# Soham Gaggenapally, P.E. (License pending)

U.S. Citizen (347) 757-9819 gaggenapally.soham@gmail.com sgaggen.github.io

## Education

**TUFTS UNIVERSITY** **February 2023**

**M.S. in Mechanical Engineering: Human-Robot Interaction** GPA: 3.9

Relevant coursework: Advanced Robotics, AI Ethics, Probabilistic Systems, Biomechanics, Digital Controls, Simulation

**THE CITY COLLEGE OF NEW YORK** **May 2019**

**B.Eng. in Mechanical Engineering with Honors**

Relevant coursework: Advanced Mechatronics, Energy Systems Design, Turbomachinery, Medical Physics

## Skills and Competencies

**Languages:** English (native), Telugu (native), Spanish (proficient), Hindi (proficient)
**Engineering Software:** SolidWorks, HSM, MATLAB, Revit, AutoCAD, MicroStation, Ansys, COMSOL, Microsoft Office
**Fabrication:** CNC, Vacuum Tubing, 3D Printing, Laser Cutting, Milling, Band Saw, Hand Tools, Soldering, Circuitry
**Coding Tools:** MATLAB, Python, Arduino, ROS, MUMPS, C++

## Professional Experience

**CENTER FOR ENGINEERING EDUCATION AND OUTREACH** Boston, MA - *Intern* **06/2022 – 8/2022**

- Integrated **LEGO and MindRender** to create a **VR teaching environment** that helps children learn how to code
- Successfully **created a communication protocol** between LEGO and Unity over Bluetooth and WiFi and implemented it in racing game coupled with a **modular, force feedback enabled steering wheel**
- Held hackathons with **4th grade through college students** to explore development opportunities of software

**EPIC SYSTEMS** Madison, WI - *Technical Solutions Engineer* **06/2020 – 08/2021**

- **Deployed and maintained mission critical healthcare software** for hospitals across the nation; most recently directed an organization to go live with 3 new functionalities at once with 0 major post-install issues
- Met and brainstormed with **CIO, COO, and other executives** as well as operational users to assess organization health and **pitch new projects** to keep clients at the forefront of the industry and **ahead of government regulations**
- **Developed code to identify weaknesses** in system workflows and management and **increased patient throughput** and satisfaction by 20%

**PEAK MECHANICAL via AVI ENG. ASSOC.** NYC - *BIM Consultant, Sprinkler Engineer* **11/2019 – 02/2020**

- Used **Revit and Navisworks** to create and modify fire protection BIM models based on blueprints and schematics
- **Held coordination meetings with client** to resolve conflicts with other MEP trades as well as architecture
- Performed hydraulic calculations for piping and other components and **create necessary shop drawings** for fabrication

**JACOBS ENGINEERING** NYC - *Engineering Intern* **05/2018 – 08/2018**

- Designed and drafted **drawings for barrier transitions with MicroStation** while maintaining the QA/QC process
- Verified results of **ANSYS simulations for smoke flow and pedestrian egress** by using variable input parameters
- Organized workflow across disciplines to remove blocks and efficiently **standardize deliverables for the NYS DOT**

## Projects and Research

**BALANCE COMPENSATION ROBOT** - *Project* **01/2022 – 05/2022**

- Used **motion capture and commercial IMU technology** to develop an automatic trip-and-stumble detection and prevention **robot for gait correction**
- Conducted **user testing** to ensure comfort and evaluated against metrics for **rapport, engagement, and affinity**

**ENVIRONMENT BASED SOCIAL NORM SELECTION FOR ROBOTS** – *Research* **01/2022 – 05/2022**

- Combined **ML based audio and video scene recognition** methods and placed them in a **probabilistic architecture** to find **appropriate social behavior** within different contexts

- Optimized different **weights for input selection** and streamlined **social norm determination** based on deontic rules

**BRACHIATING ROBOT** - *Project* **11/2021 – 12/2021**

- Rapid prototyped a robot that could go through a **brachiation challenge course** with different grip sizes, rung spacing, and alternating rung positions
- Implemented a **state machine** to make the robot **autonomous** while also keeping it teleoperable
- Iterated through gripper design and **motion planning** algorithm to make system faster and more accurate

**INTERRUPTABILITY FOR SERVER ROBOTS** - *Research* **10/2021 – 12/2021**

- Conducted a study to find the optimal time for a **server robot** to interrupt the customer to serve their order
- Designed and implemented an **algorithm with ROS** onto a rudimentary robot and measured **different HRI metrics**
- Set up **serial communication** between Linux, Arduino, Raspberry Pi, and Windows to **remotely control** the robot

**CATCH PLAYING ROBOT** - *Project* **11/2021**

- Built a throwing and catching robot that can automatically find a person, lock on, throw a ball, and then receive the ball
- Incorporated **human factor fundamentals** in order to improve the likeability of the robot and **avoid the uncanny valley**
- Designed a **compound gear train with a shaft adapter** to create high torque ratio that fit into a very small space

**SELF BALANCING ROBOT** - *Project* **10/2021**

- Made a pendulum based robot that could **autonomously balance itself** within a given range of perturbation
- Used a **Kalman filter and PID controller** to control the movement of the robot, along with a **system decoupler** to engage and disengage the pendulum as needed

**ROBOTIC WRITING ARM** - *Project* **09/2021**

- Constructed a **robotic arm** fitted with a **salt release end effector** that writes an inputted word on an A4 sized canvas
- Went through an **extreme weight reduction process** to decrease the mass of the arm by over 70%
- Optimized system to work with **limited power servos** and **maximized overall aesthetics**

**HYDRAULIC MUSCLE POWERED EXOSKELETON** - *Project, Research* **08/2018 – 07/2019**

- Led group of 5 students to **design and fabricate a state-of-the-art** soft exoskeleton powered by a hydraulic **artificial muscle that can lift over 200 times its weight**, verified through multiple FEM/FEA studies and manual testing
- Worked with the Biomechatronics and Intelligent Robotics Lab to allow integration into a larger, full-body exoskeleton
- Used **Arduino, PID, and sensor based control schemes** to produce a variable degree of automation for arm movement
- Paper **published and presented** at the IEEE International Conference on Robotics and Automation **(ICRA) 2019**

**HUMAN POWERED VEHICLE CONTEST** - *Competition* **10/2015 – 05/2017**

- Headed a subproduction group to create an **impact resistant fiberglass shell ahead of production schedule**
- Helped create **carbon fiber frame using vacuum tubing** for a recumbent tricycle with **lean-steering mechanism**
- Used CAD models and ASME specified codes and stress tests to check, guarantee, and record **safety compliance**

## Licenses and Affiliations

**Fundamentals of Engineering (FE) – Engineer-in-Training (EIT)** | *Mechanical* Licensed **01/2019**
**Principles and Practice of Engineering (PE)** | *Mechanical: Machine Design and Materials* Exam Passed **10/2019**
**American Society of Mechanical Engineers** (ASME) | *Member* **10/2015 – Present**
**American Society of Highway Engineers** (ASHE) | *Member* **09/2018 – Present**

## Leadership

**DDN Legends Championship** | *Executive Board* | Helped direct a national dance competition **01/2022 – Present**
**Grove Honors Program** | *Student Lead* | Directed Honors cohorts of 3 years; developed program **08/2015 – 05/2019**
**NYU Dillagi Dance Team** | *Captain, Producer* | Led award winning team of 27; made choreo, music **03/2017 – 05/2019**
**Jacobs Engineering** | *Health Advocate* | Championed mental health; created challenge board **05/2018 – 08/2018**