Acorn Innovation Fund Report (FY23 Cohort)

The Innovation Commercialization Seed Fund, also known as the Acorn Innovation Fund, is enabled by the Legislature: "shall be used to advance the goals of job growth creation, innovation and economic development which may include, but shall not be limited to, the construction of prototypes, testing, market research and other steps necessary to bring the invention or concept to market in the commonwealth."

The Acorn Innovation Fund supports principal investigators (faculty, graduate students and post-doctoral students) at Massachusetts research institutions (universities and medical centers) who seek to demonstrate the viability of their technology and advance them towards commercial use. Awards can be used to: 1) further develop a prototype, 2) gather additional data to demonstrate proof of concept, or 3) obtain data to compare the technology to existing technologies and show its competitive advantages. Several past Acorn Innovation grant winners have gone on to spinning out startups based on their inventions and have raised outside capital.

Here is the program summary re applications, reviewers and results for the past 6 years. Note: During 2021, MassVentures ran the Acorn program for both the FY21 and FY22 Cohorts on behalf of the Massachusetts Technology Transfer Center (MTTC) which was then housed at University of Massachusetts.

Acorn Stats for the past 6 years:

Year	Total Applications	UMass Applications	MA Applications	Winners	Proposal Reviewers
2023	22	8	14	12	34
2022	37	8	29	12	55
2021	35	14	21	13	69
2020	24	12	12	13	23
2019	53	18	35	14	16
2017	49	29	20	10	20

MassVentures is actively addressing the decline in applications and working with UMass and the Executive Office of Housing and Economic Development to find a solution.

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FY23 Details:

Twelve grants of $16,250 each, for a total of $195,000, were awarded to faculty researchers from Harvard Medical School; Northeastern University; MIT; Tufts University; the University of Massachusetts at Amherst, Dartmouth and Lowell; and Worcester Polytechnic Institute to assist them in testing the viability of their technologies and potentially bringing their research to market.

Selected from a field of 22 applicants, the recipients were chosen for their project's technical merit, commercial viability, project plan and strength of team. Seven projects selected are medical device or therapeutic advances, such as an improved "liquid biopsy" technique for prostate cancer, novel "virtual staples" for gastrointestinal surgery that rely on magnetic forces to close tissue, and an AI-guided cloud-based baby monitoring system.

Advanced materials, life science and photonics projects were also chosen, including a novel water treatment technology for remote areas, a cost-effective, laser method for testing the soundness of concrete infrastructure, and "eco-cooling" fibers that when added to paint cool interiors without electricity.

FY23 recipients of the MassVentures Acorn Innovation Fund awards are as follows:

Zi Chen, Hassan Khalil, MD, Steven J. Mentzer, MD; Harvard Medical School/Brigham and Women's Hospital
Preventing Anastomotic Leakage with No-perforation "Virtual Staples" The researchers invented novel, no-perforation "virtual staples" to minimize stress effects and reduce anastomotic leakage (AL) in patients undergoing gastrointestinal surgery. AL has been one of the worst complications of esophagectomy and intestinal and colorectal surgery for over a century, leading to prolonged hospital length of stay, higher readmission and mortality rates, and significant additional costs both to the patient and the hospital. The virtual staples consist of a magnetic component and a complementary ferromagnetic component, both coated with biocompatible adhesives, that hold two sides of tissue together via magnetic forces.

Kwok-Fan Chow, PhD; Weile Yan, PhD; University of Massachusetts Lowell
"Low-Temperature Electrolytic Technology for Destruction of PFAS in Spent Water Treatment Cartridges" The researcher is developing a technology to break down the toxic "forever chemicals" PFAS (per- and polyfluoroalkyl substance) into non-harmful molecules using electrolysis. The technology provides an efficient and environmentally friendly method for the

disposal of materials carrying concentrated PFAS, such as domestic and industrial water treatment media.

Maolin Guo, PhD; Yifei Dou; University of Massachusetts Dartmouth
"Novel platinum(II)-based anticancer agents and targeted conjugates" This innovation is a novel platinum (II)-based anticancer agent and targeted conjugates with significantly enhanced water solubility. It addresses a need in the industry for novel Platinum (II) drugs with better water solubility that are more easily synthesized and efficacious and have reduced side-effects and toxicity than prior Platinum-based drugs. These complexes contain multi-carboxylate/hydroxyl ligands and a free carboxyl group which can form salts or be conjugated to a peptide or antibody, which is promising for targeted Platinum-based anticancer drug development.

