Nathan Kim

B.S. in Mechanical Engineering, UCLA (2022)
M.E. in Autonomous Systems, UCLA (2023)

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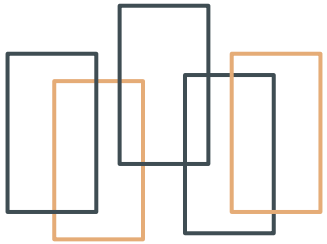
Hello!



My name is Nathan Kim and I am a graduate student in Autonomous Systems at UCLA. Through my experiences with projects, research, and engineering internships, I have gained valuable technical knowledge and teamwork skills. I hope to apply the things that I have learned in the field of robotics.

01.

School Projects [4-10]

- Space Additive Manufacturing Print Head
- FEA using Abaqus
- 4DOF Robot Arm
- Robotics Trajectory Generation
- Autonomous Vehicle Simulation

02.

Capstone Projects [11-14]

- Bobabot
- STMicroelectronics Qvar Sensors

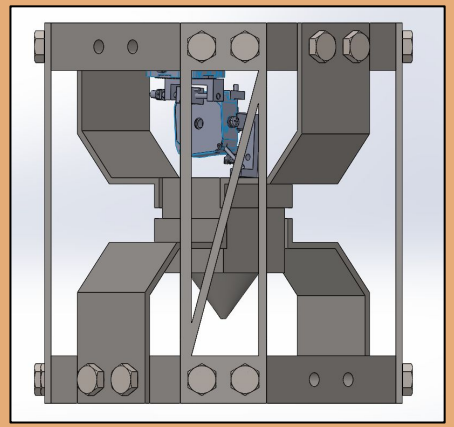
03.

Intern Experience [15-16]

- Jet Propulsion Laboratory

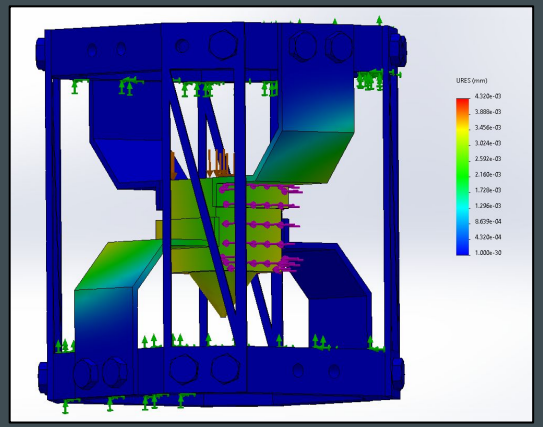
School Projects

Space Additive Manufacturing
Print Head Design



Final Design with Compliant Elements

Fully developed part design for compliant movement in 6 degrees of freedom



Stress Analysis

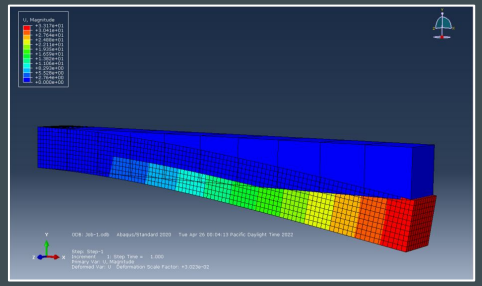
Conducted stress analysis for the compliant parts to ensure no permanent deformation

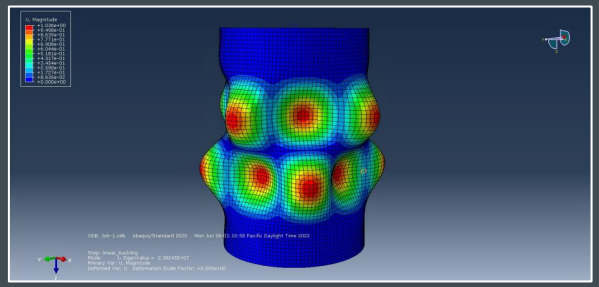
Link to final paper: https://docs.google.com/document/d/18J5h58R6f8TFTpfm6753KFgFwjPF58ScRy2BzmNJAvE/edit?usp=sharing

Abaqus Finite Element Analysis

- Learned the basics to conducting FEA on Abaqus for different geometries and materials
- Used hand calculations of equations to check results of Abaqus simulations
- Geometries simulated:
  - Cantilever beam
  - Structural cylinder for launch vehicle
  - Engine regen cooling tube
  - Heat Sink for heat transfer

