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KAVI DEY

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EDUCATION

Harvey Mudd College (HMC) <ul style="list-style-type: none">B.S. in Computer Science	Claremont, CA	Aug 2022 – May 2026
Seattle Academy High School (SAAS) <ul style="list-style-type: none">High School Diploma, High Honor Roll	Seattle, WA	Jan 2019 – June 2022

EMPLOYMENT

2023 - Current	Machine Shop Proctor	Machine Shop, HMC
Responsibilities: Ensuring student safety while teaching usage of metal manufacturing (Mills & Lathes, both CNC & manual) and wood working (bandsaws, routers, planers, etc.). Starting spring 2024: additional role as <i>Shop Improvement Proctor</i> . Responsibilities include weekly machine maintenance and repair, and upgrading tooling		
2023 - Current	Makerspace Steward	Makerspace, HMC
Responsibilities: Helping students learn and use 3D printers (FDM, SLS, Carbon, & Resin), laser cutters, sewing & embroidery machines, looms, welders, spray paint, and more; running workshops (15+ people). Starting spring 2024: Additional role as <i>Makerspace Repair Steward</i> , weekly preventative maintenance and repair on laser cutters and 3d printers		
2023	Computer Science TA & Grader	CS Department, HMC
Responsibilities: Taught new and experienced students computer science concepts (low level programming, classes, functional programming, data science, graphics, etc.). Graded weekly homework assignments and created midterm study guide		
Summer 2023	Audio Information Retrieval	Prof. Tsai, MIR Lab, HMC
Goal: To train large language models to understand and classify music data; Audio tampering detection		
<ul style="list-style-type: none">Developed novel online alignment algorithms for 3 way audio alignment of piano concertosLead data collection and created new audio tampering detection systemsOne publication in preparation		
2020-2022	Robotic Tele-Operation	Prof. Cakmak, HCR Lab, University of Washington
Goal: To develop accessible robot tele-operation interfaces		
<ul style="list-style-type: none">Performed data analysis of user studies [IEEE RO'MAN 2021 Paper].Led interface design and studies of interface alternatives. Co-first authored [IEEE IROS 2021 Co-First Authored Paper].Led research in programming by demonstration & human-in-the-loop object grasping and manipulation approachMentored 5 undergraduates across 3 different projects		

OTHER INTERNSHIPS AND RESEARCH

2024 - Current	Variational Deep Learning	Prof. Hope, Hope Lab, HMC
Goal: Learned about and implemented SVAEs with a variety of priors. Integrated S4/S5 models with linear dynamical system prior in SVAE. Working towards publication		
2023	Embedded Programming	Prof. Spencer, ACE Lab, HMC
Goal: Revise and test ultrasonic beam forming sonar sensor. Led low level embedded development on SAM-4 MCU. Implemented embedded communication protocol for talking to an Ethernet chip using SPI		
2022	Zero-shot Image Classification	Prof. Carr-Markell, Bee Lab, HMC
Goal: Pollen detection and classification (translational ML work with biologists). Trained zero shot classifier using Siamese Net & ResNet transfer learning. Developed public website to share the model and blog post explaining the basics of siamese nets and auto encoders		
2020-2021	Full Stack Web Development	WA State Hospital Association
Goal: Develop custom Personal Protective Equipment exchange website to help address COVID shortages. Engineered custom PPE-Distribution algorithm with input from MultiCare Hospital.		
2019	Deep Learning	Prof. Froehlich, Makeability Lab, UW
Goal: Integrate deep learning into curb-ramp detection to improve temporal tracking of sidewalk quality to improve transparency about sidewalk accessibility [ACM ASSETS 2021 Poster]		
2018	Voice Activity Detection	Adobe
Goal: Develop ultra-lightweight ML speech detection classifier for Character Animator. Added to developer credits		

PUBLICATIONS

Ather Sharif, Paari Gopal, Michael Saugstad, Shiven Bhatt, Raymond Fok, Galen Weld, **Kavi Dey**, and Jon E. Froehlich. Experimental crowd+ai approaches to track accessibility features in sidewalk intersections over time. In Jonathan Lazar, Jinjuan Heidi Feng, and Faustina Hwang, editors, *ASSETS Adjunct Proceedings*, pages 65:1–65:5. ACM, '21. doi: 10.1145/3441852.3476549. URL <https://doi.org/10.1145/3441852.3476549>

