Emera ideaHUB
DALHOUSIE UNIVERSITY

Impact Report 2021-22

DALHOUSIE UNIVERSITY

Emera

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Message from the Dean

Faculty of Engineering

Over the last several years, the IDEA project and the Emera ideaHUB have played a transformative role in the Faculty of Engineering. The revitalization has provided us with state-of-the-art facilities and equipment, positioned our faculty as a hub for innovation and research, and created a more collaborative learning environment for our students. But it's also allowed us to turn the page on a new chapter in the Faculty of Engineering; one dedicated to fostering the modern engineer.

In the coming months, the faculty will release its 2022-2027 strategic plan. The plan maps out a new direction and vision for immersive engineering education, and places topics such as equity, diversity, inclusion and accessibility, and innovation and entrepreneurship at the forefront of our priorities and actions.

As our society continues to rapidly evolve, so too does the role of the modern engineer. The urgent need to address pressing global challenges and advance sustainability efforts is inspiring engineers to tackle problems differently. Facilities such as the Emera ideaHUB are providing our faculty with the tools and resources to teach and train a new generation of innovative leaders to collaborate and solve these grand issues.

Over the past year, the Emera ideaHUB has continued to grow their central team, bringing in new members who have helped build and design programs and opportunities for aspiring entrepreneurs. They've also continued to strengthen and expand partnerships with key industry leaders and grow their team of Experts in Residence who provide founders and young innovators with the business fundamentals and engineering knowledge required to think, design and thrive. None of this would have been possible without the generosity and ongoing support of our donors.

Together, we are enhancing learning environments and opportunities for students and entrepreneurs in the region. Thank you for making this possible through your continued support. I look forward to sharing the impact of your investment in the Emera ideaHUB and the Faculty of Engineering.

Dr. John Newhook
Dean, Faculty of Engineering

Building Founders. Building an Ecosystem. Enabling Impact.

2019/2020 **19** STARTUPS SUPPORTED

2020/2021 **35** STARTUPS SUPPORTED

2021/2022 **78** NEW STARTUPS SUPPORTED

100 5 YEAR GOAL

In three short years, we are close to achieving our 5-year target.

$75M
TOTAL FINANCING
SECURED BY STARTUPS

$6.8M
REVENUE

162
NET NEW JOBS CREATED

INTELLECTUAL PROPERTY

- **116** Trade Secrets
- **54** Patents
- **15** Copyrights
- **21** Trademarks

*5 year goal achieved in 2022

*5 year goal achieved in 2022

Cumulative successes since 2019

Giving Startups the Tools to Thrive

Despite another year of pandemic conditions, the Emera ideaHUB continued to support deep tech founders with the resources, expertise, and facilities they needed. Deep tech startups have unique needs that make it harder to get their ventures off the ground. At the Emera ideaHUB we provide the specialized equipment, technology, and space they need to build. We offer unique and crucial training on engineering and entrepreneurship capabilities that founders can't get elsewhere.

We offer access to experts from academia and industry alike, helping ensure our founders can reach potential customers and understand their needs, and have leaders in their field challenge them with tough questions and opportunities to consider. And, we help founders de-risk their entrepreneurial journey by offering them access to funding resources and the kind of coaching they need to prepare for raising funds and scaling their businesses.

We're proud of the founders we have seen through this year, who are already contributing to this ecosystem through meaningful innovation that has the power to solve the world's most important problems. And we are grateful to all of the funding partners we have who are enabling this impact.

2021-2022 Emera ideaHUB Companies

DRINKABLE WATER SOLUTIONS

ZEN e-bikes

mypaq

katchi PRECISION FISH HARVESTING

AIR CLARITY SOLUTIONS

HeAlZe

OceanSync

hollo MEDICAL

SOLAS ultraviolet

aXtion™ Independence Mobility Inc.

