

Welcome

Innovation Crossroads is a public-private partnership founded by Oak Ridge National Laboratory and supported by the DOE Office of Energy Efficiency and Renewable Energy's Advanced Manufacturing Office and the Tennessee Valley Authority.





Outline

- Program Overview
- Meet Our Innovators
- Program Metrics
- Application Process
- Ecosystem and Partners
- Programming and Curriculum
- Discussion





Program Overview





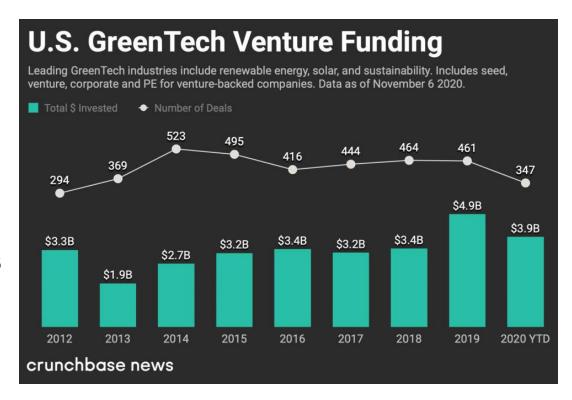
LEEP Premise & Vision

Premise:

- Hardware-based startups are challenging
 - Require technical and business expertise
 - Capital intensive
- Early-stage VC funding is decreasing

· Vision:

- 1. Recruit the best energy technology innovators
- 2. Leverage expert mentorship and world-class facilities at national labs on a win-win basis
- 3. Position people and technology for market



cyclotronroad







2016

2016

Embracing Our Differences, Changing The World

Innovation Crossroads is committed to creating an inclusive environment where diversity is valued so that innovators will be inspired to contribute fully to the success of their startups' research and development. We strive to promote diversity, equity, and inclusion (DEI) across our program, including in our operations, our leadership, our innovators, our mentors, and our partners.

Our diversity efforts support Oak Ridge National Laboratory's mission to do "world-class science" by providing a pipeline of qualified, diverse candidates, and by recommending policies and procedures that ensure:

- equitable treatment and opportunities for all candidates and selected program innovators
- an environment free from harassment
- and respect for individual differences

As part of this ongoing effort, we:

- Work to attract a diverse candidate pool with diverse technology concepts and business viewpoints
- Ensure our review and selection processes are inclusive and that final decisions are unbiased and based on qualifications and standardized selection criteria
- Strive to create an inclusive environment that celebrates diversity and ensures that individual differences are respected and valued
- Devote resources and time to expanding DEI awareness, training, and skillsets
- Proactively engage with program sponsors, partners, and supporters to promote DEI
- Recognize and reward innovators for supporting diversity key principles within their startup
- Review and adjust, recognizing that DEI initiatives are not static, and our strategy must be ever evolving



About the Program

Accelerating Innovation:

- The Innovation Crossroads Program takes top entrepreneurial scientists and engineers and embeds them at Oak Ridge National Laboratory to perform early-stage research and development (R&D) that will lead to the launch of energy or manufacturing businesses in the future.
- In addition to technological access and support, the program trains innovators to develop entrepreneurial acumen and skills, while introducing them to our ecosystem partners needed to facilitate commercial and investment opportunities.
- This dual focus on early-stage R&D and entrepreneurial development provides innovators with the platform they need to take their ideas from the lab and onto the commercialization pathway.

Program Sponsors:

- Oak Ridge National Laboratory
- Tennessee Valley Authority
- U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's Advanced Manufacturing Office and Building Technologies Office







Sponsors and Impact Areas

Sponsors

Impact Areas





Clean Energy & National Security

Mission: Deliver scientific discoveries and technical breakthroughs that will accelerate the development and deployment of solutions in clean energy and national security that provides economic benefit to the nation.



Energy & Advanced Manufacturing

Mission: Catalyze research, development and adoption of advanced manufacturing technologies and practices to drive U.S. economic competitiveness and energy productivity.



Building Efficiency & Energy Cost Reduction

Mission: Support research and development, validation, and integration of affordable, energy-saving technologies, techniques, tools, and services, to enable industry and others to develop and deploy technologies that can improve the efficiency and reduce the energy costs of the nation's homes, offices, schools, hospitals, and other commercial and residential buildings in both the new and existing buildings markets.



