

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

U.S. Citizen

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## Education

### TUFTS UNIVERSITY

Expected: December 2022

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, C++, Python, Arduino, ROS, MUMPS

## Projects and Research

### BALANCE COMPENSATION ROBOT - Project

01/2022 – 05/2022

- Used **motion capture and commerical 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 AND SOCIAL NORM RECOGNITION 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 Biomechanics 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**

## 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 **4<sup>th</sup> 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**

## 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

#### Telugu Literary and Cultural Association (TLCA) | *Member*

06/2012 – Present

#### Telugu Association of North America (TANA) | *Member*

12/2018 – Present

## Leadership

#### DDN Legends Championship | *Liaison* | Manage national competition and competing teams

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