BROWN TECHNOLOGY INNOVATIONS

2024 Annual Report

The Year in Review

Dear Colleagues,

Fiscal year (FY) 2024 saw Brown Technology Innovations (BTI) surpass its goals in startup growth and industry-sponsored research. We had four new startups, evenly split between deep tech and life sciences. Brown's industry-sponsored research surged by over 20%, including new research relationships with leading robotics, pharma and tech companies.

At the local level, BTI expanded its outreach to faculty inventors. We reached out to the engineering faculty in the Engineering Research Center, hosted Faculty Entrepreneur Connect sessions at the Nelson Center for Entrepreneurship and, in October of last year, launched our Innovation@Brown Showcase, which highlighted Brown startups and research to investors, entrepreneurs and executives.

Looking ahead to FY25, we are particularly excited about the emergence of climate and energy research at Brown, where we already have new startups, the strong growth of the RNA Center, which has spurred interest from industry partners, and the development of the Jewelry District as a new center for innovation with the launch of the Rhode Island Life Sciences Hub and development of a wet lab incubator for Providence and Rhode Island.

Sincerely,

Neil Veloso
Executive Director

Brown Technology Innovations Industry and Investor Advisory Board

Our advisory board members are experienced executives, investors and entrepreneurs who inform our strategy and connect us to entrepreneurs who can help develop commercial pathways for Brown faculty inventions. They represent a variety of disciplines and perspectives that help shape the trajectory of our growth.

Kristopher Brown, Partner, Goodwin Law

Neil Cohen, Chairman, Emerald Development Managers

Rich Ganz, Executive Chairman, Sentien Biotechnologies Inc.

Walter Jin, Chairman and Chief Executive Officer, Pager Inc.

Keith Kerman, M.D., Operating Partner and Senior Advisor, The Riverside Company

Rajiv Kumar, M.D., Co-Founder, Brown Angel Group

Kirsten Leute, Partner, University Relations, Osage University Partners

Annie Mitzak, Partner, Cure Ventures

Sara Nunez-Garcia, Co-Founder, Partner, Forty51 Ventures

Jeff Pootalal, Managing Director, Sixth Street Partners

Greg Sieczkiewicz, J.D., Ph.D., Executive Partner and Chief IP Counsel, MPM Capital

A Year in Numbers

Brown Technology Innovations' Activity Metrics, FY23 vs. FY24

Strategic Priority	Put Brown Technology First	Steward Brown Inventions	Amplify Marketing + Networking Tactics	Streamline Deal Execution			
Measure	Disclosures	Patents Issued	CDAs	Options	Exclusive Licenses	Non-Exclusive Licenses	SRAs
Q1	16	4	11	0	2	1	8
Q2	21	6	16	1	3	0	4
Q3	22	6	11	0	0	1	4
Q4	28	6	18	4	1	0	5
FY24	87	22	56	5	6	2	21
FY23	94	30	60	7	6	3	18

CDAs: Confidentiality Agreement; SRAs: Sponsored Research Agreement

Spotlight on Startups

The four new Brown startups in FY24 showcased the richness of Brown research

ATOMICS

PHINYX

AtomICS

"Storing Big Data in Small Molecules" is the mantra of this new startup from faculty inventors Brenda Rubenstein and Jacob Rosenstein from the physics department and School of Engineering, respectively. Led by Brown alums Dana Bichele-Speziale and Selahaddin Gumus, AtomICS has won multiple venture competitions (Brown Venture Prize, Baylor Business Plan, and Arizona State University Innovation Open) and landed a $1.9 million Small Business Innovation Research (SBIR) award through the U.S. Army xTechPrime competition.

Phinyx AI

Using the cutting-edge research of machine learning pioneer and Brown professor George Karniadakis, Phinyx AI employs artificial intelligence-powered simulation tools to make complex engineering software simple. Based in Providence, Phinyx received venture investment from the Slater Technology Fund.

TiNOS Therapeutics

TiNOS Therapeutics arose from the research of Lifespan investigator Dr. Nikos Tapinos. Alongside Brown alum David Karambizi, TiNOS targets RNA modifications to modulate the cancer proteome with both reductions of tumor growth and activation of anti-cancer immune responses in the animal models. Companies such as TiNOS highlight the broad base of life science research taking place at both Lifespan and Care New England.

Xiberlinc

Xiberlinc was founded by Maro Machizawa, a former postdoc in Takeo Watanabe's Laboratory for Cognitive and Perceptual Learning in the Department of Cognitive and Psychological Sciences. Xiberlinc will be using a neurofeedback technique that Machizawa developed, which involves a user imagining (or mentalizing) an image, to robustly improve cognitive functions.