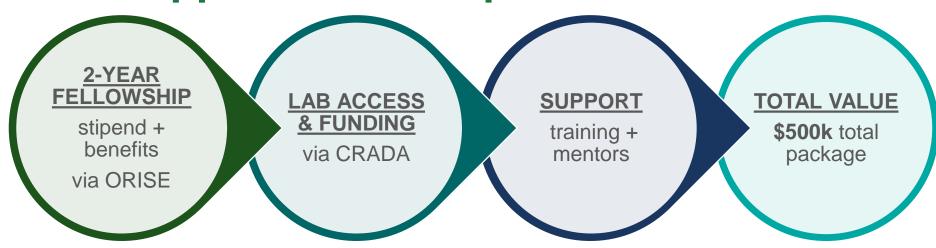
Integrated Grid

Mission: Support investments in technologies to achieve an integrated grid: a power system that is highly flexible, resilient, and connected and that optimizes energy production, delivery, and use.



INNOVATION CROSSROADS

World Class Support for Startups





- 2017-2019
- 4 Innovators / 3 companies
- Sponsors: AMO, ORNL



- 2018-2020
- 5 Innovators
- Sponsors: AMO, ORNL



COHORT 3

- 2019-2021
- 7 Innovators
- Sponsors: AMO, ORNL, TVA



COHORT 4

- 2020-2022
- 5 Innovators
- Sponsors: AMO, ORNL, TVA



COHORT 5

- 2021-2023
- 6 Innovators
- Sponsors: AMO, ORNL, TVA, BTO



Providing Multi-Faceted Support

Innovation Crossroads offers unique multi-faceted support tailored to the individual needs of each startup company. This unique structure, combined with ORNL's diverse capabilities, provides fellows the opportunity to take their groundbreaking research to market more quickly and with more impact.

National lab expertise

ORNL is DOE's largest science and energy laboratory and home to some of the nation's most significant user facilities. Because Innovation Crossroads entrepreneurs work within ORNL, they have immediate access to essential tools and resources. This access reduces cost, risk, and R&D time, allowing fellows to focus on creating the next generation of game-changing technologies.

Multidisciplinary collaboration

Innovation Crossroads participants work with ORNL's renowned scientists and engineers across many disciplines, including biological and environmental sciences, advanced materials, neutron sciences, nuclear science and engineering, and highperformance computing, providing a platform for accelerating innovation.

Business mentoring assistance

Innovation Crossroads has a growing network of partners who offer a unique entrepreneurial and business mentoring experience. The program facilitates connections with industry executives, investors, entrepreneurs, and other experts from academia, government, and finance who can serve as advisors and mentors to help develop priorities, mature skills, provide guidance, and make connections to their broader networks.



Accelerating Innovation by Leveraging ORNL's Unique Resources and Capabilities











Building Technologies Research and Integration Center Carbon Fiber Technology Facility

