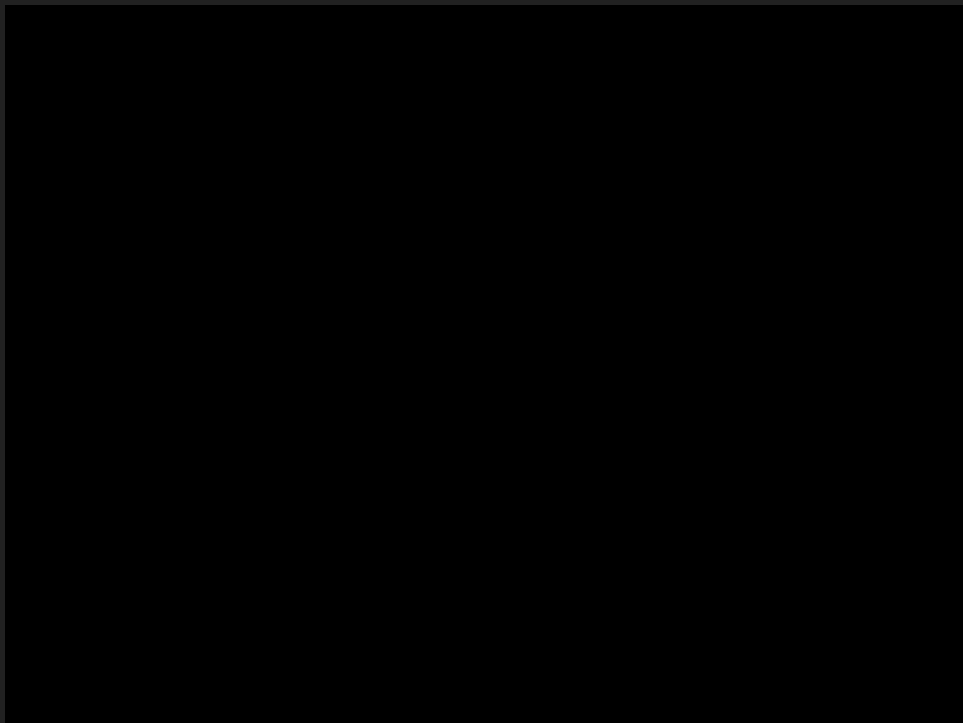


# Building a 2DOF Haptic Arm

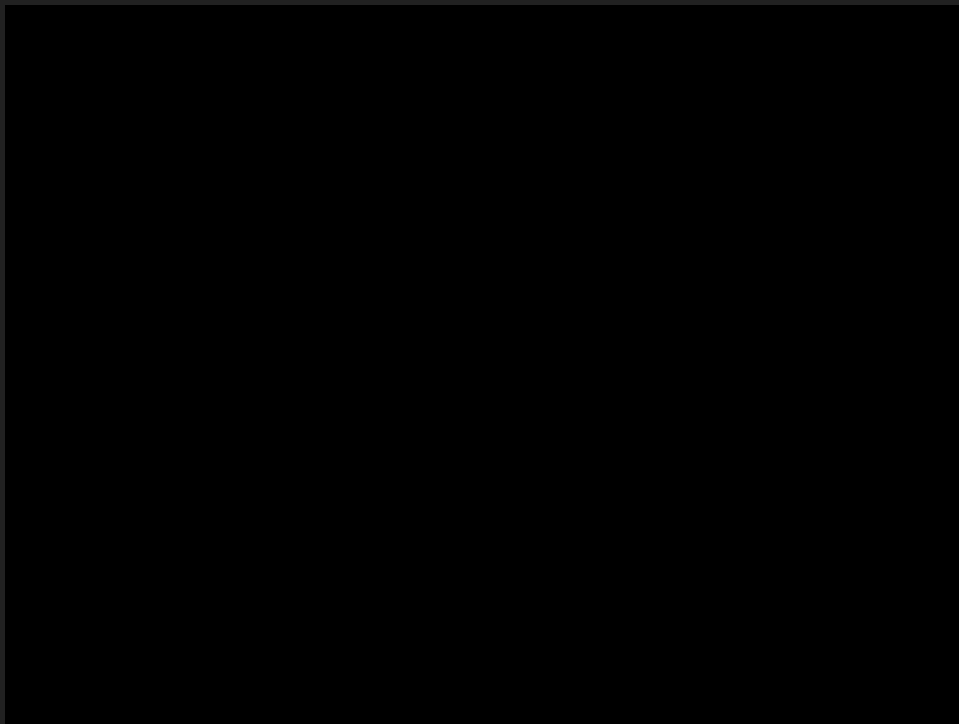
Ethan Vogelsang – Intelligent Systems

# What is haptics?

- The study of things relating to the sense of touch
- Vibration motors in phones or in game controllers are the most common haptic device



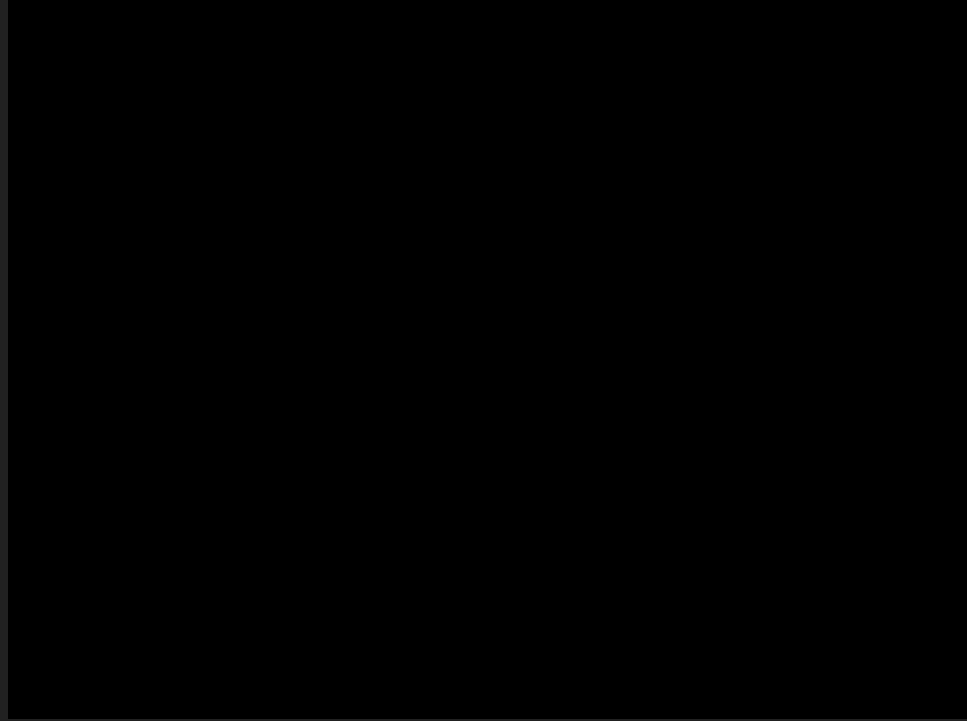
# Example Haptic Devices



- Da Vinci surgery arm helps to guide surgeons when performing delicate operations
- Costs somewhere around \$2m

# Example Haptic Devices

- The Kinarm is a device to help scientists research motor movements, especially when pertaining to patients with injuries or physical conditions
- Around \$50,000-\$150,000



