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EDUCATION

Harvey Mudd College (HMC)	**Claremont, CA**	**Aug 2022 – May 2026**

- B.S. in Computer Science

Seattle Academy High School (SAAS)	**Seattle, WA**	**Jan 2019 – June 2022**

- High School Diploma, High Honor Roll

EMPLOYMENT, INTERNSHIPS, & RESEARCH

2025 - Current	**Computational Orbit Modelling**	**Prof. Tamayo, POEL Lab, HMC**

Goal: Using machine learning and optimization techniques to model planet and asteroid orbits and find transforms to action-angle coordinates. One publication in preparation.

2024 - Current	**Variational Deep Learning**	**Prof. Hope, Hope Lab, HMC**

Goal: Learned about and implemented SVAEs with a variety of priors. Integrated state space models with linear dynamical system prior in SVAE. Working towards publication

Summer 2024	**fMRI to Image Brain Decoding**	**Prof. Helen Zhou, MNNDL Lab, National University of Singapore**

Goal: Improve fMRI conditioned diffusion image generation; ML interpretability

- Developed several novel fMRI encoder and diffusion training strategies to improve reconstruction performance
- Reverse engineered fMRI encoders for model interpretability and understanding

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 *Shop Improvement Proctor*. Responsibilities include weekly machine maintenance and repair, and upgrading tooling

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

2023	**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 *Makerspace Repair Steward*, weekly preventative maintainance 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

- Developed novel online alignment algorithms for 3 way audio alignment of piano concertos [IEEE ICASSP 2025 First Student Author Paper].
- Lead data collection and created new audio tampering detection systems

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

2020-2022	**Robotic Tele-Operation**	**Prof. Cakmak, HCR Lab, University of Washington**

Goal: To develop accessible robot tele-operation interfaces

- 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 approach
- Mentored 5 undergraduates across 3 different projects

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

Kate Glazko, Margaret Seehorn, Medina Lamkin, JunHyeok Cha, **Kavi Dey**, Ben Kosa, Sudheesh Singanamalla, and Jennifer Mankoff. Prompt injections as a tool for agency and expression in multi-user gai systems. (CSCW2), 2026. **In submission to CSCW 2026.**

Tj Tsai, **Kavi Dey**, Yigitcan Özer, and Meinard Müller. Dense-sparse dynamic time warping for customizing piano concerto accompaniments. In *ICASSP 2025 - 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1–5, 2025. doi: 10.1109/ICASSP49660.2025.10890080. URL `https://doi.org/10.1109/ICASSP49660.2025.10890080`. **First student author.**

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 telemanipulation 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`

ADDITIONAL EXPERIENCE AND AWARDS

2025 **Astronaut Scholar**
2024 **HMC J. R. Phillips Award** Awarded for doppler velocity log
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

SIGNIFICANT PROJECTS

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.
- Working 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

2024   **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

📄 Report 📄 Documentation

2023-2024   **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 Baysian Methods