Center for Nanophase Materials Sciences High Flux Isotope Reactor

Center for Structural Molecular Biology

Manufacturing Demonstration Facility

National Transportation Research Center

Spallation Neutron Source



Innovation Crossroads Leadership Team & Mentors



Mike Paulus
Director, Technology Transfer



Dan MillerProgram Lead



Kelly Wampler Business Specialist



Gary Rawlings
Commercialization Consultant



Angelique Adams
Business Solutions Consultant

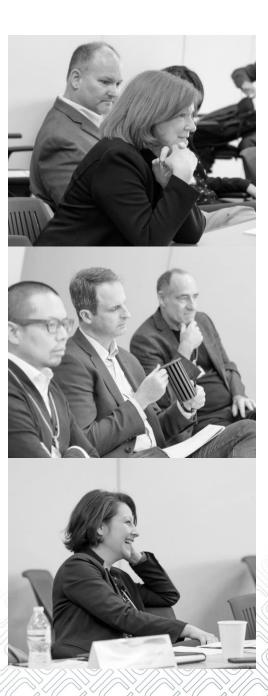


John Derrick Strategic Consultant



Leadership Council Guidance from industry and investment leaders

- Brendan Abolins External Innovation Manager, Eastman Chemical Company
- Coleman Adams Partner, Clean Energy Venture Group
- Jason Blumberg Chief Executive Officer and Managing Director, Energy Foundry
- Doug Buerkle Chief Executive Officer, LTM Ventures
- Aaron Chockla Venture Capitalist, True North Ventures
- Jonathan Goldman Principal, Georgia Tech VentureLab
- Alison Gotkin Associate Director of Business Development, United Technologies Research Center
- Paul Leggett Managing Director, Mithril Capital Management
- Sanjiv Malhotra Founder and Chief Executive Officer, SPARKZ
- Eric McFarland Professor of Chemical Engineering, University of California, Santa Barbara
- Stacey Patterson Vice President for Research, Outreach and Economic Development, The University of Tennessee
- Vig Sherrill Founder, General Graphene
- Mary Anne Sullivan Partner, Hogan Lovells
- Abby Trotter Interim Chief Executive Officer, Launch Tennessee
- Grady Vanderhoofven President and Chief Executive Officer and Board Member, Three Roots Capital
- Peter Winter Program Manager, In-Q-Tel
- Johanna Wolfson Principal, Prime Impact Fund
- Jetta Wong Senior Advisor for Northern California Operations, LA Cleantech Incubator (LACI)





Meet Our Innovators





Innovation Crossroads Innovators – Alumni (2017 – 2019)



Anna Douglas SkyNano Technologies *Vanderbilt University*



Michell Ishmael
Active Energy Systems
Cornell University



Matthew Ellis & Samuel Shaner
Yellowstone Energy
Massachusetts Institute of Technology





Innovation Crossroads Innovators – Alumni (2018 – 2020)



Don DeRosaEonix
State University of New York at Albany



Shane McMahon
Lux Semiconductors
State University of New York at Albany



Justin Nussbaum
Ascend Manufacturing
University of South Florida



Megan O'Connor Nth Cycle Duke University



Matt Smith
TCPoly
Georgia Institute of Technology



Innovation Crossroads Innovators – Alumni (2019 – 2021)



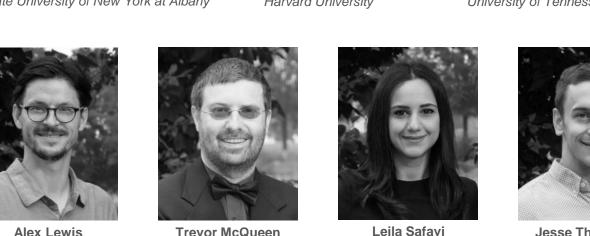
Jesse Claypoole MantaPoole Technologies State University of New York at Albany



William Fitzhugh American Nanotechnologies Harvard University



Hicham Ghossein Endeavor Composites University of Tennessee



Purist

Alex Lewis Electro-Active Technologies University of Tennessee

Trevor McQueen Neptune Fluid Flow Systems University of California Irvine Stanford University



Jesse Thornburg Grid Fruit Carnegie Mellon University



Innovation Crossroads Innovators – Cohort 4 (2020 - 2022)



Renee Carder

- PIXELEXX SYSTEMS: Mie Photo Sensors and Arrays
- University of Pittsburgh Medical School
- · Sponsor: AMO, ORNL
- ORNL PI: Lorenzo Fabris



Danielle Castley

- BECQ: Lightweight, High-Temperature Neutron Shielding Materials
- Dartmouth College
- Sponsor: TVA
- ORNL PI: Philip Edmondson, Peter Stefanovic



Joe Fortenbaugh

- ACTINIC: On-Demand Tunable Curing of Thermoset Composites for Additive Manufacturing
- Pennsylvania State University
- Sponsors: AMO, ORNL
- ORNL PI: Vlastimil Kunc



Thomas Foulkes

- AQUAQUANT LABORATORIES: Nanostructured Coating for Direct Water Immersion Cooling of Server Electronics
- University of Illinois at Urbana-Champaign
- Sponsors: AMO, ORNL
- ORNL PI: Burak Ozpineci