Cantilever beam

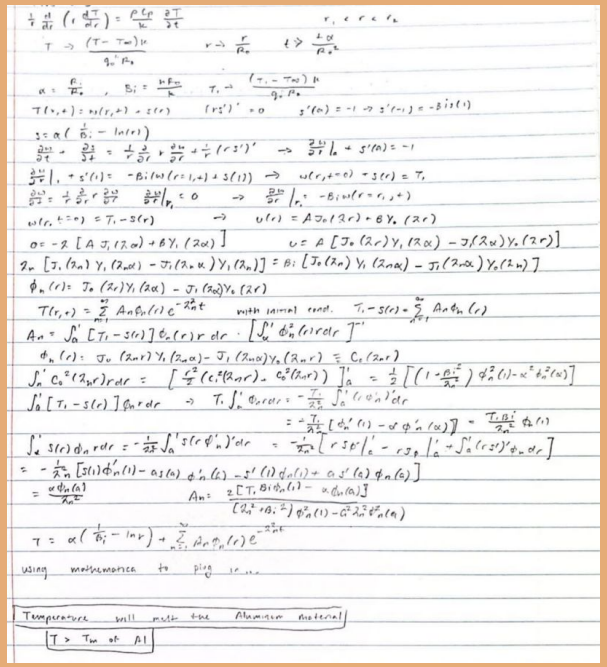




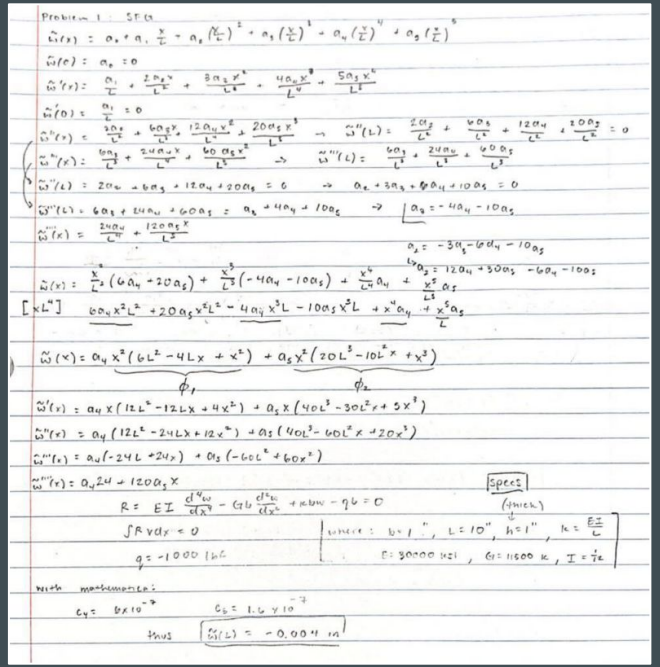
Launch vehicle part

Abaqus FEA: Example Hand Calculations

Regen Cooling Tube

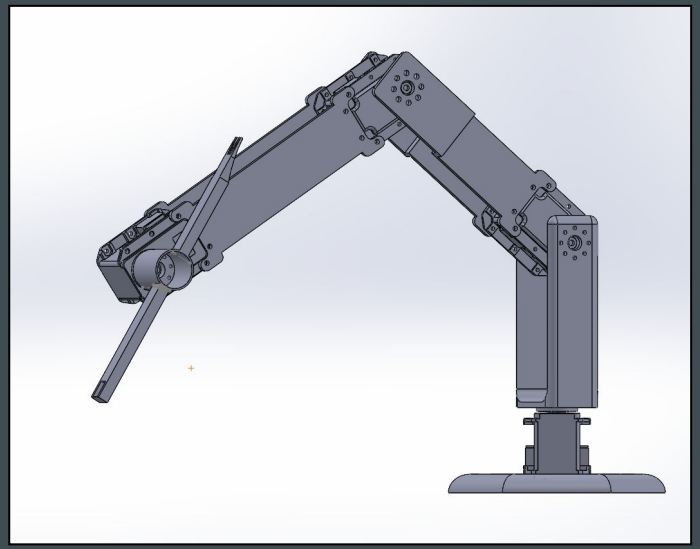


Cantilever Beam SFG



4DOF Robot Arm

- **Problem Statement:**
  - Create a robotic solution to a specific application
- **Problem Solution:**
  - 4 DOF Robot Arm to help feed patients in a hospital bed to minimize movement
- **Personal Impact:**
  - Designed the hardware for the 3D printed arm components (links, base, end effector)
  - Solved forward and reverse kinematics for arm movements