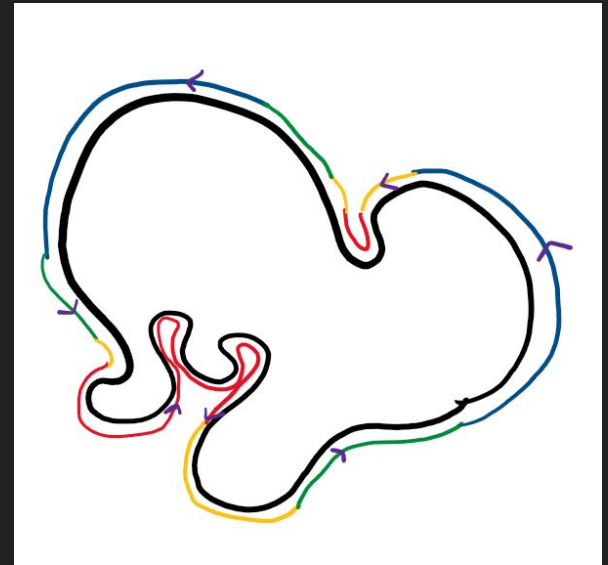
# What's the big deal? Why research this?

- Pre-existing products are expensive
- Increased popularity of consumer electronics with brushless motors leads to decreased prices



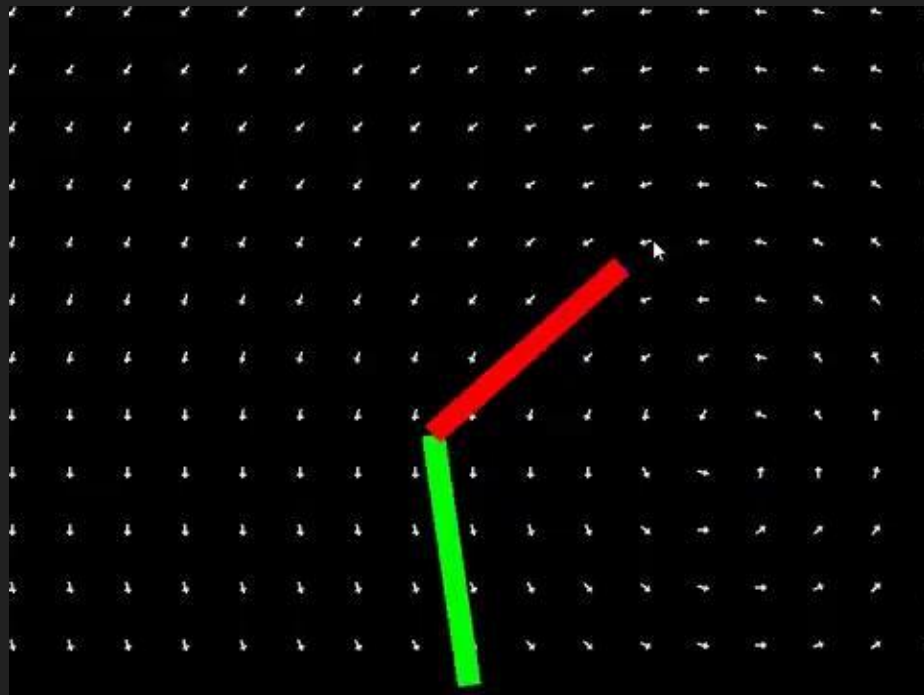
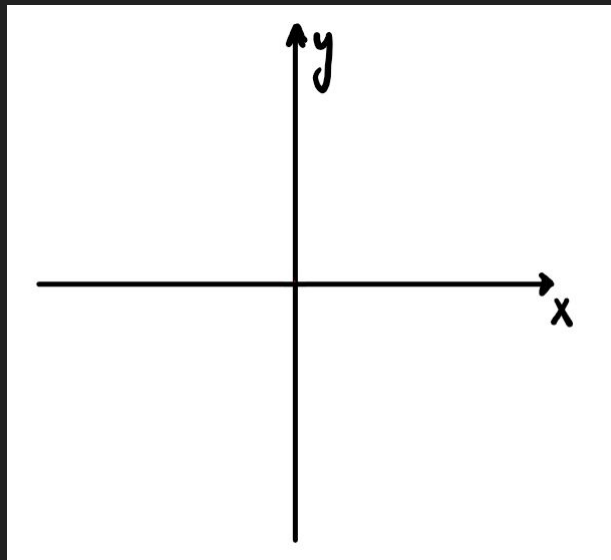
# Research Goals

