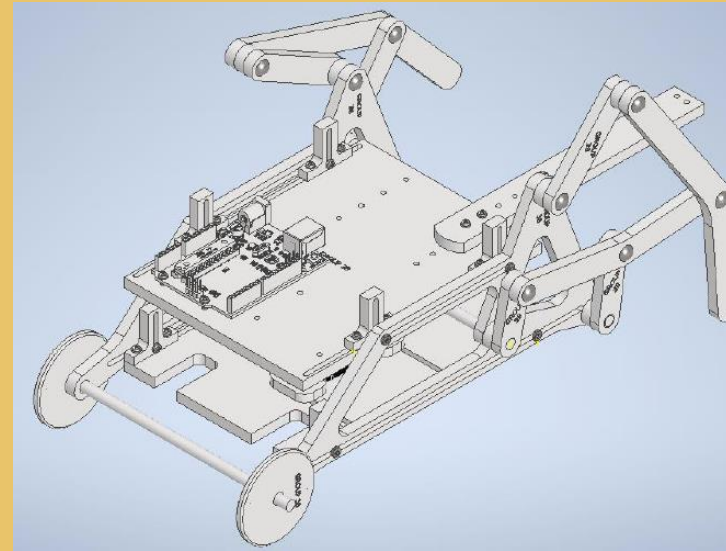
• Results

- Achieved successful prototype manufacturing through the implementation of **Geometric Dimensioning and Tolerancing (GD&T)** principles in the technical drawings.
- Demonstrated superior results through the successful manufacturing and testing of the ergonomic snow shovel prototype, showcasing enhanced safety, cost-effectiveness, and ergonomic benefits.



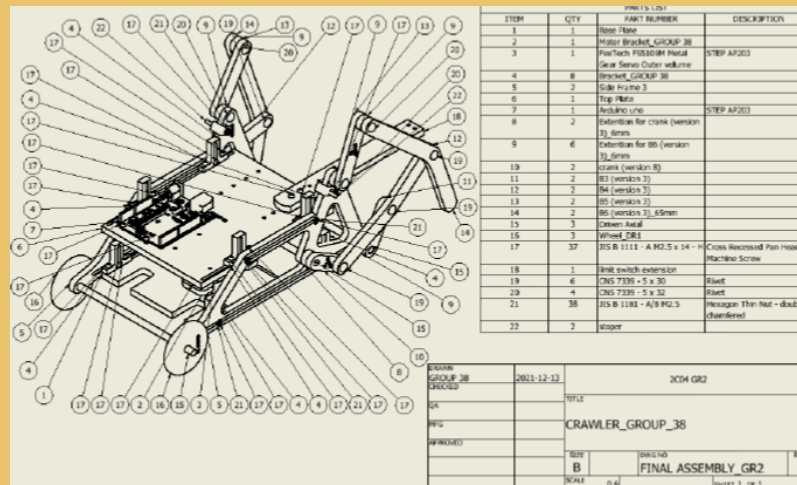
Kinetic Robot

- What?
 - Modelled and Assembled, a robot with a complex linkage system that used a propulsion mechanism to complete predetermined course.



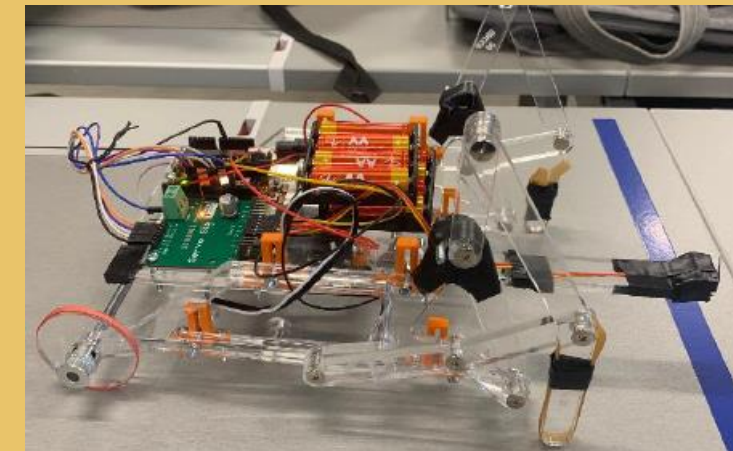
Results

- Increased the robot's velocity by 25% by implementing a series of rubber bands on contact points to increase friction and reduce slippage
- Received outstanding recognition for creativity and speed, earning a rating in the top 90th percentile within the class.



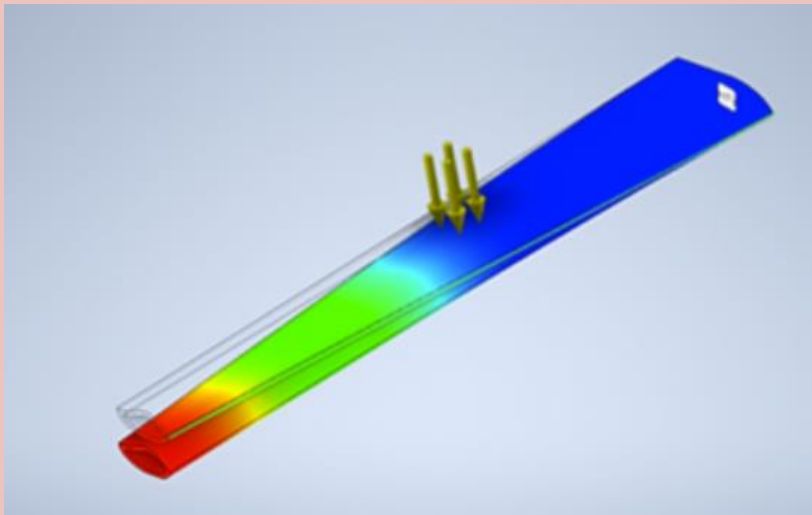
How?