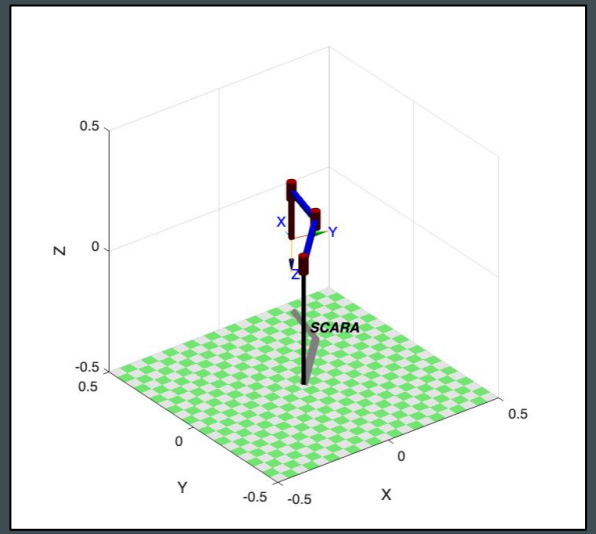


Final Design

Link to final paper: https://docs.google.com/document/d/1Qu_pvgKOTJnhQnH5T152dHWrhy1YcHUUo-mrpoCcF14/edit?usp=sharing

Robotic Trajectory Generation

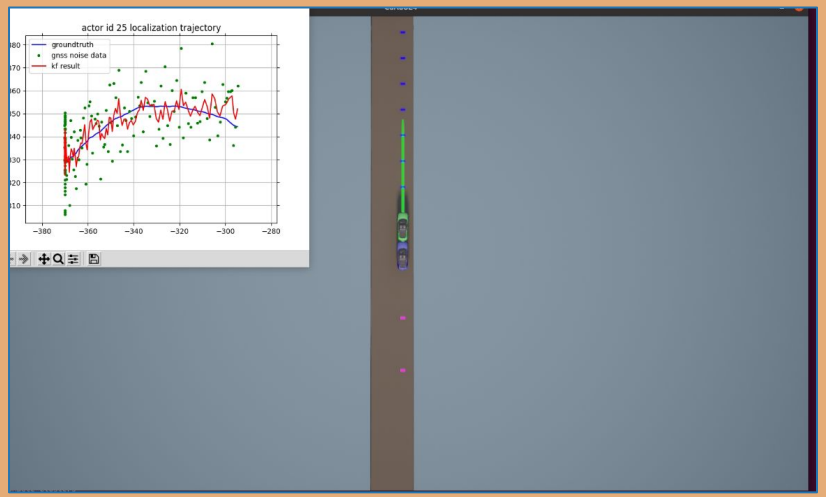
- **Problem Statement:**
  - PCB component placement by robotic arm (Mitsubishi SCARA)
- **Problem Solution:**
  - Use of Peter Corke toolbox in Matlab for simulations
  - Hand solved forward and inverse kinematics for trajectory
  - Created custom via points for trajectory to PCB corners



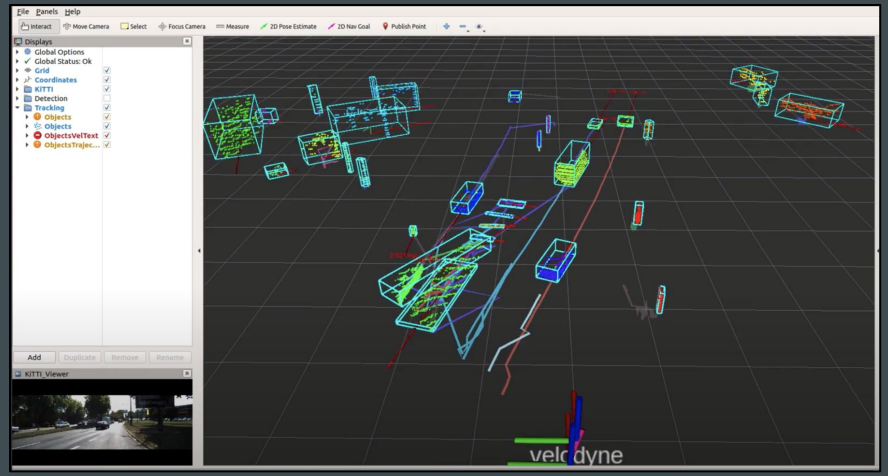
SCARA Matlab Simulation

Link to final paper: https://docs.google.com/document/d/1xhxPukbUUQwkXltBZmcQ7FZBU9wwlic-cftIJfvsuWs/edit?usp=sharing