Strategy Report

Brown Technology Innovations continued to execute on its strategy below for FY24. This was particularly evident in our service to the faculty customer and marketing and networking activities (see below). As we look to FY25, key activities will impact our strategy and outcomes:

- **Maturation of Brown's *Operating Plan for Investing in Research:*** This is particularly evident in growth of new faculty across the University, from computer science to engineering to the RNA Center. Many of these faculty are coming in with patents, startups and industry relationships.
- **Growth of BIRCH:** The Brown Innovation and Research Collaborative for Health (BIRCH) will impact intellectual property (IP) commercialization, as BIRCH aligns the research operations among hospitals and the University. BTI has worked closely with its hospital counterparts around IP with the intent of engendering true collaboration among clinicians and scientists around innovation and commercialization.

Goal 1:

Put Brown Technology First

Prioritize areas of strength and high potential; focus on technology and inventions; connect to industry interests and market needs.

Both tech and life science research were equally represented in the FY24 invention disclosures. BioMed and the School of Engineering each brought in 33 invention disclosures of the 87 total. Brown bucked the national average of one invention disclosure per $3.8 million in research expenditures by having a new disclosure for every $3.3 million of research, showing how Brown faculty have greater output per research dollar.

The inaugural Innovation@Brown Showcase was emblematic of BTI's commitment to highlight Brown's research and innovation to the world. At a fantastic event, punctuated by faculty awards and a demonstration of choreorobotics, startups connected with investors, inventors linked up with entrepreneurs and deals were transacted in meeting halls and conference rooms.

Goal 2:

Steward Brown Inventions

Provide excellent service to the faculty customer; manage the intellectual property (IP) budget to maximize benefit to investors and inventors.

We continue to focus on customer service to our faculty. It is the faculty researcher who conducts the research and innovation that lead to invention disclosures, patents, licenses, startups and industry collaborations. To that end, BTI's "internal business development" efforts put our staff where faculty are located. We are visible in the Engineering Resource Center weekly (Wednesdays) and available for faculty questions. BTI attends faculty seminars and department meetings to raise awareness of what we do and solicit the new ideas that lead to future inventions.

These activities, combined with the creativity of Brown faculty, has allowed Brown to grow its patent portfolio. Brown is in the Top 100 universities for issued U.S. patents. This growth has come with a need to be very deliberate about our IP budget spend, however. To that end, the office has stayed within budget, with excellent accountability and transparency around expenditures.

Goal 3:

Marketing and Networking

Connect with high-potential customers through multiple channels; engage advisor network to inform strategy and refer entrepreneurs.

Our marketing and networking efforts in FY24 were targeted and regional in nature. With the Innovation@Brown Showcase bringing investors and entrepreneurs to Providence, we took Brown startups "on the road" to expand our networks. In collaboration with alumnus Kris Brown of Goodwin Procter, BTI hosted its first event in New York City for an audience of life science investors. This was followed up by an equally successful event in Boston, hosted by J.P. Morgan, where Brown's tech startups were presented to a well-heeled audience of tech venture capitalists.

This focus on developing venture and early-stage investors has been a hallmark of BTI since its inception in 2020. These efforts were especially accelerated in FY24, as we added over 37 new investor groups to bring our total network size to 145. Those investors ranged from life science, digital health and deep tech to climate-focused venture capital firms.

Goal 4:

Deal Execution

Focus on patent licensing and industry-sponsored collaborations; streamline process and mechanisms to ensure highest-quality deals.

FY24's deal flow was punctuated by four new startups (highlighted above), which quadrupled our amount from FY23. These startups were marked by the shared characteristic of having a Brown alum (oftentimes a graduate student or postdoc following their work out of the University). This mirrors national trends, in which startups are an increasingly viable path for graduates. We saw new technologies and licenses issue forth from existing industry research relationships with the University. Derek Stein of the physics department continued his successful research collaboration with a leading molecular sensing technology that resulted in a license to single-cell mass spectroscopy technology.

BioMed (4) and Computer Science (3) took the first and second slot for departments with the most deals from the research of Nikos Tapinos, Jeff Huang and George Karniadakis.

Brown Innovation Fellows Program

By Ann Rae Jonas

Brown Innovation Fellows is a paid internship program that provides graduate students, postdocs and medical students with experience in technology evaluation, market research, patenting and commercialization. The program looks to recruit fellows from a variety of STEM fields, including biomed, engineering, brain science, digital health, chemistry, physics and computer science, as well as business-related fields in economics and public health. The program was launched in 2022 by Melissa Simon, a business development director with BTI, who participated in a similar program at Columbia as a doctoral student.

