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# KAVI DEY

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## EDUCATION

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

## EMPLOYMENT

|  |   |  |
|--|---|--|
| <b>2023 - Current</b>  | <b>Machine Shop Proctor</b>             | <b>Machine Shop, HMC</b>                               |
| <b>Responsibilities:</b> 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   |   |  |
| <b>2023 - Current</b>  | <b>Makerspace Steward</b>               | <b>Makerspace, HMC</b>                                 |
| <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   |   |  |
| <b>2023</b>  | <b>Computer Science TA &amp; Grader</b> | <b>CS Department, HMC</b>                              |
| <b>Responsibilities:</b> 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  |   |  |
| <b>Summer 2023</b>   | <b>Audio Information Retrieval</b>      | <b>Prof. Tsai, MIR Lab, HMC</b>                        |
| <b>Goal:</b> To train large language models to understand and classify music data; Audio tampering detection   |   |  |
| <ul style="list-style-type: none"><li>Developed novel online alignment algorithms for 3 way audio alignment of piano concertos</li><li>Lead data collection and created new audio tampering detection systems</li><li>One publication in preparation</li></ul>   |   |  |
| <b>2020-2022</b>   | <b>Robotic Tele-Operation</b>           | <b>Prof. Cakmak, HCR Lab, University of Washington</b> |
| <b>Goal:</b> To develop accessible robot tele-operation interfaces   |   |  |
| <ul style="list-style-type: none"><li>Performed data analysis of user studies [IEEE RO'MAN 2021 Paper].</li><li>Led interface design and studies of interface alternatives. Co-first authored [IEEE IROS 2021 Co-First Authored Paper].</li><li>Led research in programming by demonstration &amp; human-in-the-loop object grasping and manipulation approach</li><li>Mentored 5 undergraduates across 3 different projects</li></ul> |   |  |

## OTHER INTERNSHIPS AND RESEARCH

|  |                                       |   |
|--|---------------------------------------|---|
| <b>2024 - Current</b>  | <b>Variational Deep Learning</b>      | <b>Prof. Hope, Hope Lab, HMC</b>            |
| <b>Goal:</b> Learned about and implemented SVAEs with a variety of priors. Integrated S4/S5 models with linear dynamical system prior in SVAE. Working towards publication   |                                       |   |
| <b>2023</b>  | <b>Embedded Programming</b>           | <b>Prof. Spencer, ACE Lab, HMC</b>          |
| <b>Goal:</b> 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  |                                       |   |
| <b>2022</b>  | <b>Zero-shot Image Classification</b> | <b>Prof. Carr-Markell, Bee Lab, HMC</b>     |
| <b>Goal:</b> 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 |                                       |   |
| <b>2020-2021</b>   | <b>Full Stack Web Development</b>     | <b>WA State Hospital Association</b>        |
| <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.   |                                       |   |
| <b>2019</b>  | <b>Deep Learning</b>                  | <b>Prof. Froehlich, Makeability Lab, UW</b> |
| <b>Goal:</b> Integrate deep learning into curb-ramp detection to improve temporal tracking of sidewalk quality to improve transparency about sidewalk accessibility [ACM ASSETS 2021 Poster]   |                                       |   |
| <b>2018</b>  | <b>Voice Activity Detection</b>       | <b>Adobe</b>                                |
| <b>Goal:</b> 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**

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2024 **Astronaut Scholarship Nominee**  
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