HAMZAH KHAN

hamzahkhan.me

EDUCATION

University of Texas at Austin, Austin, TX
Ph.D. in Aerospace Engineering — Expected 2026

University of Texas at Austin, Austin, TX
M.S. Thesis in Aerospace Engineering (GPA: 3.79/4.0) — Aug '21 - Aug '23

Harvey Mudd College, Claremont, CA
B.S. Individual Program of Studies in Robotics (GPA: 3.67/4.0) — Aug '14 - May '18

SKILLS

Programming Languages: Python, C++, Julia, MATLAB, web development, LaTeX
Tools: AWS/GCloud, ROS, Unix CLI, pytorch, TensorFlow, DeepSpeech, pandas/numpy, Apache Airflow
Machining/Electrical: Raspberry Pi, Arduino, FPGA, Lathe, Mill, ShopBot CNC
Languages: Urdu (Familiar), Arabic (Familiar), Spanish (Familiar)

WORK EXPERIENCE

University of Texas at Austin, Graduate Researcher, Austin, TX — Aug '21 - current
Department of Aerospace Engineering and Engineering Mechanics
- Developed SILQGames, an algorithm to iteratively solve general Stackelberg games
- Developed an algorithm to measure Stackelberg leadership in multiagent interactions; accepted to RA-L
- Develop a data-driven naturalistic projection approach that adjusts autonomous system behavior to act more like human operators performing the same task, submitted to CPHS 2024

Aurora Innovation (formerly Uber ATG) Self-Driving Software Engineer, Pittsburgh, PA — Sep '18 - Aug '21
- Improved a machine-learned model for planning truck behavior on highway merges; performed without any driver takeovers due to autonomy failures during a critical company demo
- Developed and validated a trajectory clustering algorithm that improved planned jerk limit violations by 8%
- Drove a team-wide effort to use uncertainty-based logic and multimodality in predictions and metrics; one example reduced the potential impact of injected errors in trajectory prediction by over 50%
- Implemented safety-critical recommendations from a RAND safety review - enforced I/O contracts for redundancy in autonomous systems
- Proved, implemented, and validated a collision checking algorithm that catches events between lidar sweeps

ML Systems Engineer, Tarteel AI, remote — Nov '18 - Aug '21
- Collected 500k+ communally sourced Quran'ic recordings, published first of kind dataset
- Trained a state of the art Arabic LSTM model with augmented audio. Achieves 92% word accuracy (8% WER)
- Led a 6-volunteer team (on 4 continents) to build a data ingest pipeline to standardize and autolabel audio

Anki Robotics Behavioral AI Intern, San Francisco, CA — May '18 - Jul '18
- Improved long-term human-computer interactivity for Anki's Vector robot companion; my feature was highlighted in the product launch video and well-reviewed in international press such as *The Verge*

Amazon Prime Air Hardware Development Engineer, Seattle, WA — May '17 - Aug '17
- Created software, hardware, and RF designs for a novel automated test and evaluation infrastructure for 24, 60, and 77 GHz radar technologies in close collaboration with Amazon research scientists
- Enabled data-driven decision making in a groundbreaking, research-focused project within Prime Air

Robotic AI Scheduling Researcher, Human Experience and Agent Teamwork Lab, Claremont, CA — Jan '17 - Dec '17
- Designed, simulated, and experimental evaluated maximally robust multiagent scheduling algorithms
- Collaborated with NASA Ames on reducing communication overhead for the lab's previous algorithm

Grader, Lab Proctor, and Machine Shop Proctor, Harvey Mudd College Engineering Department Jan '16 - Dec '17
- Trained on the proper usage of many machine shop tools, including lathes, mills, CNCs, and 3D printers
- Taught younger students to use best practices and enforced safety in the shop during 2-hour shifts

Facebook Software Engineering Intern, Menlo Park, CA May '15 - Aug '15
- Identified slow points in software crucial for serving Facebook's most profitable ads customers (top 1%)
- Brainstormed and designed backend C++ software that would increase this speed 10x-100x

Grader and Tutor, AI and Algorithms, Harvey Mudd College Computer Science Department Jan '15 - May '18
- Spent 2-4 hours per week grading open-ended responses to problem sets
- Tutored students for 2-4 hours per week on core concepts in algorithms and AI and helped debug code

Regional Hackathon Manager, srnd.org Feb '14 - Nov '15
- Created and executed an event plan, while assisting attendees with debugging software projects
- Led 10 events and introduced hundreds of minority students to coding; 70% still coded after the event
- Secured over $7,000 in sponsorships from companies in San Francisco and Portland, OR

PUBLICATIONS

Khan, H; Thorpe, A, Fridovich-Keil, D; Act Natural! Projecting Autonomous System Trajectories Into Naturalistic Behavior Sets, Submitted to CPHS 2024.

Khan, H; Fridovich-Keil, D; Identifying Leadership in Multi-Agent Interactions, RA-L 2024.

Khan, H; Identifying Leadership in Multi-Agent Interactions. Master's Thesis, University of Texas at Austin 2023.

Khan, H; Evaluating Flexibility Metrics on Simple Temporal Networks with Reinforcement Learning. Senior thesis, Harvey Mudd College, 2018.

PRESENTATIONS

Evaluating Flexibility Metrics on Simple Temporal Networks with Reinforcement Learning. Southern California Applied Mathematics Symposium, April 28, 2018.

PROJECT EXPERIENCE

Implementing Robotics Algorithms on a Polulu Romi Autonomous Navigation Class Labs and Project Jan '18 - Apr '18
- Implemented odometry, path tracking controller, particle filter, and probabilistic roadmap motion planning
- Measured the performance of these with a camera-based ground truth system on a differentially driven robot

Face Tracking T-shirt Cannon Turret, Microprocessors and AI Final Project Sep '16 - Dec '16
- Built a rotating base and pneumatic air system to shoot t-shirts from a two-axis cannon
- Designed aiming logic and circuitry to control motors with a Raspberry Pi and FPGA
- Wrote and trained a face-detection AI with OpenCV to aim the t-shirt cannon (away from faces)

SpaceX Hyperloop Competition Openloop Alliance, Electrical Engineer Jun '16 - Oct '16
- Designed PCBs and low-level code to produce, sample, and translate pod sensor input for a Beaglebone Black
- Created and ran tests to profile the output of an in-house photoelectric sensor

Rocket Altitude Tracking with Extended Kalman Filter, E80 Experimental Engineering Project Jan '15 - May '16
- Led a team of four to design a sensor package for tracking a model rocket's flight altitude
- Implemented and calibrated a Kalman Filter to accurately track the team's rocket

RELEVANT COURSEWORK

Modeling Multi-Agent Systems (Game Theory) | Linear Systems Analysis | Differential Equations | Linear Algebra | Artificial Intelligence | Machine Learning | Operations Research | Estimation Theory | Adv. Algorithms | Differential Geometry | Stochastic Processes | Autonomous Robotic Navigation | Microprocessor Systems Design | Control Theory

AWARDS AND ACTIVITIES

Graduate Engineering Council, VP (2022-23), Secretary (2021-22) | HMC Disciplinary Board Chair | 1st place, MuddHacks 2016 | 2016-17 Dorm Mentor | 1st place, People's Choice at 5C Fall 2014 Hackathon, Best Game Fall 2015 | 5C Muslim Students Association, VP | Mudd Rocketry Club | Award-winning FIRST Robotics Team 1540, Manager | Recreational Tennis | Hackathon Organizing | Strategy Games