KOBE PAAS

Mechanical Engineering at the University of Waterloo

SKILLS

Design

- SolidWorks
- AutoCAD
- Fusion 360
- Onshape
- KiCAD
- Ansys/SolidWorks FEA
- Granta CES Edupack

Hardware

- Arduino
- Motors and Drivers - Stepper, Servo & DC
- Electrical Power Connectors
- Raspberry Pi
- IoT Sub-1 GHz MCUs
- DC Solar Panels

Manufacturing/Production

- FDM 3D Printing
- Test Fixture Design
- DFM - Injection Moulding
- Hydraulic Process Equipment
- Mill & Lathe
- Metabase
- ERP Systems

Software

- React & React Native
- MATLAB & Simulink
- Python
- C, C++
- HTML & CSS

EDUCATION

University of Waterloo
Mechanical Engineering
Sep 2020 - Apr 2025

- Cumulative GPA: 89%
- Dean's Honour List
- Excellent Academic Standing

CONTACT

k@kobepaas.com

(647) - 964 - 5623

https://www.kobepaas.com

www.linkedin.com/in/kp43

EXPERIENCE

OtO Lawn | Mechatronics Product Design Co-op

Toronto, ON | Jan 2024 - Apr 2024

- Re-designed a user facing external power connector. Validated designs by building test fixtures for temperature cycling and water submersion. DFM by modifying injection moulded parts for the connector to integrate into the device. Design will be used in the production of 80k units.
- Designed a fixture using solenoid valves controlled by a Raspberry Pi and Python script to cycle hot and cold water through the product. Test was used to evaluate the seals within the OtO unit.

Woodbridge Group | Mechanical Engineering Co-op

Mississauga, ON | May - Aug 2023

- Designed a nozzle testing fixture using a closed-loop pump system with flow and pressure gauges. Certified 40 nozzles resulting in zero downtime in industrial hydraulic process equipment.
- Re-engineered an industry standard hydraulic pourhead by dismantling, sourcing parts, and building a tight tolerance assembly in SolidWorks. The customer then approved a prototype.
- Studied mechanical failure mechanisms in pourhead equipment, presented analysis, and implemented design improvements to mitigate issues ensuring zero mechanical failure in 2 months.

Cover Technologies | Production and Quality Intern

Los Angeles, CA | Sep - Dec 2022

- Gathered production assembly data to create a plan that schedules work orders in an ERP system. Reduced factory downtime, and was implemented for the manufacturing of 4 pre-fab homes.
- Reviewed BOMs and CAD assemblies in Onshape and released work orders to the production floor. Resulted in issue-free fulfillment of hundreds of production work orders.
- Developed a safe and efficient foaming process for structural wall panels by optimizing shot timings for chemical mixing. Resulted in the completion of 50 wall panels.

Canada Post | Process Engineering Co-op

Mississauga, ON | Jan - Apr 2022

- Designed a process flow for sorting mail by creating plant layouts in AutoCAD, ordering equipment, and developing SOPs. Process was implemented within a unionized production facility.

Lorcan Technologies | IoT and Automations Co-op

Waterloo, ON | May - Aug 2021

- Developed a proof of concept long range mesh network by programming microcontrollers in C, and monitoring the network using a React dashboard that resulted in the network expanding by 50m.
- Designed a durable enclosure in SolidWorks that protects RF transmitting electronics from harsh outdoor conditions by sourcing appropriate materials using CES Edupack. The air-tight design had solar panels integrated and was shared with investors as a future product concept.
- Determined the power output from DC Solar Panels by prototyping a charging circuit under various environmental conditions. This validation was used to justify the direction of product development.

PERSONAL PROJECTS

Autonomous Tank

- Integrated Arduino with electronic components including motors, sensors, and battery subsystems to create a tank that drives 3 hours continuously avoiding collisions with it's surroundings.
- Project required research into battery capacity, power consumption, and sensor accuracy learning the basics of circuit design. Achieved a speed of 5 km/hr, 0m turn radius, and low-light operation.

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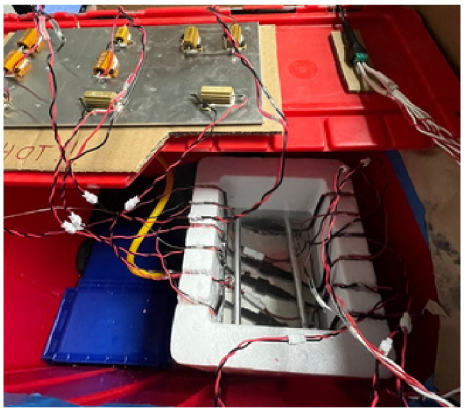
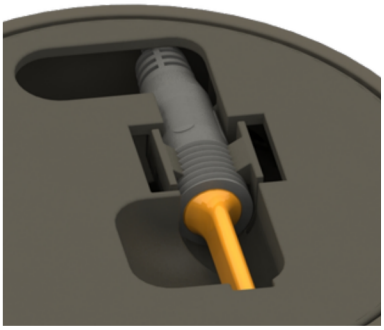
OTO CONNECTOR DESIGN

Used mechanical testing to validate a new user-facing power connector, followed by implementation into OtO's smart-home product.

