2023 Impact Report

Caltech Technology Transfer & Corporate Partnerships

COLLABORATION INNOVATION ENTREPRENEURSHIP

Exploring New Horizons in Artificial Intelligence

Excitement as well as concerns regarding artificial intelligence (AI) have exploded over the past few years. Through two innovative partnerships, Caltech researchers remain at the forefront of driving AI science and its applications for good.

With the exponential growth of social media and the online world, it can be challenging and time consuming to identify and prevent abusive behavior. Two Caltech researchers have teamed up with Activision on a research project that aims to create an AI that can detect abusive online behavior and help the company's support and moderation teams to combat it. Anima Anandkumar, the Bren Professor of Computing and Mathematical Sciences, and Michael Alvarez, professor of political and computational social science, are using large data and deep learning to identify toxic conversation and behavior. Through this partnership, Caltech will have insight into real world behavior through Activision's game-driven data. The objective will be to create a safe gaming—and online—environment for all.

In 2023, Caltech completed the third year of our partnership with AWS as part of our AI4Science initiative. AI4Science brings together AI researchers with experts from other disciplines across campus to develop new foundations for AI that enable a revolution in scientific discovery. Over the last few years, AI4Science has supported multiple cutting-edge research projects that are changing the way we understand the world. Through AWS support, Caltech researchers are using AI to explore the universe, improve public health, and push the boundaries of fundamental AI research.

OTTCP Summer Internship in Entrepreneurship: Investing in the Next Generation of Entrepreneurs

The Caltech Seed Fund (CSF) not only supports and funds startups commercializing Caltech technology but also integrates entrepreneurship education though the OTTCP Summer Internship in Entrepreneurship. This ten-week paid internship program provides both undergraduate and graduate students firsthand experience working in entrepreneurship. Students are placed at startups that either are funded by the CSF, are current collaborators with OTTCP, or are locally based.

The first cohort of seven embarked upon their summer internships remotely in 2021. While the first year of the internship had to be conducted entirely online due to COVID restrictions, the second and third years were hybrid, conducted online; at Caltech's startup incubator, the Caltech Innovation Center (CIC); or at the startups' offices, providing schedule flexibility for both full-time and part-time interns. The second cohort was a group of eight students; and in 2023, the cohort expanded to 12.

During interns' time with their assigned startup, they work on a project that contributes to the company. Past projects have included market analysis reports, user interface design, technical capabilities analyses, investment pitch deck creation, and investment memo creation, among many other possibilities. In some cases, the valuable work that interns contribute to their assigned startups even leads to career opportunities. Brian Nguyen, a member of the second intern cohort in 2022, had started his internship by running competitor research and analysis for CSF-funded startup StrokeDx. However, during his internship, StrokeDx realized there was a technical stumbling block with their stroke-detection device – it ran only on older Windows devices. Realizing that he had the skills needed to solve this issue, Brian pivoted his project and got to work creating an app that would allow users to be able to receive data directly from the device. Thrilled with his innovation and drive, StrokeDx's co-founders offered Brian a full-time position, and after his graduation, Brian began working at StrokeDx as its Chief Technical Officer.

Between working with their startups on their individual projects, interns take part in OTTCP programming led by the office's Entrepreneurs-in-Residence (EIRs). This year's programming included speakers such as BOLD Capital Partners' Neal Bhadkamkar, who presented a two-part talk on venture mechanics that he had previously run at Harvard Business School. Aside from meeting and hearing directly from VCs, the interns also engaged with talks from startup legal counsel, Caltech entrepreneurs, and OTTCP staff, all helping to provide them with a holistic view of entrepreneurship and the many processes it encompasses. Stephanie O'Gara, a member of 2023's intern cohort, loved the insight that the presentations provided. "Being able to hear directly from VCs and get their insights was perfect for me," she said, since she had previously considered venture capital to be "a mysterious black box of money."

OTTCP looks forward to the growth and expansion of the internship program and hopes to see more students and companies joining the Caltech entrepreneurial ecosystem as a result. As Julie Schoenfeld, EIR for Physical Sciences, advocates, "Caltech is one of the best research institutes in the country—it should be surrounded by startups."

The Caltech Seed Fund

The Caltech Seed Fund invests in startups based on all areas of technology from Caltech and JPL. The investments follow research where strong comercialization opportunities exist. Current investments include:

Calcarea

Calcarea is a carbon capture and sequestration company from the Caltech lab of Jess Adkins, Caltech's Smits Family Professor of Geochemistry and Global Environmental Science. Calcarea aims to address global carbon dioxide emissions by focusing on flue gas produced by cargo ships, which contributes around 1 gigaton to global carbon emissions a year. In a process that mimics and accelerates one found in nature, the Calcarea team has created a chemical reactor that uses limestone and seawater to remove carbon dioxide from the exhaust gas and transform it back into saltwater. Calcarea launched with CEO Jess Adkins, who is taking a temporary leave from Caltech to lead the company, with seed funding from the Caltech Seed Fund, Azolla Ventures, and the Grantham Foundation.

captura

Captura is a carbon capture and sequestration company from the Caltech lab of Harry Atwater, Caltech's Howard Hughes Professor of Applied Physics and Materials Science. The company's technology removes excess carbon dioxide from the upper layer of the ocean, extending the ocean's capacity to absorb carbon emissions. Captura's Direct Ocean Capture system utilizes electrodialysis technology and a bipolar membrane to transform dissolved carbon back into carbon dioxide gas that can be captured and sequestered. Captura launched with CEO Steve Oldham and seed funding from the Caltech Seed Fund, multiple institutional investors, and through winning the XPRIZE Carbon Removal competition in 2022.

