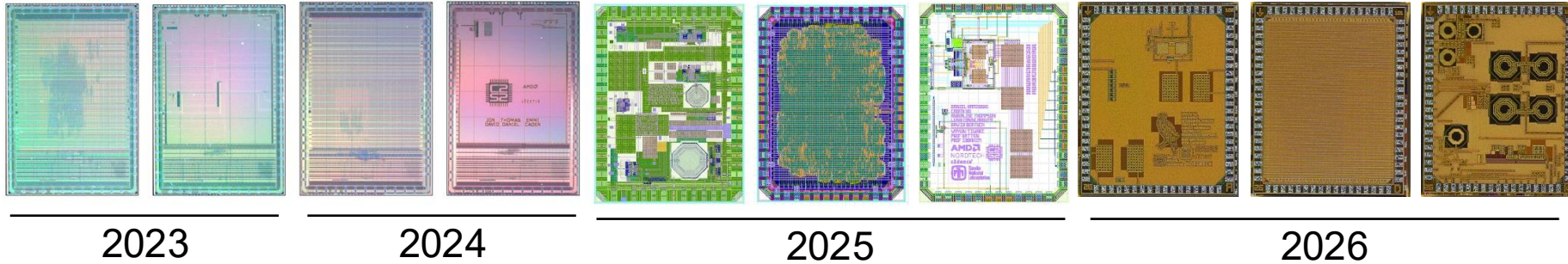


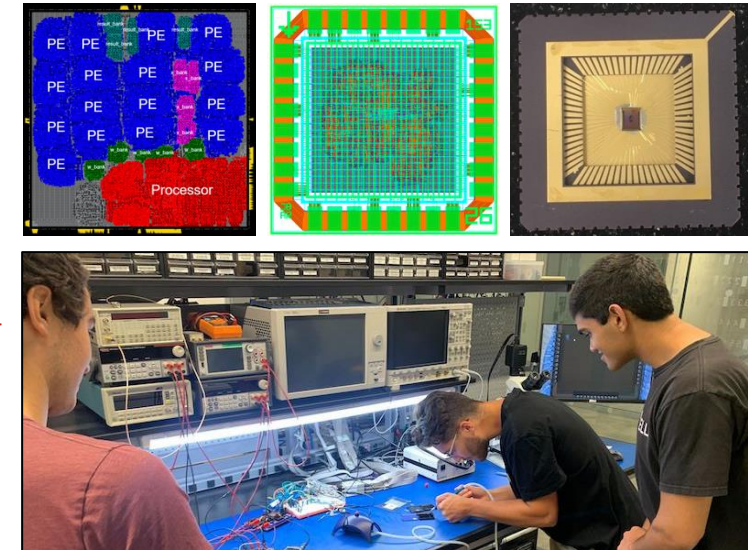
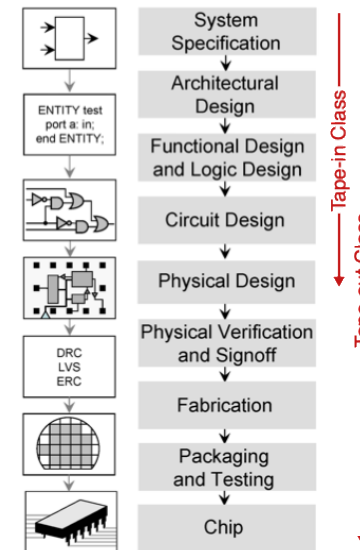
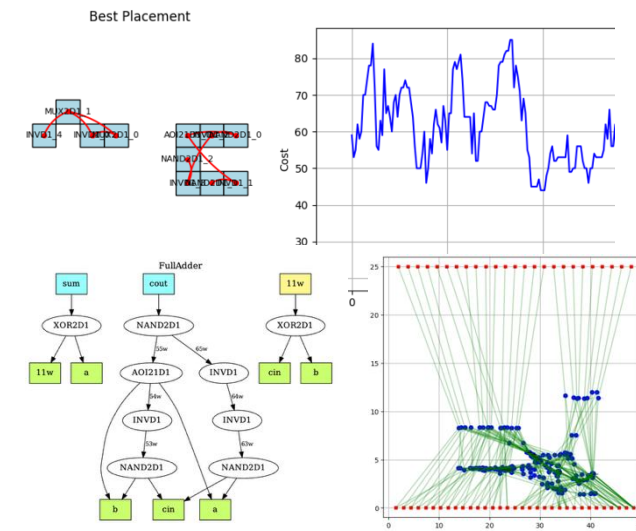
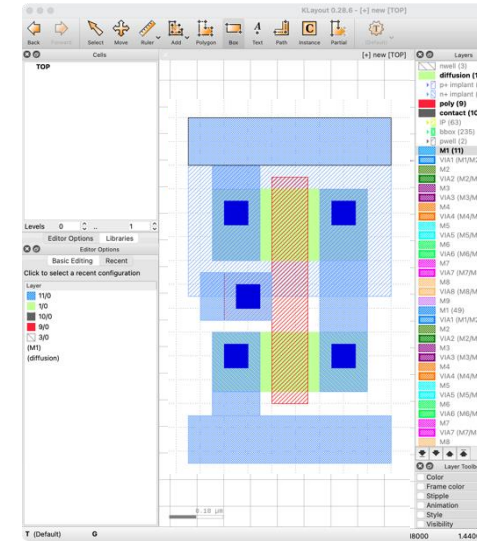
Experiential Learning for Semiconductor Chip Design through Student-Led Project Teams