Working with BTI business development directors, fellows take an active role in assessing the commercial potential of early-stage technologies developed at Brown, evaluating industry interest and developing marketing strategies, writing technical reports and pitching documents. Through participation in the program, they gain an understanding of the basic business elements involved in creating an early-stage startup company, as well as valuable business skills relevant to nonacademic careers in science, technology, business and law.

Researching and Sharing Market Insights

Josephine Kalshoven, who completed her biomedical engineering Ph.D. in Spring 2024, worked with BTI senior business development director Brian Demers to explore licensing, research collaboration and potential startup opportunities for a mass spectrometry technology developed by physics professor Derek Stein. The proposed commercial pathway required buy-in from two existing companies (one of which, Nansoft, is led by a Brown alum), an industry expert and Stein. The goal was to broker a deal that would enable all parties to make best use of the exciting technology coming out of Brown.

"My job was to talk with those involved and understand what they needed to know about the market opportunity, competitors, projections of future technology and more in order to decide what their role should be in the potential license and collaborative research effort," Kalshoven said.

Gene Yazbak, director at Nanosoft, was part of the group working with Josephine.

"Josephine jumped right in to assess the market landscape, product offerings and key academic research advances," Yazbak said. "Her contribution was instrumental in getting us to a clear decision quickly. She instantly became part of the team."

Demers said Kalshoven did a fantastic job researching the mass spectrometry market.

"She collected information related to state-of-the-art research, new product launches and competitive market landscape. She then produced a high-quality, distilled report that was used to craft a commercial strategy to translate research from Derek's lab," Demers said. "Josephine's insights were informative and instrumental in strengthening our understanding of the commercial potential of the research."

Connecting Startups with Capital

M.D./Ph.D. student Alexandra (Alex) Wong has been a Brown Innovation Fellow for two years. She assisted a Brown startup co-founded by Nikos Tapinos, which is developing RNA technology for cancer therapeutics. Wong worked with David Karambizi, who did his doctoral work under Tapinos, to put together a pitch deck to present to a venture capital (VC) firm, as well as create a pitch deck template for future use. Her projects have included assessing new research and technology disclosures for commercialization potential, reviewing applications for grant funding and helping to prepare companies to pitch to VC firms.

"Alex's work was key in helping us hone our message during the early stages of the company," David Karambizi said. "She even brokered a connection with a potential funding source. The information that she shared will be relevant and useful at all stages of our development as we interact with VCs."

Wong's experiences as a fellow helped her land a fellowship position this summer at Civilization Ventures, a San Francisco VC firm.

"The skills I had gained as a fellow allowed me to dive into due diligence with relative ease and ask my mentors at Civilization deeper questions on how VCs analyze new technology and think about founding teams," Wong said. "I also had the opportunity to introduce companies to them as part of a sourcing assignment."

Wong said she now views herself almost as a "translator" between the deep research and innovation/entrepreneurship worlds.

Past and Current Brown Innovation Fellows

CURRENT FELLOWS
(left to right)

Irvin Akinseye, medical student

Kiera Dwyer, School of Engineering

Joe Inger, medical student

Lawrence Huang, medical student

Alec McCall, School of Engineering

Kushaal Rao, Neuroscience

Alex Wong, Computational Biology

PROGRAM GRADUATES

Brandon Armstead, Ph.D., Pathobiology

Liam Connolly, medical student

Xiaozhou Fan, Ph.D., School of Engineering

Josephine Kalshoven, Ph.D., School of Engineering

Supporting BBII Applications

Ph.D. students Kiera Dwyer and Brandon Armstead (now a postdoc) supported Karen Bulock in reviewing Brown Biomedical Innovation to Impact (BBII) applications.

Armstead felt challenged to go beyond his comfort level in learning new life science concepts. He welcomed the opportunity to immerse himself in technology from several different emerging areas.

"The added benefit of lunch-and-learn experiences and training workshops for fellows provided invaluable insights on startup development, as well as on the steps necessary for successful IP [intellectual property] commercialization," he said.

Bulock said Armstead's support was welcome.

"Brandon assisted us in researching the feasibility and commercial potential of the preproposals, which was extremely helpful when we assessed which ones to move forward to the next stage," she said.

Working with Dr. Adam Lewkowitz, Dwyer analyzed the market surrounding postpartum depression treatments.

"In addition to learning about different aspects of technology development and translation, I saw how the Brown network came together to advise on intellectual property development, available resources, regulatory guidelines, the market and the potential impact on patient care," Dwyer said. "And I was inspired by Dr. Lewkowitz's passion to develop a technology to address challenges he saw when working with patients."

