

## EDUCATION

<b>Harvey Mudd College (HMC)</b>	<b>Claremont, CA</b>	<b>Aug 2022 – May 2026</b>
• B.S. in Physics, Dean's List FA22-SP25, Major GPA: 3.91, Overall GPA: 3.88		
<b>Seattle Academy High School (SAAS)</b>	<b>Seattle, WA</b>	<b>Jan 2019 – June 2022</b>

## RESEARCH

<b>Spring 2025 - Current</b>	<b>Computational Orbit Modelling</b>	<b>Dan Tamayo, POEL Lab, HMC</b>
Using machine learning and optimization techniques to model planet and asteroid orbits and find transforms to action-angle coordinates. Active research on using dimensionality reduction algorithms to find conserved quantities. One publication in preparation on using classical ML to predict proper orbital elements for asteroid.		
<b>Spring 2024 - Current</b>	<b>Variational Deep Learning</b>	<b>Gabe Hope, Hope Lab, HMC</b>
		Foundational ML research using graphical models as a prior for variational autoencoders (SVAE). Developing and implementing novel algorithms for Multi Object Tracking and non-linear sequence modeling. Working towards publication.
<b>Summer 2024</b>	<b>fMRI to Image Brain Decoding</b>	<b>Helen Zhou, MNNDL Lab, National University of Singapore</b>
		Developed several novel fMRI encoder and diffusion training strategies to improve reconstruction performance. Reverse engineered fMRI encoders for model interpretability and understanding. One publication in preparation.
<b>Spring 2023</b>	<b>Embedded Programming</b>	<b>Matthew Spencer, ACE Lab, HMC</b>
		Revised and tested 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.
<b>Summer 2023</b>	<b>Audio Information Retrieval</b>	<b>TJ Tsai, MIR Lab, HMC</b>
		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 algorithms.
<b>Fall 2022</b>	<b>Zero-shot Image Classification</b>	<b>Morgan Carr-Markell, Bee Lab, HMC</b>
		Implemented pollen detection and classification algorithms (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 ( <a href="http://kavidey.com/l/bee-post">kavidey.com/l/bee-post</a> )
<b>2020-2022</b>	<b>Robotic Tele-Operation</b>	<b>Maya Cakmak, HCR Lab, University of Washington</b>
		Developed accessible robot tele-operation interfaces. Led interface design and studies of interface alternatives and ran 200+ person online user study. Co-first authored [IEEE IROS 2021 Co-First Authored Paper]. Modeled interaction pattern analysis [IEEE RO'MAN 2021 Paper]. Led research in programming by demonstration & human-in-the-loop object grasping and manipulation approach. Mentored 5 undergraduates across 3 different projects.
<b>Summer 2019</b>	<b>Deep Learning</b>	<b>Jon Froehlich, Makeability Lab, University of Washington</b>
		<b>Goal:</b> Integrated deep learning into curb-ramp detection to improve temporal tracking of sidewalk quality to improve transparency about sidewalk accessibility [ACM ASSETS 2021 Poster Paper]

## PUBLICATIONS

**Kavi Dey**, Leia Shen, Kat Volk, Sam Hadden, and Dan Tamayo. Predicting Asteroid Proper elements with linear estimation and regression. *The Astrophysical Journal*. **In preparation, author order & title not finalized.**

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 revision.**

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. Presented in person.**

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>

## EMPLOYMENT

2024 - Current	Engineering TA & Grader	Machine Shop, HMC
<b>Responsibilities:</b> TA'd several intro and advanced engineering classes. Organized grading for 100 person class. Developed a new lab for advanced digital engineering class.		
2023 - Current	Machine Shop Proctor	Machine Shop, HMC
<b>Responsibilities:</b> Ensuring student safety while teaching usage of metal manufacturing (Mills & Lathes, both CNC & manual) and wood working. Spring 2024: additional role as <i>Shop Improvement Proctor</i> (weekly machine maintenance and repair, and upgrading tooling).		
2023-2024	Makerspace Steward	Makerspace, HMC
<b>Responsibilities:</b> 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
<b>Responsibilities:</b> Taught new and experienced students computer science concepts (low level programming, classes, functional programming, data science, graphics, etc.). Graded homework and created midterm study guide		
2020-2021	Full Stack Web Development	WA State Hospital Association
<b>Goal:</b> Develop custom Personal Protective Equipment exchange website to help address COVID shortages. Engineered custom PPE-Distribution algorithm with input from MultiCare Hospital.		

## ADDITIONAL EXPERIENCE AND AWARDS

2026 CRA Honorable Mention	2023 HMC Davies Engineering Prize for trebuchet design
2024 & 2025 Astronaut Scholar	2022 Harvey S. Mudd Merit Award
2024 HMC J. R. Phillips Award for doppler velocity log	2020 FRC Dean's List Semi-Finalist

## SIGNIFICANT PROJECTS

2024 - Current	Synthetic Opals	HMC
<b>Goal:</b> Manufacture synthetic opals		
<ul style="list-style-type: none"><li>Learned about science behind opals and nano particles (Stöber process, Bragg diffraction, and structural color).</li><li>Worked with HMC chemistry department to manufacture opals. Actively working with HMC engineering department to design 7 MPa, 300 °C autoclave for sintering opals</li></ul>		
Lab Manual <a href="http://kavidey.com/1/opal-manual">kavidey.com/1/opal-manual</a>		
2024	Doppler Velocity Log	HMC
<b>Goal:</b> Design and manufacture doppler velocity log		
<ul style="list-style-type: none"><li>Designed and manufactured custom piezoelectric transducer with good acoustic properties</li><li>Created circuit with high speed h-bridge driver, TX/RX switch, differential analog receive circuitry, and high speed ADC.</li><li>Implementing I2C communication and FFT on an FPGA which will control the circuit and transducers</li></ul>		
Report <a href="http://kavidey.com/1/e80-report">kavidey.com/1/e80-report</a> Documentation <a href="http://kavidey.com/1/dvl-docs">kavidey.com/1/dvl-docs</a>		
2023-2024	Digital Camera Sensor	HMC
<b>Goal:</b> Design and manufacture digital sensor completely from scratch		
<ul style="list-style-type: none"><li>Designed and soldered pcb with grid of 1200 phototransistors to form digital camera sensor</li><li>Led 3 person team in implementing QOI image compression and debayering on an FPGA</li><li>Interfaced with camera sensor and FPGA using an STM32 microcontroller to use it as a USB webcam.</li></ul>		
Video Demo <a href="http://kavidey.com/1/camera-video">kavidey.com/1/camera-video</a> Documentation <a href="http://kavidey.com/1/camera-docs">kavidey.com/1/camera-docs</a>		
Spring 2023	Trebuchet Design	HMC
<b>Goal:</b> 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
<b>Goal:</b> Design and implement a C to assembly compiler and associated processor in Verilog		
<ul style="list-style-type: none"><li>Designed and implemented a compiler for a subset of C. Compiler supports control flow, recursion, register allocation, liveness analysis, and using the stack.</li><li>Designed a processor in Verilog with support for the compiler's assembly language</li></ul>		
Compiler Github <a href="http://kavidey.com/1/compiler-code">kavidey.com/1/compiler-code</a> Processor Github <a href="http://kavidey.com/1/processor-code">kavidey.com/1/processor-code</a>		