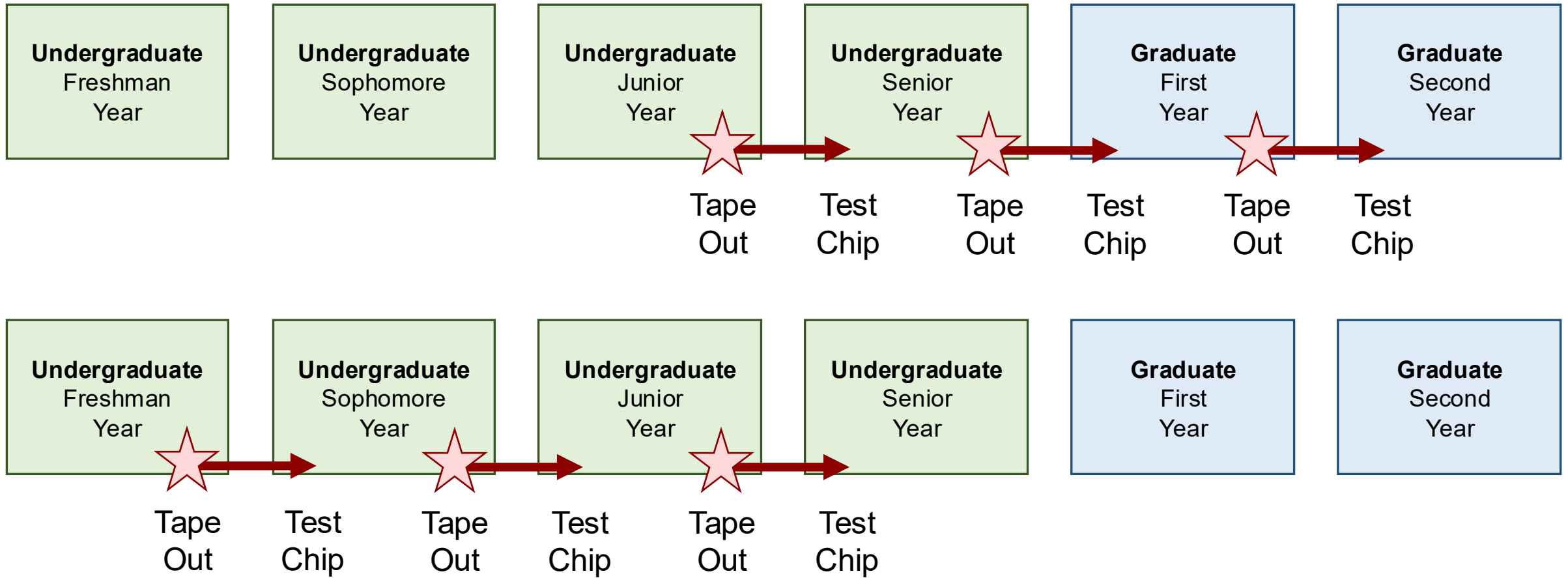
Christopher Batten, Cornell University
NORDTECH WFD Summit, September 2026



ECE 4745 Digital ASIC Design

- 2-3 students work in a group on three 4-5 month projects
- **Project 1: TinyFlow**
 - Develop 3-5 standard-cells in Klayout with λ rules
 - Develop very simple Python-based technology mapper, placer, router, and static timing analysis
- **Project 2: Accelerator Tape-Out**
 - Tape-out 1x1mm digital ASIC on TSMC 180nm
 - Commercial tools, standard-cells
 - Students test their chips in the fall
- **Project 3: System-on-Chip Tape-In**
 - Tape-in much larger and more complex digital ASIC using TSMC 180nm
 - Commercial tools, standard-cells, SRAM compiler