Yong Kim, PhD; University of Massachusetts Dartmouth
"Flocked Reticulated Foam (FRF) Air-Purifying Filter Media" This researcher is developing novel, effective air-scrubbing anti-bacterial air-filter media materials. This advanced material is created by coating short, "low denier" flock fibers onto thin layers of open-cell structured reticulated foam to produce a novel, very high surface area, effective air filtration media. The flocked reticulated foam (FRF) material is then treated with an antimicrobial agent to create a superior air-disinfecting filter media.

Joshua Landis, Kemal Eseller, PhD; Noureddine Melikechi, PhD; University of Massachusetts Lowell
"Portable cement degradation analysis tool" This technology uses laser induced breakdown spectroscopy to analyze cement structures for contaminants that could lead to oxidation and the eventual corrosion of reinforcing steel rods. (Sea spray and melted snow runoff can penetrate porous concrete and cause the steel to oxidize, expand, and crack the cement.) The device is a handheld scanner that could be used by an inspector to spot aggressive salts before a structure oxidizes and cracks. Current technology requires core sampling of cement structures, which is expensive and damaging.

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Gili Naveh, DMD, PhD; Athena Papas DMD, PhD; Tufts University
"Dental Cavity Sensing Toothpick" The grantee is developing a cavity-sensing toothpick that instantaneously changes color in the presence of an active cavity. Simple to use, it allows the dentist to get real-time information on patients that is not available by x-rays and the patient to monitor the effectiveness of their oral health regimen at home.

Sarah Ostadabbas, PhD; Mohammad Moghadamfalahi, PhD; Deniz Erdogmus; Northeastern University
"AiWover: A Smart Way to Monitor Your Baby" The researcher is developing a first-of-its-kind AI-guided cloud-based baby monitoring system. AiWover tracks a baby's every movement, categorizes their pose/postures, and analyzes their motor function reliably to provide parents with a smart way to monitor their baby's activity and development.

Ahmet Can Sabuncu, PhD; Lee Moradi, PhD; Eric Rosero, MD; Worcester Polytechnic Institute
"TwitchCLIP: A Quantitative Train-of- Four monitoring device for monitoring neuromuscular blockade in patients undergoing surgery" Researchers are developing a novel approach to monitoring neuromuscular blockade, which is used in certain surgical procedures to paralyze muscles of patients to prevent any unexpected patient movement that could be catastrophic for the surgical outcome. The technique uses a pressure balloon and transducer to capture quantitative variations in the muscular response of the thumb. The researchers' goal is to offer a reliable and easy-to-use device to increase the certainty in dosing the neuromuscular blockade and the reversal agents during surgery.

Rachid Skouta, PhD, Larry Schwartz, PhD; Joseph D. Jerry, PhD; University of Massachusetts Amherst; Kin-Ho Choi, PhD, Dana Farber Cancer Institute
"Novel Ferroptosis Inducers to Target RAS-Positive Tumors" This grantee has engineered a drug-like ferroptosis inducer with nanomolar potency and improved solubility, targeting hard-to-treat non-small cell lung cancer. Currently there are no FDA approved drugs targeting ferroptosis pathways for hard-to-treat cancers, while the approach has been shown to preferentially target cancer cells, while sparing normal cells and without producing significant side effects.

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Govind Srimathveeravalli, PhD, Dr. Stephen Solomon, MD; University of Massachusetts Amherst
"Prostate cancer diagnostic technology" This research team has developed a high-quality "liquid biopsy" technique that allows for far greater sampling of potentially malignant tissue than the standard needle biopsy. The aspiration technique produces on-demand liquid samples, enriched with intracellular material such as DNA, RNA, protein and metabolites, that can directly be fed into existing cancer diagnosis pipelines and genomic sequencing with minimal post-processing.

Junghyo Yoon, PhD; Jongyoon Han, Ph.D; Massachusetts Institute of Technology
"Prototyping of portable desalination unit based on Ion Concentration Polarization" This technology is a novel approach to desalination that enables maintenance-free use, easy operation and high-power efficiency. The portable technology uses the Ion Concentration Polarization process, a filter-less process (unlike reverse osmosis) that eliminates critical maintenance issues, including membrane replacement and chemical pretreatment. This technology could be a game-changer for water treatment in remote areas that are disconnected from infrastructure and supply chains.

Yi Zheng, PhD; Northeastern University
"Self-cleaning and Fireproof Fiber-based Meta Paint for Passive Cooling" The grantee invented a self-cleaning, fire-resistant, and eco-friendly cooling fiber, based on hydroxyapatite (a calcium phosphate mineral), which can be integrated into paint formulations. When the paint is applied to structures, it lowers the interior building temperature without consuming any electricity. The innovation diminishes the use of electrically-powered cooling systems, and lowers the carbon footprint of buildings. Traditional compressor-based cooling systems account for about 20% of total worldwide electricity consumption.