Autonomous Vehicle Simulations



- Programmed LiDAR detection using point cloud generation around ego vehicle
- Implemented PID controller for vehicle



Used kitti ROS to process public LiDAR data

Link to final presentation: https://docs.google.com/presentation/d/1W75cnVwtelFkCiKBQDzKS_xftgdEERkpempOGKD0Fac/edit?usp=sharing

Capstone Projects

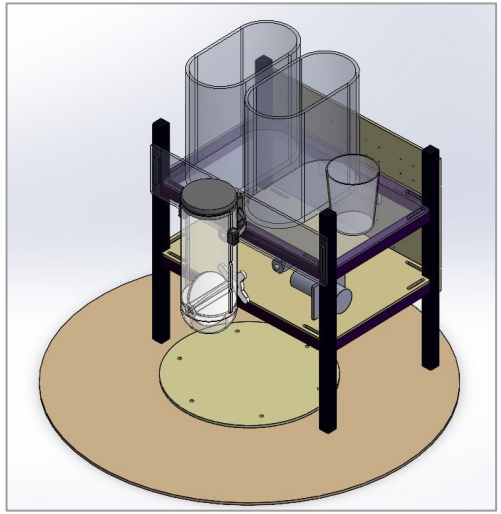
Capstone Project: Bobabot

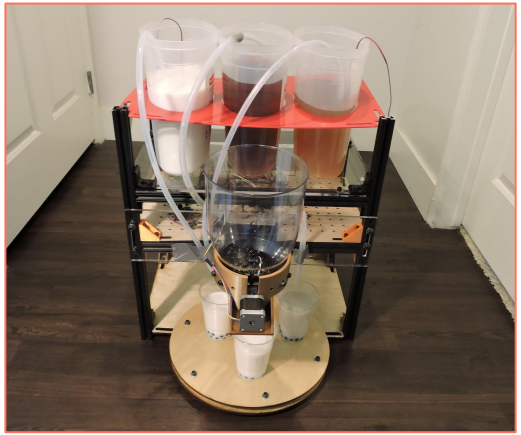
Problem Statement:

- Undergraduate capstone project creating a robotic mechanism

Personal Impact:

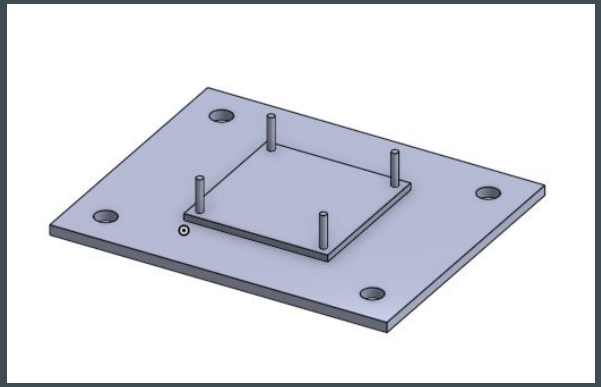
- Designed multiple hardware elements
  - Battery plate
  - Spur gear
  - Motor driver mounts
  - Hub axle
- Created assembly for machine using Solidworks
- Worked with 5 teammates in dividing the workload and meeting project deadlines