Mechanical Testing

- Submersion test (upper left) determined which connectors continuously seal when submerged in water. Tracked the current at a fixed voltage to indicate if a connector corroded over time.
- Built temperature cycling fixture (upper right) that shocks connectors with hot and cold water to determine if seal performance is affected by rapid temperature fluctuations.
- Cycled connectors verifying that the selected design can withstand expected lifetime of 50 mating cycles.
- These tests narrowed down to 2 connector options which was resolved by considering the UX implications of each design.



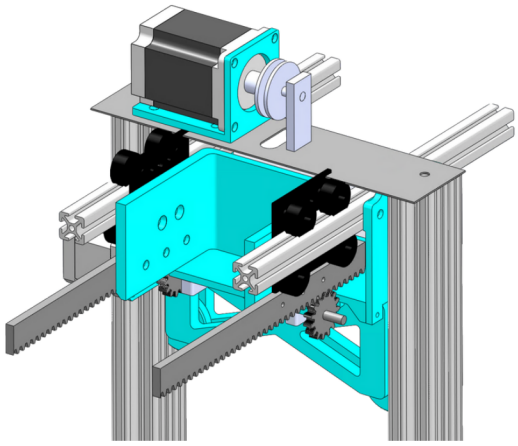


Implementing Connector Into the Product

- Used a cantilevered snap design to hold the connector to the base of the product and can be easily removed by the user.
- A rubber plug (orange) is attached to the base of the product and seals the jack side of the connector when it is not in use.
- Developed SolidWorks FEA simulation to ensure the snap would bend so that the connector can be pressed in and remain snug. Also needed to verify against yielding of injection moulded part.
- Design was verified by 3D-Printing a few iterations, and will be implemented into next year's production of 80,000 devices.

MECHANICAL DESIGN PROJECT

Third year design project of an electromechanical device that transports a 3kg object of any geometry to two distinct drop-off locations.



Motor Selection

- Performed torque, power, and speed calculations to spec the 3 motors required for this design.
- High-torque stepper motors used for the elevator and the rack and pinion mechanism that loads/unloads the elevator.
- Servo motor used to pivot a diverter arm to direct the object to the correct drop-off location.

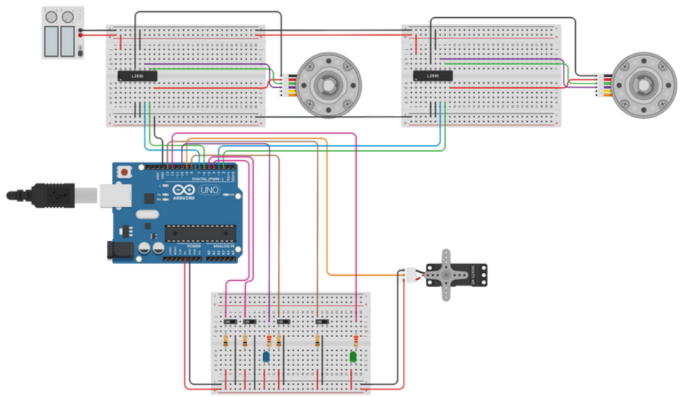
3D-Printing

- 3D-Printed load-bearing components such as the elevator carriage, motor mounts, and diverter arm using my FDM printer.

Designed and Implementing Electrical Schematic

- Arduino Microcontroller
- Pushbuttons - User Input
- Limit Switches - Control movement of elevator
- 2x NEMA Stepper Motors and TB6600 Motor Drivers
- Servo Motor
- LEDs - Indicate whether the object is going to location A or B

Programming the Arduino to deliver the object to the final location with a reliability of 99%. Resulted in a grade of 93%.



