

Calim K-W

Mechanical Engineering @ University of Waterloo

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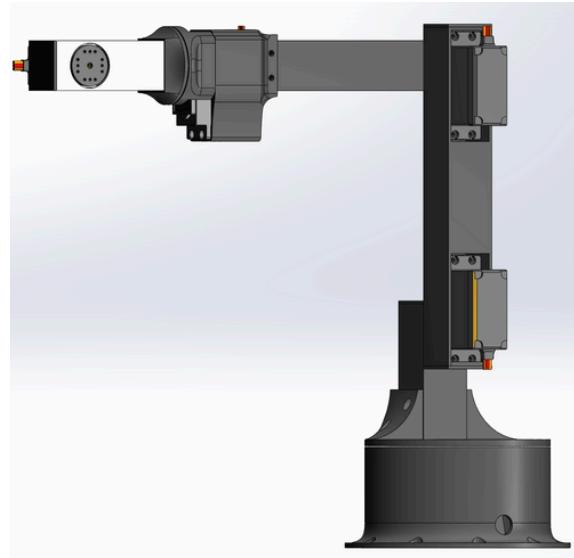
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5-Axis Controllable Robot Arm



Developed a **5-axis robot arm** with the ability to support multiple interchangeable tools, including a **claw grip**, a **solenoid magnet**, and a **suction cup**.

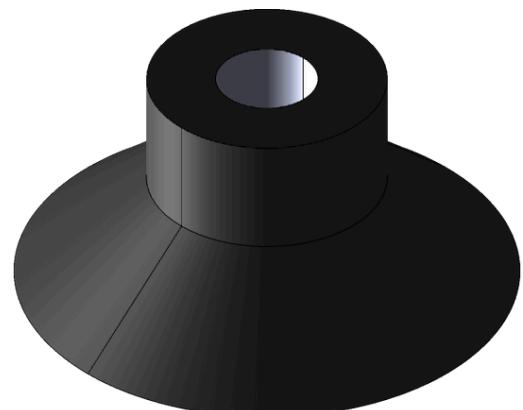
To ensure optimal movement involving the multiple motors a **PID control system** was implemented.



Components were designed in **SolidWorks** and **3D printed**.

An **Arduino** was used with **C++** to program the motors.

Clip Prototypes:



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Computer Fan

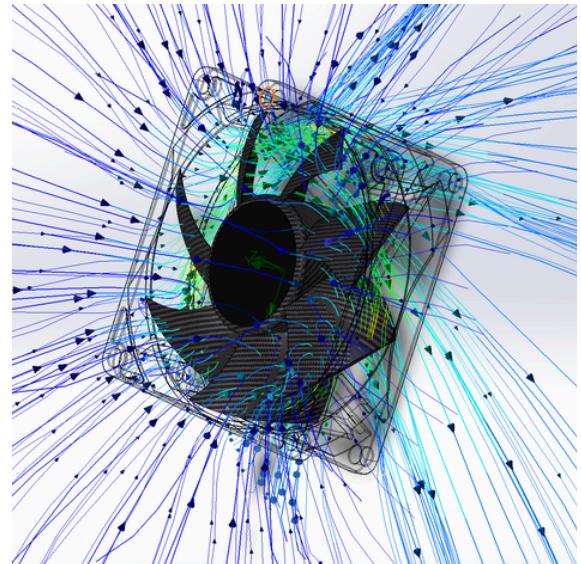


Modeled a computer fan to be **3D printed** and assembled with brushless motors. The speed of these motors is controlled by **PWM**.

The frame was designed in **SolidWorks** with **Catia 3DX** used to design the blades for added precision.

To optimize the shape and size of the blades **CFD** was used through a **SolidWorks Flow Simulation**.

The inclusion of this fan in my computer **reduced temperatures by 9%** while maintaining consistent frame rates.