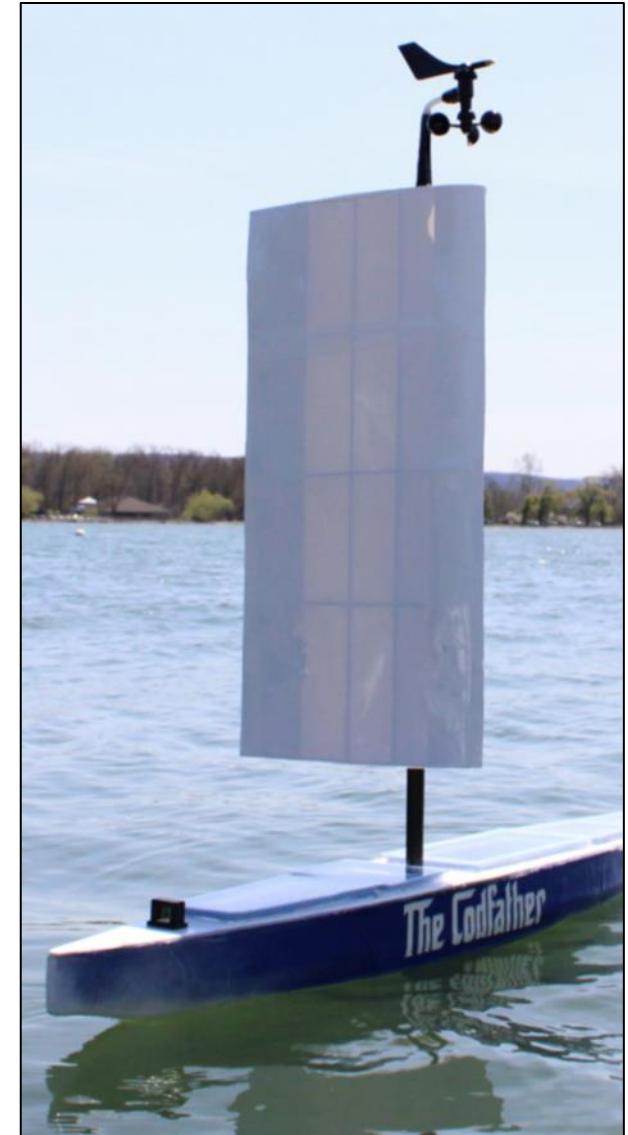
How can we get students experiencing the joy of chip design first-hand far earlier in their time as undergraduate students?

Is chip design really too hard for these younger students?

Cornell Student-Led Project Teams



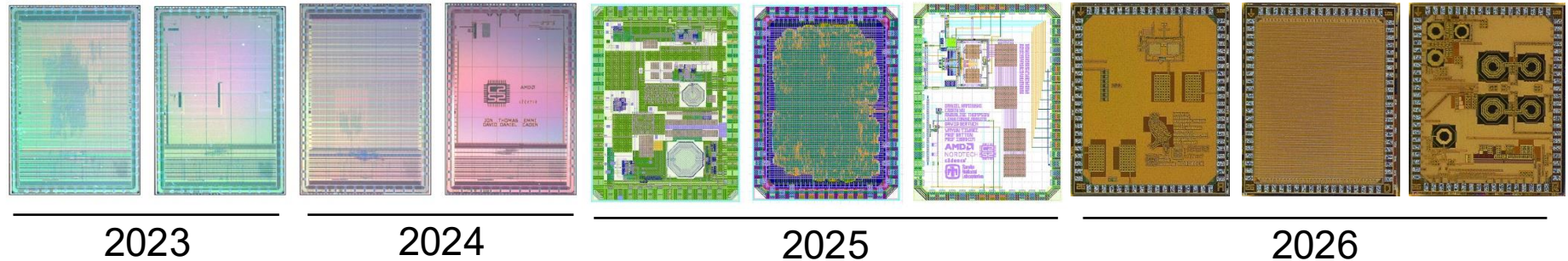
144 Students on 30 teams
14 engineering majors



C2S2: Cornell Custom Silicon Systems

- Student-led project team focused on specifying, designing, implementing, testing, fabricating, and evaluating custom digital, analog, and mixed-signal chips
- 50+ students/year including freshman, sophomores, juniors, and seniors majoring in ECE, CS, IS, and Management organized into nine subteams