Maria E. Cabrera*, **Kavi Dey***, Kavita Krishnaswamy, Tapomayukh Bhattacharjee, and Maya Cakmak. Cursor-based robot tele-manipulation through 2d-to-se2 interfaces. In *IEEE/RSJ IROS*, pages 4230–4237. IEEE, '21. doi: 10.1109/IROS51168.2021.9636008. URL <https://doi.org/10.1109/IROS51168.2021.9636008>. *Co First Authors


Maria E. Cabrera, Tapomayukh Bhattacharjee, **Kavi Dey**, and Maya Cakmak. An exploration of accessible remote tele-operation for assistive mobile manipulators in the home. In *30th IEEE RO-MAN*, pages 1202–1209. IEEE, '21. doi: 10.1109/RO-MAN50785.2021.9515511. URL <https://doi.org/10.1109/RO-MAN50785.2021.9515511>

SIGNIFICANT PROJECTS

2024 - Current Doppler Velocity Log HMC

Goal: Design and manufacture doppler velocity log


- Designed and manufactured custom piezoelectric transducer with good acoustic properties
- Created circuit with high speed h-bridge driver, TX/RX switch, differential analog receive circuitry, and high speed (10 Msps) ADC.
- Implementing I2C communication and FFT on an FPGA which will control the circuit and transducers

 Documentation

2024 - Current Synthetic Opals HMC

Goal: Manufacture synthetic opals



- Learned about science behind opals and nano particles (Stöber process, Bragg diffraction, and structural color) and wrote lab manual.
- Worked with HMC chemistry department to carry out procedure and make opals and HMC engineering department to design 7 MPa, 300 °C autoclave for sintering opals

 Lab Manual

2023 Digital Camera Sensor HMC

Goal: Design and manufacture digital sensor completely from scratch

- Designed and soldered pcb with grid of 1200 phototransistors to form digital camera sensor
- Led 3 person team in implementing QOI image compression and debayering on an FPGA
- Interfaced with camera sensor and FPGA using an STM32 microcontroller to use it as a USB webcam.

 Video Demo  Documentation

Spring 2023 Trebuchet Design HMC

Goal: Worked for external client with limited budget to design method of removing waste equipment from abandoned uranium mine. Led team of 4 students; simulated, prototyped and designed a 10ft tall trebuchet capable of launching 25 lb projectile 300 ft.

2022-2023 Compiler & Silicon Design HMC

Goal: Design and implement a C to assembly compiler and associated processor in Verilog

- Designed and implemented a compiler for a subset of C. Compiler supports control flow, recursion, register allocation, and stack allocation.
- Designed a processor in Verilog with support for the compiler's assembly language

 Compiler Github  Processor Github

2020-2023 Electronic Speed Control (ESC) Design SAAS

Goal: Design and manufacture custom brushless motor ESC. Led team (3 high school students); Taught college level electrical engineering and brushless motor control theory, schematic design, PCB design, microcontroller programming

 Github

2019-2022 Team Lead; ECE Lead MATE & FRC Robotics, SAAS

Goal: Build for and compete in national robotics competitions

- Led 30+ person team in remote and in person settings with focus on culture, education and diversity
- Developed multi-node realtime communication system and UI, enhanced documentation and process, led team effort to build underwater robot.

 GitHub

LANGUAGES AND TECHNOLOGIES

- **Expert:** Python, Typescript, Svelte, Pytorch, JAX, Pandas/Matplotlib

- **Intermediate:** THREE.js, C++, ROS, Unix, Compiler Design, LaTeX, Verilog, MATLAB
- **Engineering:** Schematic Capture, Board Layout, Altium, I2C, Trapezoidal and Field-Oriented ESC Design, PIC Programming, MOSFETs, Solidworks
- **Advanced studies including:** Real Analysis; Linear Algebra; Multivariable Calculus; Quantum Theory; Inverse Kinematics; Optimization; Machine Learning; Quantum Mechanics; Variational Bayesian Methods

ADDITIONAL EXPERIENCE AND AWARDS

2024 **Astronaut Scholar**
2023 **HMC Davies Engineering Prize** Awarded for trebuchet design
2022 **Harvey S. Mudd Merit Award**
2021 **World Championship Top 10** MATE Telepresence Competition
2020 **Rookie All Star Award**, FRC: Redshift 8032
2020 **FRC Dean's List Semi-Finalist**
2018 **Regional Competition Top 5** MATE Pacific Northwest Region