- Conducted tolerance calculations and leveraged **Solidworks simulation** to optimize structural rigidity and fabricated the components accordingly using **3D printing** and **laser cutting** technologies.
- Programmed an **Arduino microcontroller** to control the motors movements through a responsive switch interface.



Wind Turbine Blade

- **What?**
 - Designed a wind turbine blade, meeting specific mechanical requirements and enhancing operational efficiency. The project focus on optimizing the material and geometry of the turbine blade for optimal efficiency.

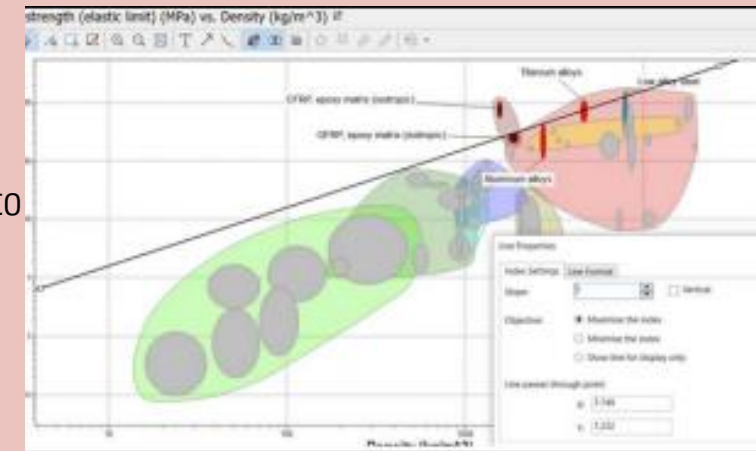


How?

- Performed stress analysis via **Autodesk Inventor**, optimizing component dimensions to meet deflection requirements.
- Utilized **ANSYS-Granta EduPack** for smart material selection, enhancing wind turbine performance and longevity by optimizing weight-to-stiffness ratio.

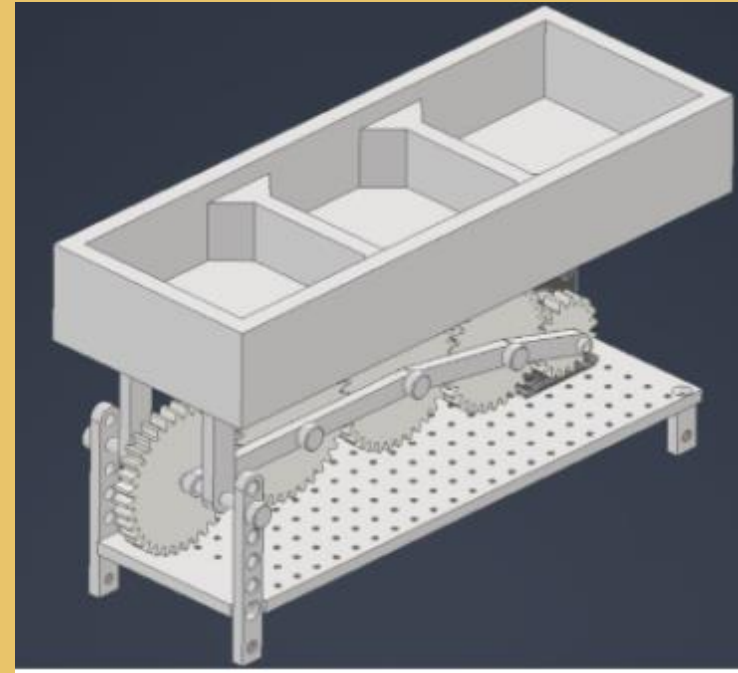


- **Results**
 - The wind turbine blade underwent optimization, resulting in enhanced efficiency and structural robustness. The new design met the mechanical requirements and was able to operate efficiently in an **FEA simulation**.



Waste Management System

- What?
 - Design a system for sorting and recycling containers to reduce the number of recyclable materials that are lost every year due to inadequate waste management.
- How?
 - Developed a program using **python** which allowed a Q-arm and a Q-bot to place the objects in the appropriate compartments in a simulated environment. Maximized the efficiency of the system by optimizing the distance travelled by both systems.
 - Used **Autodesk Inventor** design and draw the gears and container



- Results
 - The designed system presents a promising solution for reducing the loss of recyclable materials due to inadequate waste management, demonstrating potential for real-world application and environmental impact

Co-op Experience

- Stackpole International: Process and Product Development Engineering Intern (May 2023 – August 2024)
 - Leveraged **Python**, **SQL**, and **JMP** to proficiently acquire and analyze extensive data for a vehicle transmission benchmarking system, generating informative visualizations that improved decision-making processes.
 - Utilized **SolidWorks** for designing and creating models of various gears, ensuring effective production and assembly through adherence to **DFM** and **DFA** principles.
 - Conducted an in-depth **Root Cause Analysis** to investigate the causes of premature gear failure. Leveraged and conducted mechanical testing to pinpoint the underlying issues.
 - Collaborated with senior engineers in the design and development of mechanical components, including the creation of manufacturing feasibility studies, to ensure project objectives were met seamlessly from concept to production.



Thank you

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