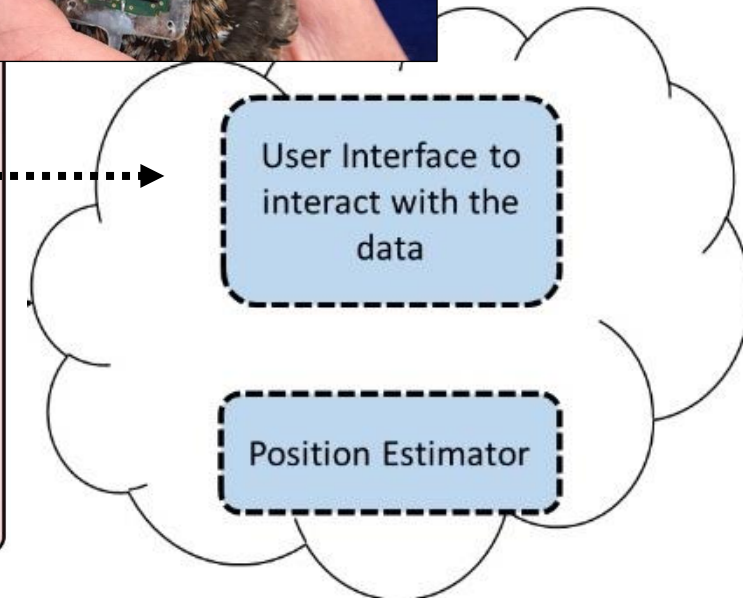
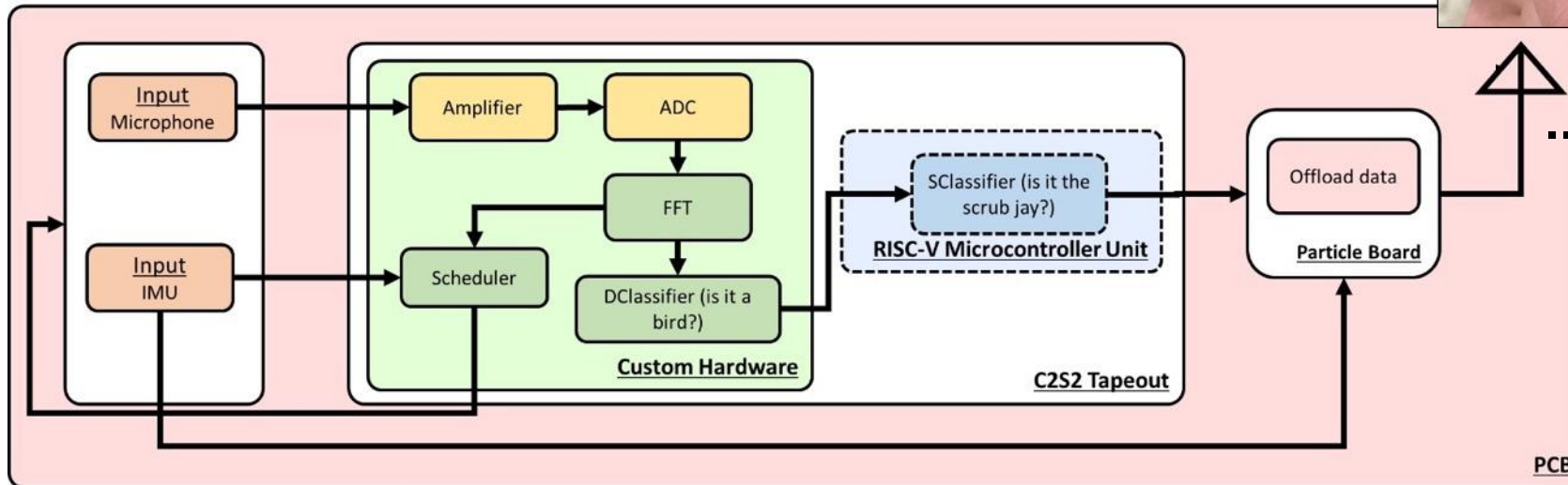
- Digital Design
- Digital Verification
- Analog Design
- RFIC Design
- RF Test & Verification
- Physical Design
- Software
- Platforms
- Business Operations



Taped out four chips on SkyWater 130nm and six chips on TSMC 180nm in just four years!