Eco

design by science

DPL

NEURO AMEL TECHNOLOGIES

PARADOS

Greenlight Analytical

SHIFTING SHAPES™

MYOMAR

SwimTrainer

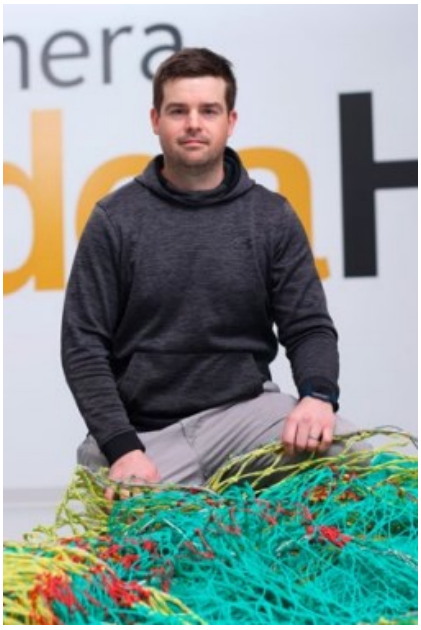
DOOBTOOL CANNABIS CASE & MULTI-TOOL

Pyon ELECTRIC

Reused Plastic

CLEAN VALLEY CIC

Katchi-ng Attention



Combining sustainability and innovation, Katchi Tech is developing a smart fishing net using technologies to improve the efficiency of conventional bottom trawling fishing while also reducing its footprint on the ocean floor.

Bottom trawling is a method of fishing where heavy nets are dragged along the seabed to catch large quantities of fish. In doing so, everything along the ocean floor that happens to be in the way, including all forms of marine life, are swept up into these nets.

While working for his family's fishing company in Yarmouth, Nova Scotia, Marc d'Entremont couldn't help but wonder if there was a better way to execute their fishing activities.

"I started to notice that industry and DFO (Department of Fisheries and Oceans) were always butting heads," he says. "Industry wants to be profitable and DFO wants to save the environment. At some point we needed everyone on the same path and the only way to do that was to get a new fishing method that could adapt to the environmental challenges that we were facing."

In 2019 d'Entremont founded Katchi Tech and is now working on a net that uses hydrodynamic blocks on the top and bottom of the net to ensure that it remains open while in the water, and doesn't touch the ocean floor. The technology replaces existing trawl doors and reduces fuel emissions and greenhouse gases.

d'Entremont says his team is also working on technology that will use lights and bioacoustics to help fisherman efficiently capture their target species while also reducing by-catch. Within the industry, by-catch refers to marine life that is unintentionally caught in a fisherman's net.

Joining the Emera ideaHUB in February, d'Entremont and his team have begun utilizing 3D printing equipment to develop the sensors and electronics required in building their SmartNet.

"For a startup like us, having access to that equipment is huge because it's a cost that we don't need to incur. It helps you build your prototypes and build your proof of concepts, and that's a big struggle for startups," he says. "At the ideaHUB, you have the right people and you have all of the equipment to build what you need."

Start-Up Goes Green and Clean

This year, 30 million e-bikes will be sold around the world. At first glance, those figures may seem like an environmental sustainability success story, but there is a catch: by 2025, the lithium-ion batteries powering those bikes will need to be recycled.

"That waste and the price are the main pain points associated with e-bikes," says Ravi Kempaiah, a propulsion engineer who is completing a post-doctorate with the Jeff Dahn Research Group at Dalhousie University. "I was thinking about how to address these issues, which led me to Dr. Dahn, who is the leading researcher in lithiumion battery technology. I shared my ideas for a new company that could resolve those pain points and he said, 'come to Halifax and I'll support you."

Kempaiah is the co-founder of Zen e-bikes, a company in the Dalhousie Emera ideaHUB. The company is dedicated to producing high-quality, netzero alternatives for urban transportation and energy storage products using cutting-edge battery technologies. Its first two e-bikes will launch this year: the mass market Shakti and the premium Samurai. Kempaiah believes the pricing for the Shakti will help break down the barrier for people to make the shift to more environmentally friendly modes of transportation. But it is the battery technology developed by Dr. Dahn's team that may prove to be the true game changer for the industry.