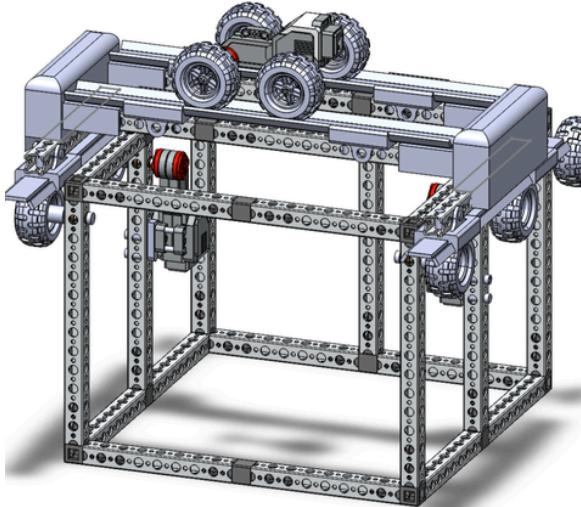
Final Print:



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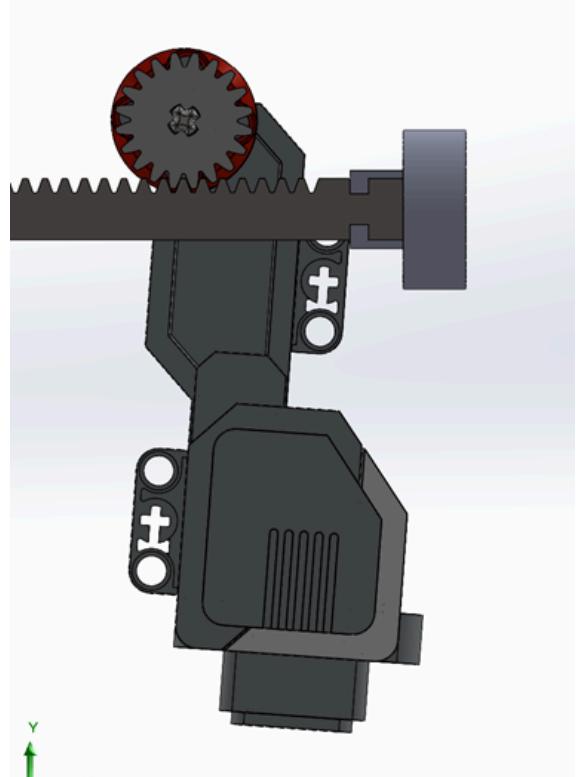
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Pancake Printer

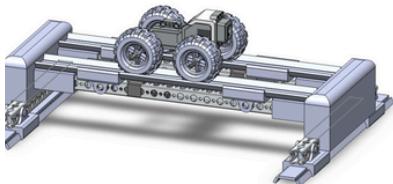


Developed a 2-axis pancake printer inspired by FDM 3D printers.

The movement of the nozzle is controlled by a gantry inspired system with a cart placed on top.



The extrusion mechanism is a syringe which is being pushed by a rack and pinion

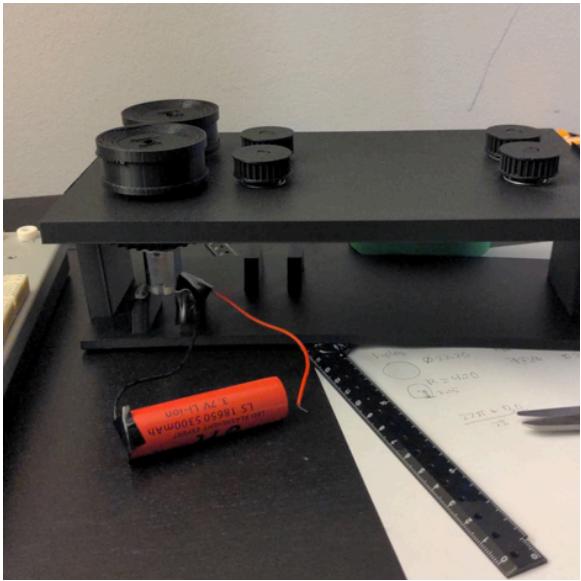


The cart system which controls the nozzle position is pictured on the left.