mitico

Mitico is a carbon sequestration company based on technology developed in the Caltech lab of Michael Hoffman, Caltech's John S. and Sherry Chen Professor of Environmental Science. The company targets flue gas from power plant smokestacks by creating a more affordable technology to reduce carbon emissions that is also minimally disruptive to operations. Employing carbonate-bicarbonate chemistry to turn carbon dioxide gas directly into a solid, their chemical reactor notably features their proprietary granulated metal carbonate sorbent technology, which provides greater surface area per volume for carbon absorption. Mitico launched with co-founder and CEO Clément Cid (MS '14, PhD '18), and co-founders Leopold Dobelle, Head of Engineering, and CTO Alan Gu (MS, PhD '22) with seed funding from the Caltech Seed Fund, Freeflow, and SOSV.

stroke Dx

StrokeDx is a medical device company creating a stroke detection instrument from the Caltech lab of YC Tai, Caltech's Anna L. Rosen Professor of Electrical Engineering and Medical Engineering. The company is developing technology that leverages the eddy current damping phenomenon to non-invasively measure biological tissues and fluids to create an automated, rapid, non-invasive point-of-care mobile device to monitor stroke progression. In addition, they have developed a handheld device will enable EMS providers to rule-in stroke and ensure that stroke patients are brought to an appropriate facility. StrokeDx was co-founded and launched with CEO Alex Ballatori and COO Dr. Shane Shahrestani (PhD '21), with seed funding from the Caltech Seed Fund, Freeflow, other individual investors, and through winning the 2023 MedTech Innovator's Global Competition.

Innovation.
Entrepreneurship.
Collaboration.

Our mission is to drive the transfer of scientific and engineering knowledge created by our researchers to maximize societal impact by developing partnerships with industry through the creation of new ventures, collaborations with corporations, and transfer of intellectual property while nurturing an entrepreneurial environment.

FY 2023:

131
Invention Disclosures
(campus only)

151
U.S. Patents Issued

2,015
Active U.S. Patents

60
Licenses Granted
(including options)

9
Startup Companies

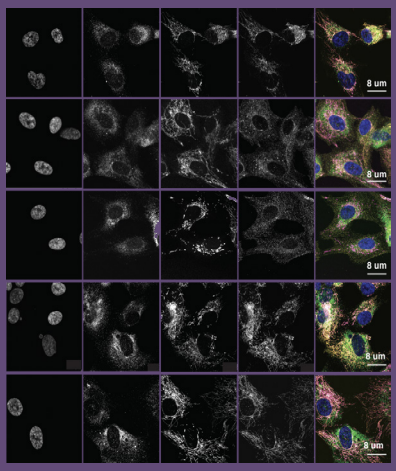
32
Companies
Sponsoring Research

36
Companies Giving Gifts

$52M
Corporate Contracts & Gifts

Ideas in the Lab

Rothenberg Innovation Initiative (RI^2) 2023 Awards



Mitochondrial imaging from the Voorhees Lab

A gift from Caltech Trustee James F. Rothenberg and his wife Anne launched the Caltech Innovation Initiative (CI^2) in 2009 to provide essential seed funding for early-stage research that addresses pressing problems and could lead to marketable technologies that benefit society. Each RI^2 award provides up to two years of support, with up to $125,000 in funding per year, to help Caltech professors, students, and post-docs mature their research beyond the conceptual stage to the point that the innovations are attractive to outside investors for further development of the technologies. Bolstered by an additional $15M gift in 2017 and renamed the Rothenberg Innovation Initiative (RI^2), the program funded six new projects and two renewal projects in 2023.

Highly Tunable Lithium Tantalate On-Chip Entangled Photon Source (renewal)
Scott Cushing, Assistant Professor of Chemistry

Cancer Prognosis Prediction through Integrated Codesign in Prep, Hardware and Deep Neural Network (new)
Changhuei Yang, Thomas G. Myers Professor of Electrical Engineering, Bioengineering, and Medical Engineering; Investigator, Heritage Medical Research Institute

Workplace Decarbonization through Data, Learning and Control (new)
Steven H. Low, Frank J. Gilloon Professor of Computing and Mathematical Sciences and Electrical Engineering

Dynamic RNA Therapeutic Platform for Treating Diseased Cells Leaving Healthy Cells Untouched (renewal)
Niles A. Pierce, Professor of Applied and Computational Mathematics and Bioengineering; Executive Officer for Biology and Biological Engineering

Development and Benchmarking of a Measurement Device Independent Quantum Key Distribution (MDIQKD) Pre-Prototype System (new)
Maria Spiropulu, Shang-Yi Ch'en Professor of Physics

A Wearable Aptamer Nanobiosensor for Non-Invasive Female Hormone Monitoring (new)
Wei Gao, Assistant Professor of Medical Engineering; Investigator, Heritage Medical Research Institute; Ronald and JoAnne Willens Scholar

Discovery of Small Molecule Inhibitors of MTCH2 for Cancer Therapy (new)
Rebecca M. Voorhees, Assistant Professor of Biology and Biological Engineering; HHMI Freeman Hrabowski Scholar

Algae Biocomposites/Biomaterials (new)
Chiara Daraio, G. Bradford Jones Professor of Mechanical Engineering and Applied Physics; Investigator, Heritage Medical Research Institute

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