Erica Grant

- QUANTUM LOCK TECHNOLOGIES: Quantum Random Number Generator to Enhance Security for Connected Facilities and Equipment
- University of Tennessee, Knoxville
- · Sponsors: AMO, ORNL
- ORNL PI: Peter Fuhr



Innovation Crossroads Innovators – Cohort 5 (2021 - 2023)



Caleb Alexander

- DAYLYTE BATTERIES: Fast, Flexible, Scalable Naion Membrane for a High Energy, Low-cost Na-air Battery
- University of Texas
- Sponsor: TVA
- ORNL PI: Jianlin Li



Sam Evans

- UNBOUND WATER TECHNOLOGIES: Carbon Supported Magnetic Nanoadsorbent for the Purification of Contaminated Water
- University of Tennessee, Knoxville
- Sponsors: AMO, ORNL
- ORNL PI: Parans Paranthaman



Tommy Gibbons

- HEMPITECTURE: Energyefficient, Carbon-negative, Bio-based Insulation
- Princeton University
- · Sponsors: BTO, ORNL
- ORNL PI: Antonio Aldykiewicz, Diana Hun



Shuchi "SK" Khurana

- ADDIGURU: Real-time Monitoring of Metal Additive Manufacturing
- Ohio State University
- Sponsors: AMO, ORNL
- ORNL PI: Vincent Paquit



Forrest Shriver

- SENTINEL DEVICES:

 Database Construction
 Using Machine Learning for
 Cyber-Attack Detection
 Devices
- University of Florida
- Sponsors: AMO, ORNL
- ORNL PI: Juan Lopez



Philip Stuckey

- FC RENEW: An Oil Change for Your Fuel Cell
- Case Western Reserve University
- Sponsors: AMO, ORNL
- ORNL PI: Gabriel Veith