- Create an open source device accessible for any group looking to do research in haptics
- Cooperative tasks between humans such as coordinated movement, tracing objects, physical rehabilitation

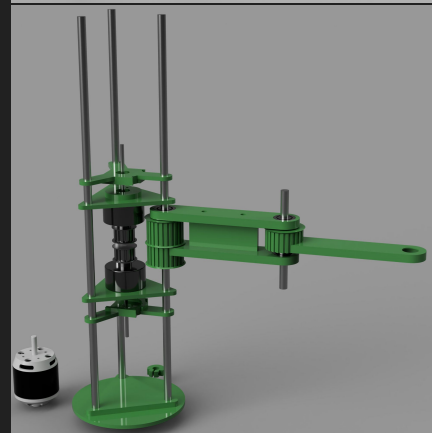
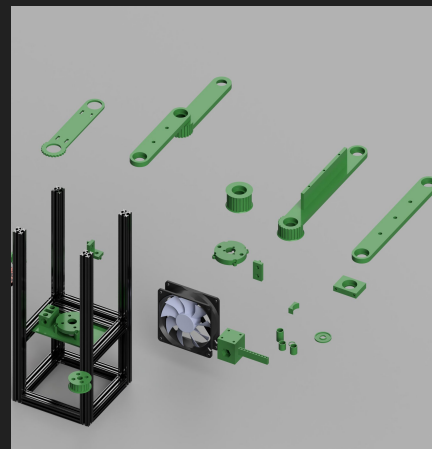


# What is a 2DOF arm?

- Two degrees of freedom means motion in a plane



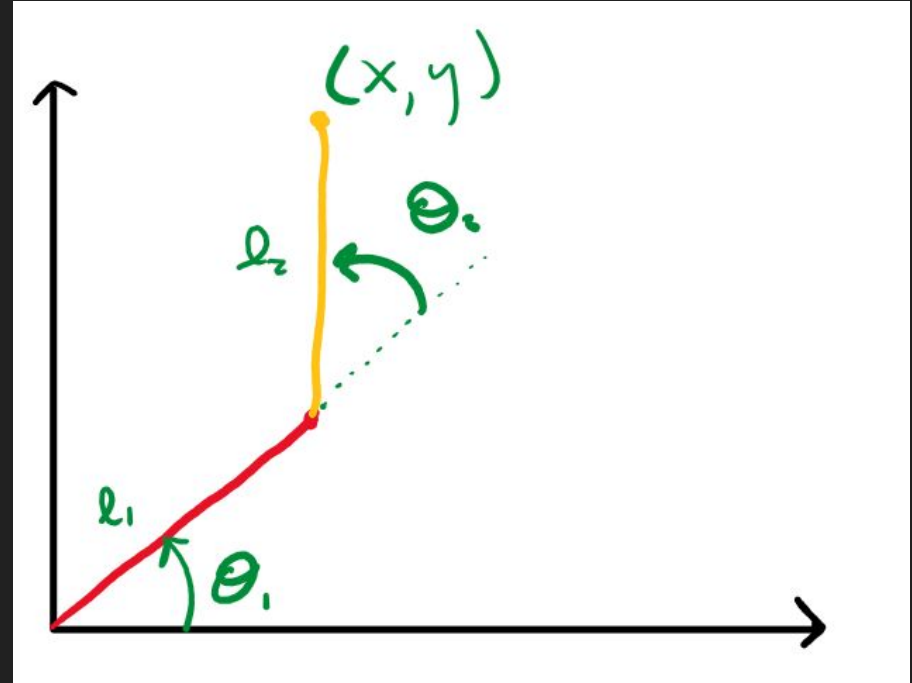
How is it made?





# How does it work?

- “Forward kinematics” allows use to calculate the position at the end of the robot using only the angles of the arm
- “Inverse kinematics” allows us to calculate the angles of the arm if we know the position at the end of the arm



# What's it do?

- It moves!  
sorta



# Next Steps

- Improve the movement of the arm
- Describe the dynamics of the arm through some math
- Produce more of these and use them in some studies