Chips With a Purpose

- Partnered with Christopher Tarango in Cornell's Lab of Ornithology from 2023-2025
- Explored a proof-of-concept ultra-low-power bird call recording system for scrub jays
 - **Digital Chips:** FFT accelerator with lightweight bird call classifier
 - **Analog Chips:** ADC for on-tag microphone
 - **RF Chips:** Simple radio frequency transceiver
 - **Software:** Embedded system for accurate bird call classifier
 - **Platforms:** Custom multi-chip proof-of-concept board



C2S2 Sponsors & Advisors

Shen Fund for Social Impact

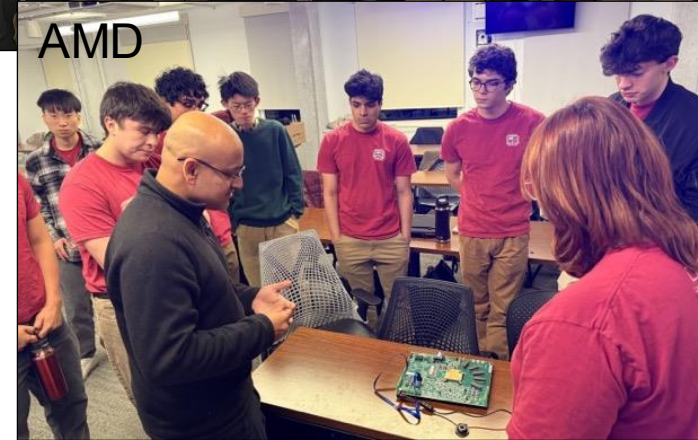


Sandia National Laboratories



NORDTECH

Northeast Regional Defense Technology Hub



Christopher
Batten



Mohamed
Ibrahim



Hunter
Adams

C2S2 Alumni Transitioning into the Workforce

- Natalia Pope (BS'25, MEng'25), **Hardware Engineer @ NVIDIA**
- Chris Lonergan (BS'25), **RFIC Design Engineer @ Apple**
- Vayun Tiwari (BS'25), **Physical Design Engineer @ NVIDIA**
- Johnny Martinez (BS'25), **Silicon Design Engineer @ AMD**
- Sherri Qazi (BS'25, MEng'25), **Design Verification Engineer @ IBM**
- Anjelica Bian (BS'26), **VLSI CAD Engineer @ Apple**
- Javier Chambilla (BS'26), **Analog Design Engineer @ Analog Devices**
- Jon Ho (BS'24), **Analog I/O Designer @ IBM**
- Aidan McNay (BS'24, MEng'25), **ASIC Design Engineer @ NVIDIA**
- Will Salcedo (BS'23), **CEO of Partcle** *(start-up building hardware accelerated open-source electronic design automation tools)*



Wali Afridi, Siddhant Ahuja, **Chimdi Anude**, Lena Araujo, **David Bertuch**, **Anjelica Bian**, Austin Brown, Shihao Cao, **Elias Castro**, Javier Chambilla, Nicholas Channg, Sana Chawla, Edwin Chen, Jiming Chen, **Joanne Chen**, Teresa Chen, Tyrone Chen, **Tomas Choi**, Kene Chukwuma-Orakwe, Angela Cui, Tanya Datta, Michael Dierkes, **Mohamed Elmi**, **Taylor Do**, **Thomas Figura**, Mika Finkman, **Jack Frank**, Asher Fred, Daniel Gabai, Ethan Gabizon, **Demetrios Gavalas**

Rachael Godwin, **Ananya Goenka**, Matt Hales, **Ridwanah Haque**, Sarah Hawes, **Jon Ho**, **Kai Imani**, Vinay Ivaturi, **Sumaia Jewena**, Ena Jovanovic, **Rohan Kalluraya**, **Daniel Kaminski**, Shehroze Kiani, Olesia Kuzdrovska, Tean Lai, Tiffany Li, **Edmund Lam**, Emily Lan, **Vicky Le**, Madeleine Lee, Chris Lonergan, Barry Lyu, **Johnny Martinez**, Michael McGruder, **Aidan McNay**, Joseph Junior Mensah, **Ivan Mokeyev**, Arnav Muthiayen, Linh Anh Nguyen, Judith Osei-Tete, Santino Pasquale, Jay Patel, **Alga Peng**, Natalia Pope, Adi Pratha, Andrew Pung, **Sherri Qazi**, Anishka Raina, Nathan Rakhlin, **Aditya Rao**, Arjun Saini, **Will Salcedo**, Jasmine Samadi, **Kate Sanders**, **Akanksha Sarkar**, Christopher Schiff, **Joyce Shen**, Jun Sim, Setor Simpri, Anika Sukthankar, Steven Sun, Adele Thompson, Annalise Thompson, **Vayun Tiwari**, **Simeon Turner**, **Akshati Vaishnav**, **Daniel Penas Varela**, **Abigail Varghese**, **Joseph Wan**, Jason Wang, Sean Whelan, Jeffrey Wilcox, **Chidera Wokonko**, Emmi Wyttenbach, Shang Xiang, **Caden Xu**, **Alyssa Xu**, Yifei Yan, Paige Yun, Chelsea Zhang, Xiangyi Zhao, **Major Zangari**, Tanya Zhou