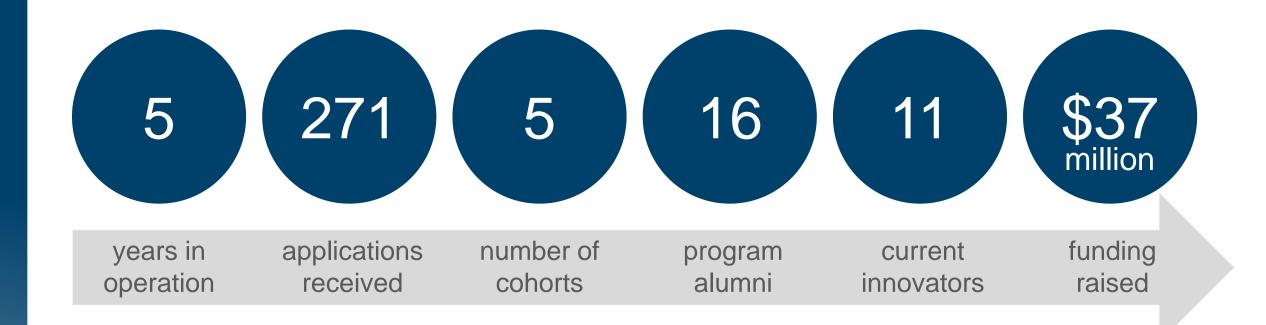


Program Metrics





Driving Impact by Embedding Entrepreneurs at ORNL

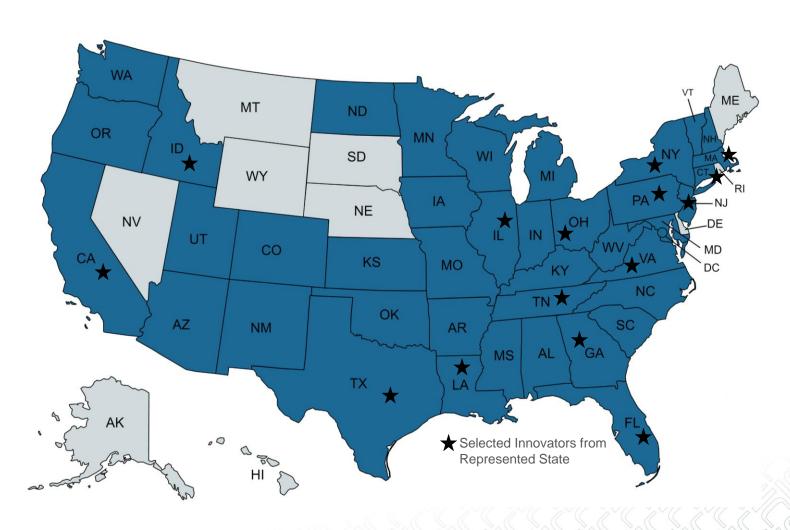




Nationwide: Attracted 271 Candidates from 40 States

STATE	#	STATE	#
Alabama	1	Mississippi	2
Arizona	3	Missouri	3
Arkansas	3	New Hampshire	1
California	28	New Jersey	5
Colorado	7	New Mexico	1
Connecticut	3	New York	19
District of Columbia	2	North Carolina	7
Florida	11	North Dakota	2
Georgia	11	Ohio	10
Idaho	1	Oregon	5
Illinois	12	Pennsylvania	5
Indiana	3	South Carolina	2
lowa	1	Tennessee	41
Kansas	1	Texas	9
Kentucky	6	Utah	3
Louisiana	8	Vermont	1
Maryland	6	Virginia	11
Massachusetts	12	Washington	9
Michigan	5	West Virginia	1
Minnesota	2	Wisconsin	2

Plus: Canada – 1, India – 1, Colombia – 1, Egypt – 1, Mexico – 1, Nuevo Leon – 1





Application Process





The Process

Applications Accepted Applications are accepted via the online application portal beginning September 21, 8 a.m. through October 31, 8 p.m. (EDT) Review of Written Applications are reviewed by the Innovation Crossroads team, as well as scientific and industry subject matter experts **Applications** Candidates who meet all required eligibility criteria will be invited to conduct an informal virtual pre-screen interview Internal Pre-screening with the Innovation Crossroads Team to learn more about the candidate, their technology/company, and address any Interview questions that they have about the program or process (December 2021) **Market Opportunity** Perform a market opportunity assessment with the ORNL Technology Transfer Office to identify a value proposition, target market, competitive landscape, competitive differentiators, risk/threats, etc. **Assessment** Virtual Semifinal Semifinalists invited to present to a review panel made up of representatives from the local entrepreneurial ecosystem and internal program champions (January 2022) Interviews Finalists invited to visit ORNL to tour facilities, connect with potential collaborators, PIs In-Person Final and mentors, and present to a talented team of investors, business executives, and Interviews experienced entrepreneurs from across the country (February 2022) **Cohort Selected** Selected innovators are made verbal and written offers (March/April 2022) Cohort Announced and Cohort formally announced via press release and innovators arrive Onboarded at ORNL to begin fellowship (June 2022)



Technology Areas of Interest

Advanced Manufacturing

Scientific breakthroughs in next-generation materials, innovative processes, recycling and reclamation technologies, artificial intelligence and enabling technologies, machine tools, and robotics, controls, and automation.

Atmospheric Decarbonization

Scientific breakthroughs fostering innovation in pathways to net-zero carbon emissions, earth system modeling, data integration, dissemination, and informatics, integrative ecosystem science and impacts adaptation, and community dynamics.

Buildings and Infrastructure Technology

Scientific breakthroughs in building electric appliances, devices, and systems, building energy modeling, green and energy efficient practices, advanced building envelope, building equipment and controls, thermal energy storage, grid-interactive efficiencies, and advanced building construction.

Digital Economy

Scientific breakthroughs in data, computing, Wi-Fi, broadband, smart cities, connected communities, manufacturing, and automation.

Electrification and Energy Infrastructures

Scientific breakthroughs to improve the reliability, sustainability, and efficiencies of energy storage systems, electric grid protections and controls, and advancements in power electronics.

Energy Technology Innovation

Scientific breakthroughs in electric vehicle evolution, storage integration, regional grid transformation, transmission and distribution (T&D) integration and controls, sensors, distributed energy resources, advanced nuclear solutions, connected communities, and advanced hydrogen economy.

Industrial Decarbonization

Scientific breakthroughs in direct air capture, low-carbon generation and manufacturing, net-zero chemical processes, and the climate positive production of cement and steel.

Intelligent Systems and Facilities (INTERSECT)

Scientific breakthroughs with autonomous experiments, "self-driving" laboratories, smart manufacturing, and AI-driven design, discovery, and evaluation.