"As we were helping Dr. Lewkowitz develop his full proposal, Kiera did a deep dive into the competitive space in the field of app-based digital therapy for postpartum depression, and then more widely into mental health in general," Bulock said.

Lewkowitz describes himself as a National Institutes of Health-funded doctor who is comfortable with grants and clinical research but knows nothing about business.

"Kiera took over the section of the application I struggled most with – the competitive landscape – and provided granular, accurate, high-quality data on competitors, including their strengths and weaknesses," he said. "She patiently explained her findings to me, which enabled me to incorporate her research into my application, greatly strengthening it. I do not think I would have been awarded this grant without her support."

Innovation Fellows

More than an Internship

Brown Innovation Fellows is not just an internship program, where fellows provide an extra set of hands, Simon said. Rather, the program is training the fellows to think about research in a more translational way and to be creative yet critical in their evaluation of potential commercialization pathways. The experience is also intended to enable them to look at their own graduate research from a fresh perspective and to develop skills that are transferable to their future careers, whether inside or outside of academia.

"The program supports fellows, BTI, Brown startups and faculty members," Simon said. "The work the fellows do extends the capabilities of BTI, directly impacting the faculty who engage with the office, helping them to think in new ways about their own research and potential new pathways for their work, including startups."

Brown Biomedical Innovation to Impact

Brown Biomedical Innovation to Impact (BBII) is a biomedical technology development program that accelerates the timeline for turning faculty discoveries into potential products with clinical impact. Since its 2018 launch, BBII has made 25 awards to 23 faculty inventors/technologies totaling $2.5 million in funding, and four startup companies have been formed to develop and commercialize BBII-funded technologies. The startups, in aggregate, have raised about $3 million in seed investment or nondilutive funding. The sixth annual BBII proposal cycle yielded awards for four projects: two therapeutics, a digital health technology, and a research tool. The $100,000 awards, funded either by BBII or by a gift from the Steven J. Massarsky Trust, help faculty inventors to develop important data demonstrating the promise of their technology.

Life Sciences Impact Awards

The newly established Brown Innovation Fund supports biomedical and life sciences innovation awards to Brown faculty for the development of technologies with the potential for commercialization. One or two yearly Life Science Impact Awards of up to $250,000 of funding, as well as advising and mentorship, are expected to generate licensable technology with the potential for company creation. “The Life Sciences Impact Awards are intended for life science technologies where there is already some established proof of concept,” BBII managing director Karen Bulock said. Some projects “graduating” from BBII or other seed funding mechanisms will be particularly well suited, but this is not a requirement.

Eric M. Morrow received the first Life Sciences Impact Award. Morrow, whose research focuses on understanding the normal molecular mechanisms of brain development and genetic perturbations that underlie disorders of human cognitive development, will use the support to develop a gene therapy for a rare neurodevelopmental disorder.

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News in Focus: Our Top Stories from FY24

BROWN *Invents*

NSF grant to Theromics for ablation therapy technology

Theromics Inc. received a $1 million Small Business Technology Transfer (STTR) Phase II grant from the National Science Foundation for HeatSYNC™, a nano-polymer gel that enhances the effectiveness of ablation therapy of abnormal tissue and allows controlled delivery of drugs directly into soft tissue with reduced side effects.

› Read: Press release

Bolden Therapeutics receives $1.5M in financing

Brown licensee Bolden Therapeutics, co-founded by Justin Fallon (Neuroscience) and Ashley Webb (Molecular Biology, Cell Biology, and Biochemistry), received $1.5 million in pre-seed convertible note financing to advance its preclinical development of antisense oligonucleotides to promote neurogenesis.

› Read: Press release

AtomICs wins Baylor's 2024 New Venture Competition

AtomICs, a data storage and processing startup founded by Brown faculty and former graduate students, won first prize in Baylor's 2024 New Venture Competition. The technology uses a novel patented technique to harness small-molecule mixtures to store digital information.

› Read: Press release

Transposon Therapeutics announces Phase 2 results

Transposon Therapeutics, which is developing oral therapies for neurodegenerative and aging-related diseases, announced final results from its Phase 2 study of TPN-101 to treat progressive supranuclear palsy (PSP) and interim results from its Phase 2 study of TPN-101 to treat C9orf72-related ALS/FTD.

› Read: Press release

Brown joins ARPA-H Inventor Catalyst Hub

In an effort led by Dr. Mukesh K. Jain, dean of medicine and biological sciences, and BTI, Brown has joined the Advanced Research Projects Agency for Health (ARPA-H) Investor Catalyst Hub consortium of universities, companies, investors, foundations and agencies, which will collaborate with ARPA-H to catalyze breakthroughs in science and medicine. Contact Neil Veloso for information.

› Read: Press release

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