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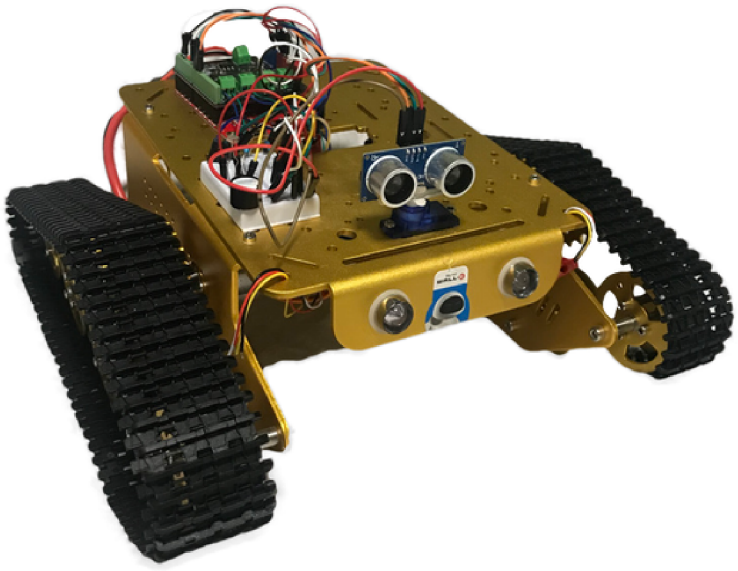
AUTONOMOUS TANK

Mini tank that drives continuously without hitting it's surroundings and requires no user control. Project completed for hobby purposes.



How It Works

Tank drives straight while an ultrasonic sensor continuously reads the proximity to the surface directly in front. When the tank gets within 20cm, it stops. A servo motor pans the ultrasonic sensor in all directions determining which way has the most available space. The tank then turns in that direction and continues driving forward.

Components

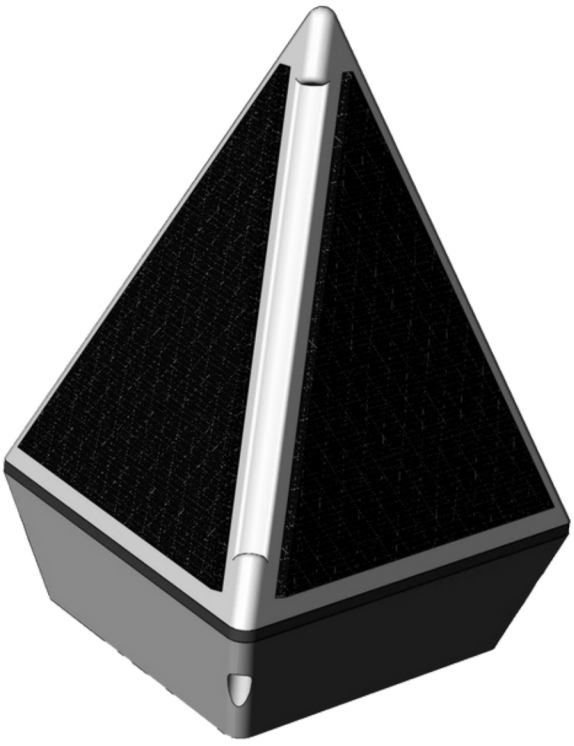
- Tank Chassis and Tracks
- Arduino Redboard
- 2x 12V DC Brushed Motors
- Quad-Motor Driver Shield
- Ultrasonic Sensor
- Servo Motor
- LED Headlights
- Photoresistor Light Sensor
- Buzzer - Noise Emitter
- Power Switch
- 5200 mAh 11.1V LIPO Battery

Features

- Turns on the spot - 0deg turn radius
- Automatic Headlights using Light Sensor
- Reversing and power on noise alerts
- 3 hour battery life

DATA TRANSMISSION UNIT HOUSING

Concept of electronics housing to withstand harsh environmental conditions. Designed for Lorcan Technologies using SolidWorks.



Design Considerations

- Ingress Protection - IP6X
- Size - Require a specific surface area to get sufficient power from solar panels
- UV resistant and must withstand wide temperature ranges
- Electronics to be secured with brackets and screw bosses
- Ribs on the interior for increased rigidity

Housing Components

- ASA Plastic Housing - Injection Moulded
- Silicone rubber gasket
- 3x Screws to clamp gasket and hold housing together
- Polyurethane Foam for insulation of electronics
- Cable Glands for sealed wire inlets

*CES Edupack used for material selection

Electronic Components

- CC1312R Sub-1 GHz Wireless MCU
- 12V DC Solar Panels
- Antenna
- 12V Lithium Ion Rechargeable Batteries