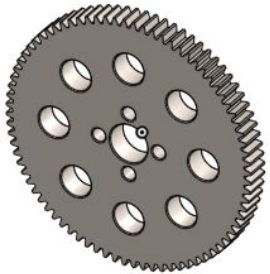




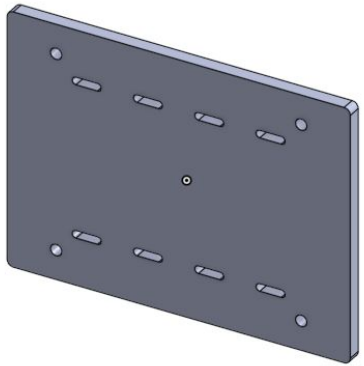
Capstone Project: Bobabot: CAD

Motor drive mount

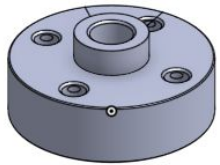




Custom spur gear

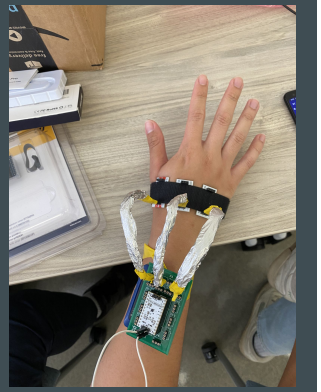


Battery plate



Hub axle

Capstone Project: STMicroelectronics Qvar sensors



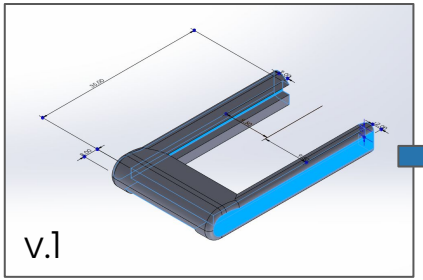
Problem Statement:

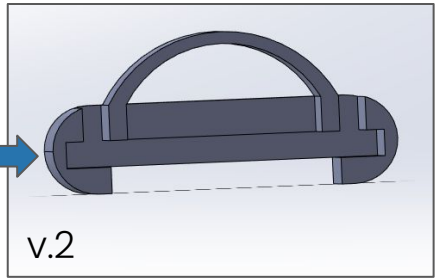
- Create a design using Qvar tile sensors and accelerometer data to interpret sign language

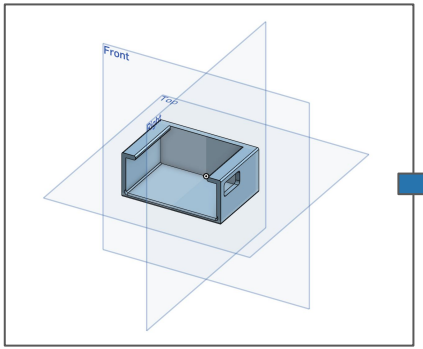
Personal Impact:

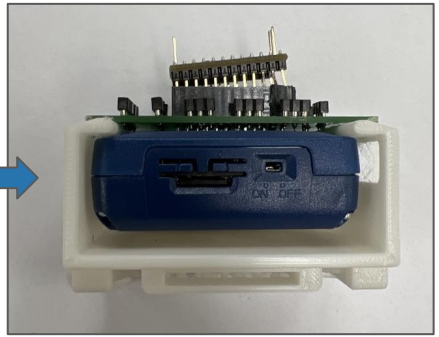
- Designed hardware fasteners for accelerometer tile
- Preliminary designs for fasteners to Qvar tiles (not used)
- Recorded data of ASL alphabet for training the ML model
- Processed data using Python to feed into ML model

Preliminary designs









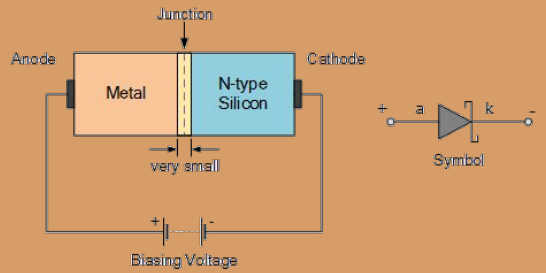
Internship Experience

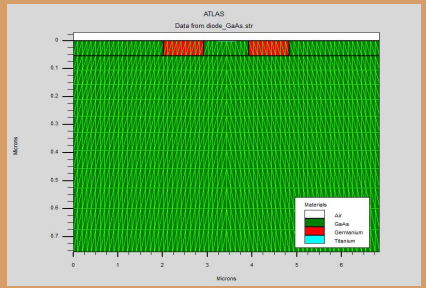
Jet Propulsion Laboratory: Submillimeter Wave Tech. Intern

Summer 2020 (Covid)

- Replicated schottky diodes with Silvaco TCAD to extract I/V curves
- Simulated with different materials to maximize current flow before diode fabrication
- Prepared a final presentation on findings and research of experimenting with diode parameters

Jet Propulsion Laboratory
California Institute of Technology





Design West Technologies: Project Engineer

Fall 2023 -Winter 2024

- Led project's second design iteration, heading up the manufacturing of twenty units in a five month timeline
- Management of entire BOM for design iteration, tracking inventory, active quantity, and expense
- Design and creation of locking mechanism used for telescoping handle

DESIGN WEST TECHNOLOGIES INC