Eligibility Criteria

Required Qualifications:

- Must apply as individuals, not as companies or organizations
- Must have PhD or equivalent experience
- Must leverage ORNL R&D capabilities and have an impact on the Department of Energy (DOE) and/or Tennessee Valley Authority (TVA) mission
- Must be willing to relocate to the Knoxville-Oak Ridge area for 2-years
- Must be a US citizen or lawful permanent resident at time of application
- Must have raised no more the \$2M USD in debt or equity funding from non-government sources within 3 years prior to program application
- Must successfully execute a Cooperative Research and Development Agreement (CRADA)
 with Oak Ridge National Laboratory
- Must disclose background IP rights, if necessary, that may be needed to freely operate on R&D related tasks as outlined within the CRADA



Application Information

- 1. Complete online application form
- 2. Attach requested application materials as a single PDF document containing the following information:
 - Resume (one page)
 - Please provide a resume highlighting your education, experience, and skills.
 - Tell us about yourself (one page)
 - Provide the back story on you and your project. Where did the idea originate? What is the current status of your technology and team? Why do you want
 to pursue this effort and what makes you qualified to do so? Explain why you have chosen to pursue an entrepreneurial career path.
 - Project abstract (one page)
 - Briefly describe how you envision making your technology a market reality. Please describe the market you intend to reach, its customers, potential suppliers/distributors/manufacturers, relevant intellectual property (status of any licenses, etc.), barriers to entry, sophistication of market, market incumbents, etc.
 - Tell us about your technology concept (two pages)
 - Describe the technology concept you want to pursue. Provide an adequate amount of technical detail for a subject matter expert to fully understand your technology concept, and the methodological next steps required to scale the technology. Use the Heilmeier catechism as a guide for what's most relevant. Please include links or references to supporting documents that back technology proof-of-concept (i.e., patents, publications, presentations, diagrams, etc.).
 - What is the potential impact on the DOE, TVA, and/or ORNL mission? (one paragraph)
 - Please comment on the potential for impact on U.S. energy and manufacturing competitiveness. More specifically on the potential for impact on the sponsor's mission area for your primary application track.
 - Why ORNL and Innovation Crossroads? (one page)
 - What most attracts you to Innovation Crossroads? Why is ORNL the ideal home for you and your project (vs. alternative paths)? Please name the people, facilities, and/or equipment at ORNL that will be most valuable in supporting your work.
 - What else? (one page)
 - An extra page for anything else that you feel we should know.



Heilmeier Questions

- What are you trying to do?
 - Articulate your objectives using absolutely no jargon.
- How is it done today, and what are the limits of current practice?
- What is new in your approach and why do you think it will be successful?
- Who cares?
 - If you are successful, what difference will it make?
- What are the risks?
- How much will it cost?
- How long will it take?
- What are the mid-term and final "exams" to check for success?



High-Level Evaluation Criteria

- Candidate eligibility
- How innovative is the proposed approach
- Applicant's technical understanding of the problem and proposed solution
- Potential market impact
- Soundness of the business concept
- Evidence that ORNL capabilities can help advance the idea
- Likelihood that the idea can be matured in the 2-year program
- Weight of candidate experience and/or formal education from a premier institution in a technologically advanced field





Ecosystem & Partners





Regional Entrepreneurial Ecosystem



- Innovation Crossroads
- University of Tennessee



- Energy Mentor Network
- Innov865 Alliance
- Knoxville
 Entrepreneur
 Center
- Launch Tennessee
- PYA
- Startup Knox
- TAEBC
- University of Tennessee



- Oak Ridge National Laboratory
- Tennessee Valley Authority
- University of Tennessee



