

# Calim K-W

Mechanical Engineering @ University of Waterloo

in [www.linkedin.com/in/CKimWans/](https://www.linkedin.com/in/CKimWans/)

📞 +1(647)-297-9687

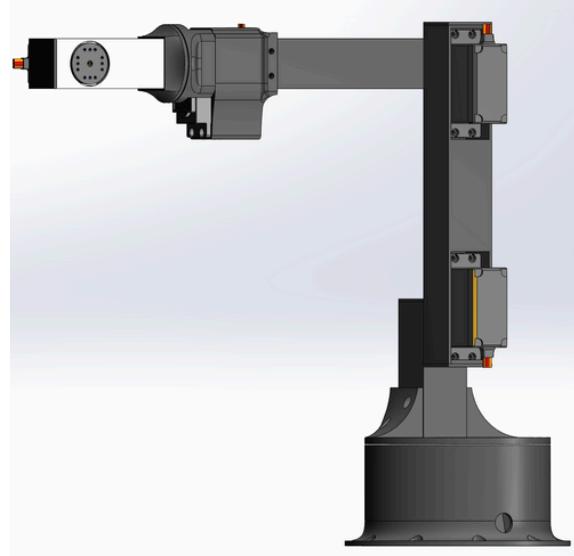
✉ ckimwans@uwaterloo.ca

## 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

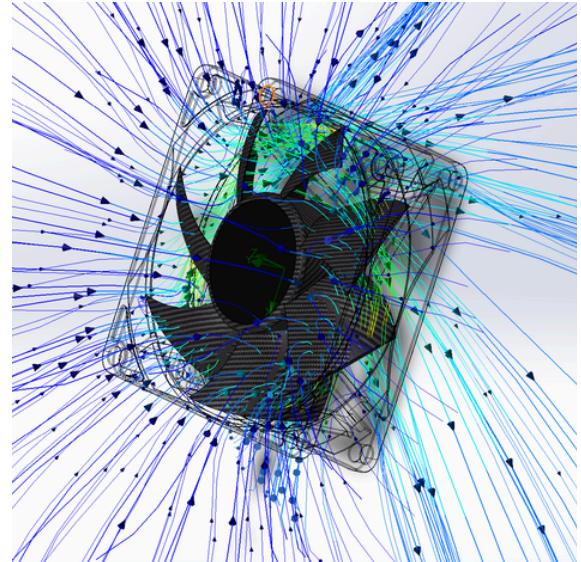


Modeled a computer fan to be **3D printed** and assembled with brushless motors. The speed of these motors is controlled by **PWM**.

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.



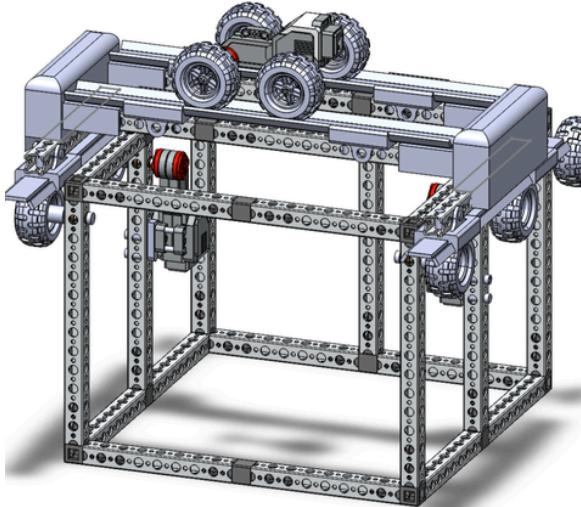
Final Print:



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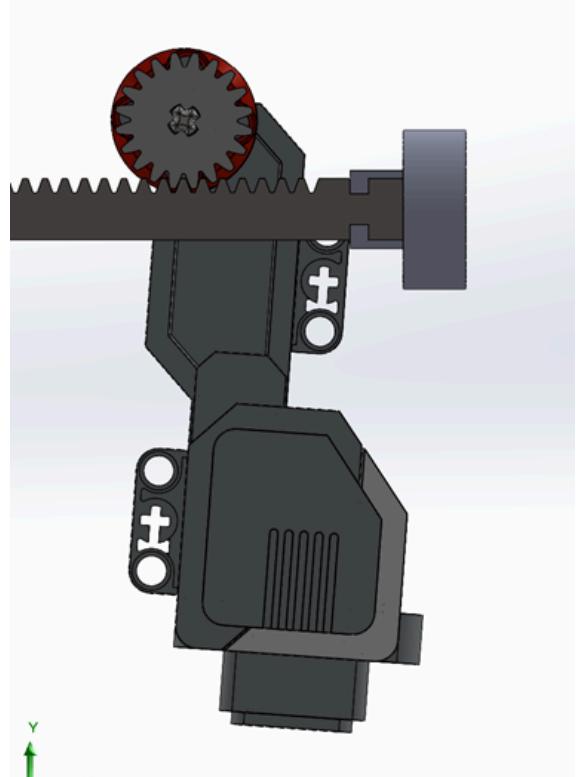
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## Pancake Printer

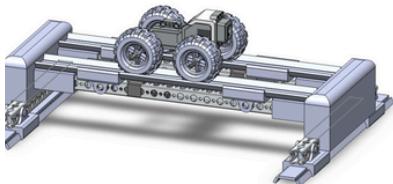


Developed a 2-axis pancake printer inspired by FDM 3D printers.