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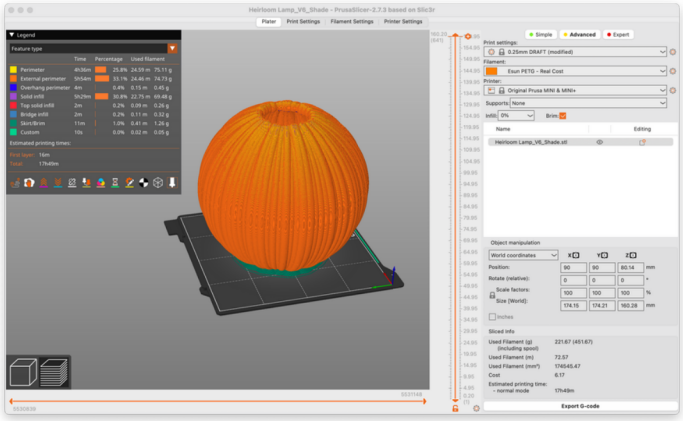
3D PRINTED LIGHTS

Hobby of 3D-Printing my own minimalist light shade and base designs. Created different form factors including table lamps and pendants.



1. Model

- Used Rhino to create complex shapes and textures to achieve artistic light shade designs.
- The base to hold the bulb and shade is modelled in SolidWorks.
- The bulb also gets modelled to analyze entire assembly.

2. Slicing and Printing

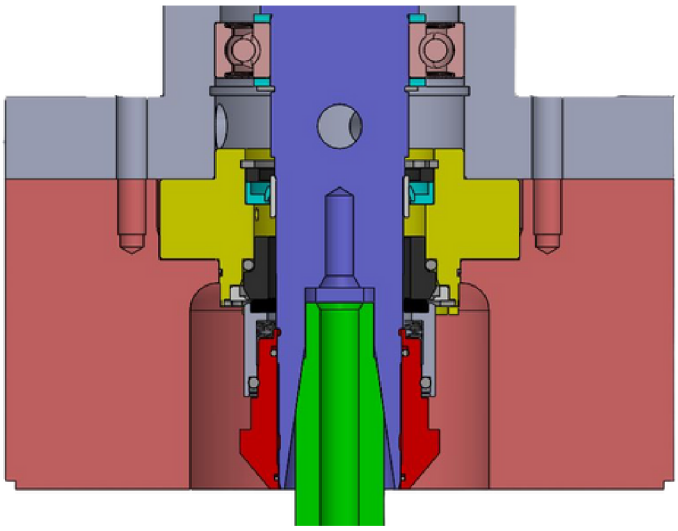
- Using the PrusaSlicer, print parameters such as perimeter shells and infill are modified to achieve the best results.
- Prusa Mini FDM prints a translucent PETG filament. Required testing with many different filament colours and materials to get the best light diffusivity effect.
- Printing takes around 15 hours and quality issues such as stringing and curled up edges need to be resolved.

3. Assembly

- Light is designed for quick assembly with a shade that easily lifts off the base.
- The base is discretely hidden inside of the shade and has an outlet for the wire to exit while sitting flush on the table.

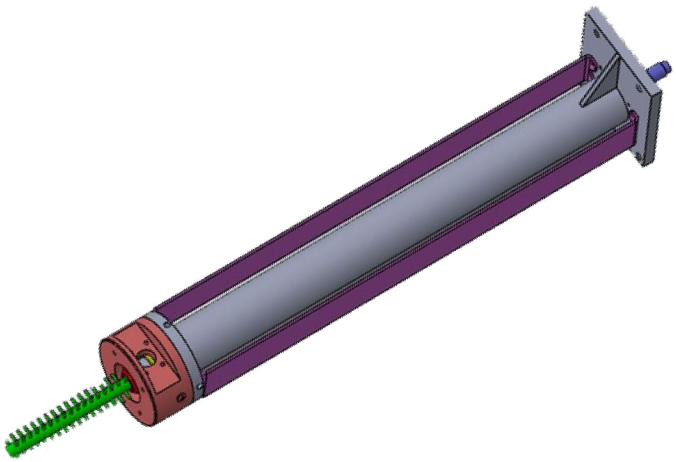
POURHEAD DESIGN

Custom hydraulic pourhead that mixes and pours high pressure foam chemicals. To be used at a Woodbridge manufacturing facilities.



Components

- Drive Shaft (Purple) - Rotates Mixing Shaft
- Drive Shaft Enclosure (Grey)
- Mechanical Seal
- Lubrication Housing (Yellow) - Distributes lubricant to the seal
- Mixing Chamber (Pink) - Inlet for chemicals
- Mixing Shaft (Green) - Pins that stir chemicals
- Ball Bearings



My Role

- Built the assembly in SolidWorks.
- Researched mechanical shaft seals, ball bearings, and lubrication systems for high RPM operation.
- Worked with machine shop to learn about their manufacturing processes and adjust components as needed.
- Communication with the plant to align on design requirements.