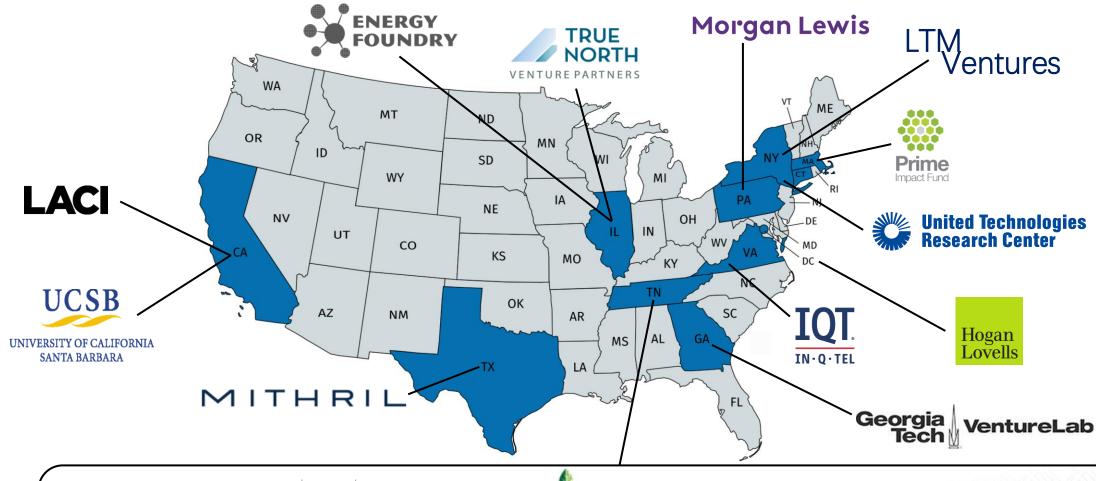
- Angel Capital Group
- Cocoon Resources
- Three Roots Capital
- Sheltowee Angel Network
- Lighthouse Fund
- Greater Sum Ventures
- JumpFund
- TennesSeed Fund



- Anderson Center for Entrepreneurship and Innovation
- CoWorking Knoxville
- e | spaces
- Fairview Technology Center
- University of Tennessee
 Research Park
- UpStart Knoxville
- SkyCity
 Entrepreneurial
 Center



Growing a Robust Advisory Network



































Programming & Curriculum





Recurring Meetings

- Weekly group meeting with all innovators
- Monthly 1-on-1 meeting with each innovator
- Annual renewal briefing with each innovator
- Frequent informal networking events









Core Curriculum

- Brand Strategy and Positions
- Building Your Core Business Pitch Deck
- Business Law
- Financial Planning
- Grant Accounting
- Grant Writing (SBIR)
- How to Become a CEO or Find a CEO
- I-Corps Short Course
- Importance of Value Chain and Competitive Analysis
- Investor Readiness and Red Team (Mock Diligence) Review
- Patents and Intellectual Property Overview
- Team Building and Advisory Board Best Practices





Discussion







NOW ACCEPTING APPLICATIONS FOR COHORT 6 APPLY TODAY! INNOVATIONCROSSROADS.ORNL.GOV

PROGRAM

Innovation Crossroads is an early-stage entrepreneurial fellowship program at Oak Ridge National Laboratory that matches aspiring entrepreneurs with experts, mentors, and networks in technology related fields to take their world-changing idea from R&D to marketplace.

ELIGIBILITY REQUIREMENTS

- · Must apply as individuals, not as companies or organizations
- Must have PhD or equivalent experience
- Must leverage ORNL R&D capabilities and have an impact on the Department of Energy (DOE) and/or Tennessee Valley Authority (TVA) mission
- Must be willing to relocate to the Knoxville-Oak Ridge area for 2-years
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- Must successfully execute a Cooperative Research and Development Agreement (CRADA) with Oak Ridge National Laboratory
- Must disclose background IP rights, if necessary, that may be needed to freely operate on R&D related tasks as outlined within the CRADA

WHAT YOU GET

- A two-year fellowship

 The two-year fellowship includes a personal living stipend, plus a health insurance stipend and travel allowance.
- Lab access and research funding
 In addition to unparalleled access to facilities, equipment, and expertise at Oak
 Ridge National Laboratory, fellows receive R&D funding to support collaboration
 opportunities with researchers across the lab.
- Participants receive access to experienced business mentors, entrepreneurial training programs, and exclusive networking opportunities. Innovators are also exposed to a wide range of leaders from academia, industry, government and finance that can serve as advisors and partners.

KEY DATES

- · September 21, 2021 Applications Open
- October 31, 2021 Applications Close
- June 2022 Cohort 6 Onboarding