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

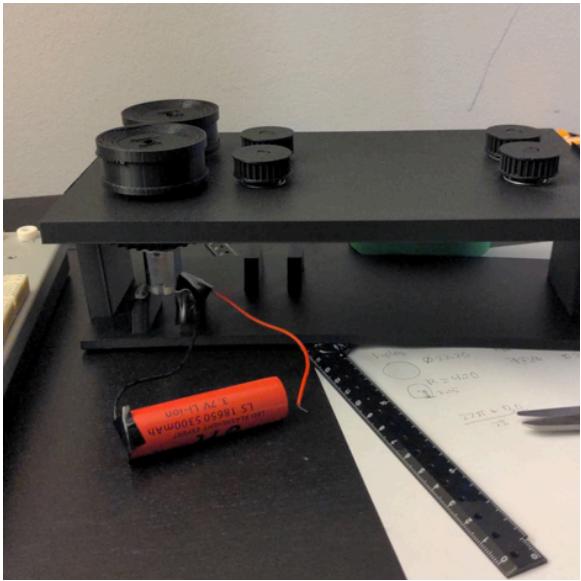


The cart system which controls the nozzle position is pictured on the left.

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## Paper Airplane Launcher

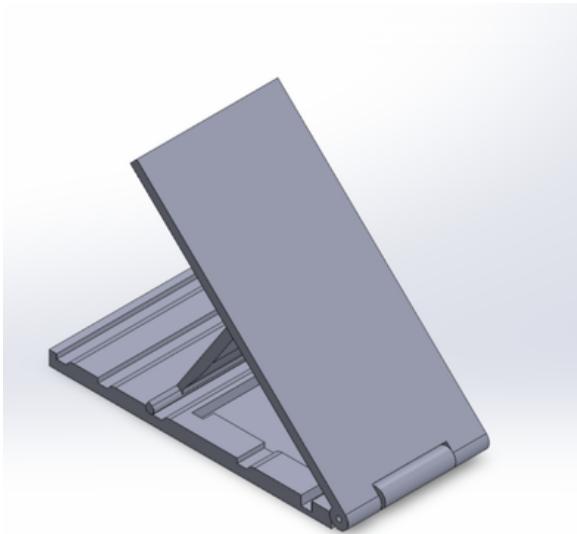
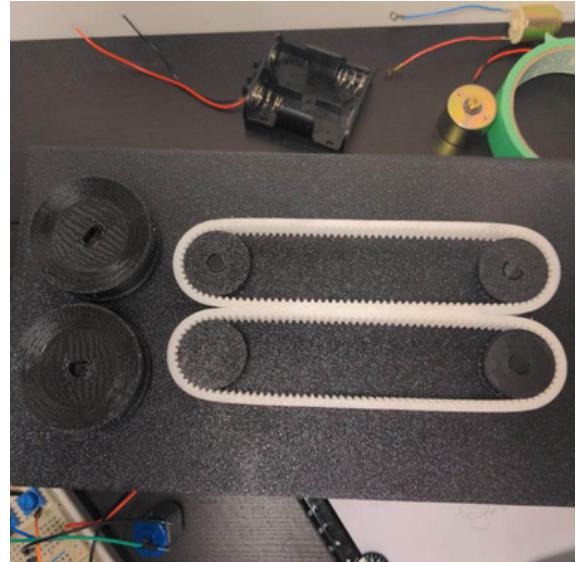


Working in a team of 5 we developed a **fly-wheel** based paper airplane launcher capable of launching planes **60+ feet**.

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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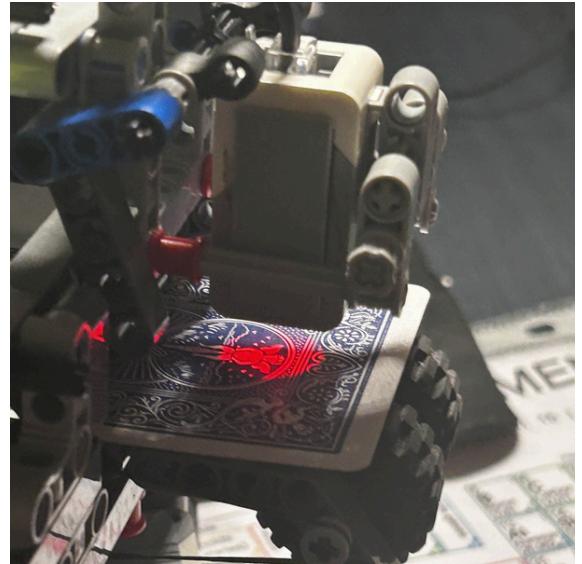
## Robot Card Shuffler and Dealer



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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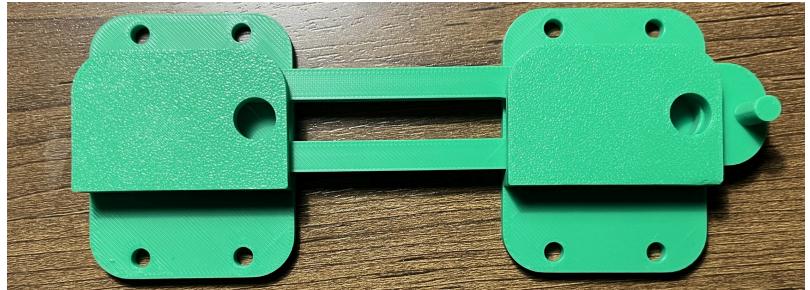
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## Door Lock



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**.