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Paper Airplane Launcher

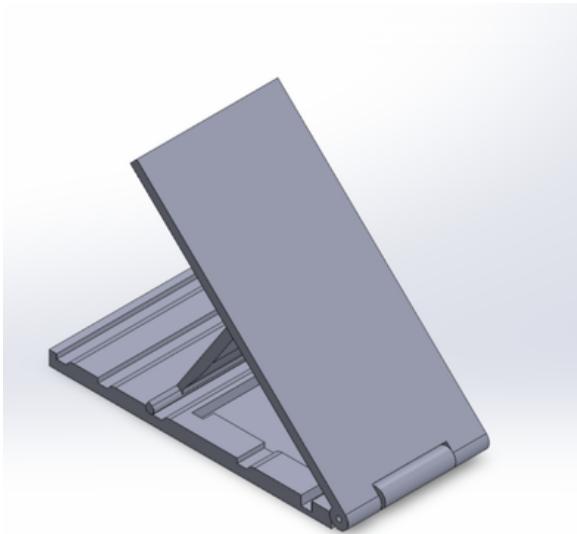
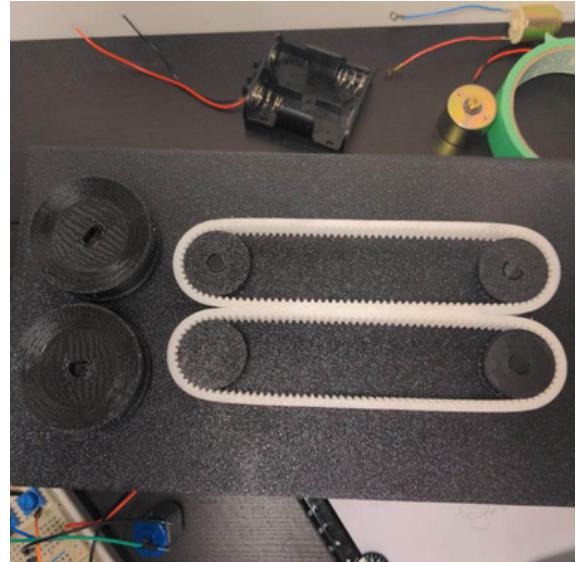


Working in a team of 5 we developed a **fly-wheel** based paper airplane launcher capable of launching planes **60+ feet**.

Prototyped with **3D prints** however for the final version fly-wheels would be machined out of stainless steel using a **lathe**.

To remove risk of injury a **conveyor belt** system was implemented to feed planes into the fly-wheels.

Multiple materials were experimented with until TPU was decided on due to its flexibility.



A stand was also designed allowing for multiple different launch angles.

The stand utilizes a series of grooves to allow for locking.

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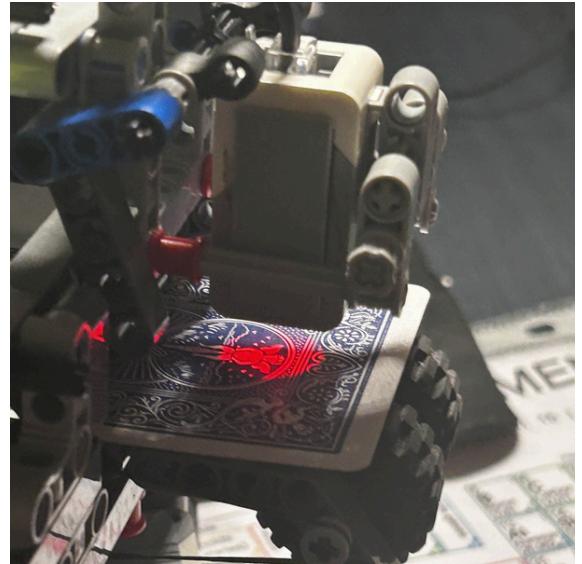
Robot Card Shuffler and Dealer



Using Lego Mindstorm and Technic kits I designed and assembled a robot capable of shuffling cards and dealing them to any specified number of people through an **automated process**.

This robot utilizes **high friction tires** to move each card and **light sensors** to count the number of cards dispensed.

The robot is portable for easy use and can rotate to deal to each individual player.



Mitre Box



3D printed a mitre box for the use of cutting wood and other soft materials.

The material used for the print is **carbon fiber PETG**

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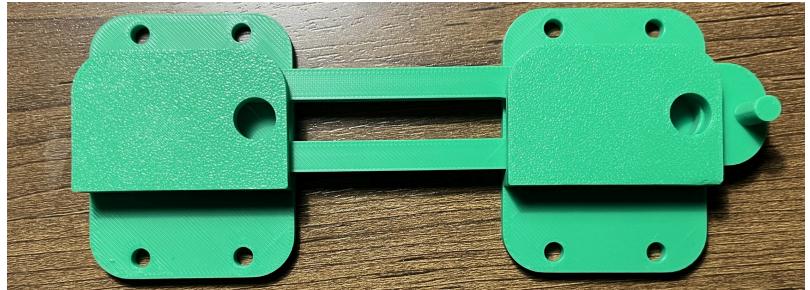
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Door Lock



Designed and 3D printed a universal lock for doors out of PLA.

This lock is designed to attach to any wall or door as long as they are flush with each other.



Mechanical Keychain



Using blueprints designed a mechanical keychain in **SolidWorks**.

Machined and assembled the individual parts using a **manual lathe**, **mill**, and a **drill press**.