"What we have found is that even after 1,000 hours, the battery still has 92 percent capacity," Kempaiah says. "That means that, after 10 to 12 years of riding, it will still have 90 percent capacity, which will significantly reduce waste and enhance sustainability – a first in this industry.

There are other notable advances in design and engineering that set Zen's e-bikes apart from their competitors. The drive system uses a high-resolution torque sensor instead of a cadence sensor, resulting in a smoother ride that almost feels bionic. The motor has a quick release system that enables it to be unlocked with one hand. And the Samurai swaps out the standard chain for a more durable carbon fibre belt.

"With the belt, you can use the Samurai all year long, even in winter conditions such as slush and road salt without any real impact to the system," Kempaiah says. "It really is low maintenance and very well suited to North America's climate."

"Once we have the scale, we will be exploring the benefits of e-bikes through a pilot study with Dalhousie Medical School," he says. "If the data shows that you can gain three to four years of extra life from investing $3,000 to $4,000

Dalhousie Couple Help Children with Asthma Breathe Easier

Sara Fedullo is leveraging her training as an engineer and expertise in 3D printing to accelerate HOLLO Medical's product development. Although she only graduated last year, she says she left Dalhousie feeling confident in her abilities as an engineer, an innovator and an entrepreneur.

"I knew from the start that engineering would help me grasp how to create this device and how to make it functional," she says. "With my chemical engineering degree, I understand at the microscopic how the medication should travel inside the device. David also has a mechanical engineering degree, so he was quite confident designing and prototyping initial concepts."

In addition to launching a successful start-up company and designing a device that could help millions of people who suffer from asthma and other respiratory illnesses, Fedullo hopes to inspire other women in STEM who sometimes struggle to find their path within the industry, especially those hoping to pursue their entrepreneurial goals.

"We can talk about how great our solution (HOLLO Medical) is going to be and all of the things that we've accomplished, but at the end of the day what's most important to me is to show people that this is possible," says Fedullo. "Our goal at HOLLO is to help bring this solution to people in need, but one of my personal goals is to inspire women in STEM."

In just over a year, HOLLO Medical has expanded their team three-fold, won the Ready2Launch People's Choice award, secured a place in the Volta Cohort, Innovacorp Accelerate, the ideaHUB BUILD program and Bridge Residency, and are well on their way to bringing this solution to the pockets of those in need.

Industry collaboration: Bridging the gap for expertise

When the Emera ideaHUB welcomes founders into our Residency, they quickly learn that the equipment and resources at their fingertips are second-to-none. Residents are accepted for a 1 – 2 year period to bring their products from operational prototype through to the stage at which they can run manufacturing pilots and begin to serve customers. That's a crucial time for founders, many of whom have never interacted with leaders in industry but bring exceptional deep expertise in their fields of study in engineering, as well as adjacent disciplines of sciences, computers, robotics, biomedical engineering, agriculture and so on.

To help our founders bridge from academic excellence to commercial fluency, we are constantly seeking out and building relationships in industry with experts in engineering employed in the private sector, who have built such commercial knowledge and capabilities. Our relationships include leaders in advanced manufacturing, such as Neocon Inc., whose interaction with Katchi, has led to their offer to provide manufacturing pilots in kind and ongoing support for how their product would iterate through customer pilots.

We also hold a relationship with Enginuity Inc., an engineering consulting firm who has offered advisory support to companies through diagnostic sessions and 1:1 support. With Enginuity's roster of consultants, start-ups can benefit from the right mix of engineering disciplines for their product's needs, and are advised on both potential gaps and greatest opportunities for exploration or success. The benefit to founders of working with consultants is that they gain exposure to the aggregate of customers the consultants work with through the insights they can share; including competitive opportunities or threats, likelihood of patentability; and global contacts.

Neocon

enginuity

Together, we delivered.

innovacorp
EARLY STAGE VENTURE CAPITAL

Emera ideaHUB
DALHOUSIE UNIVERSITY

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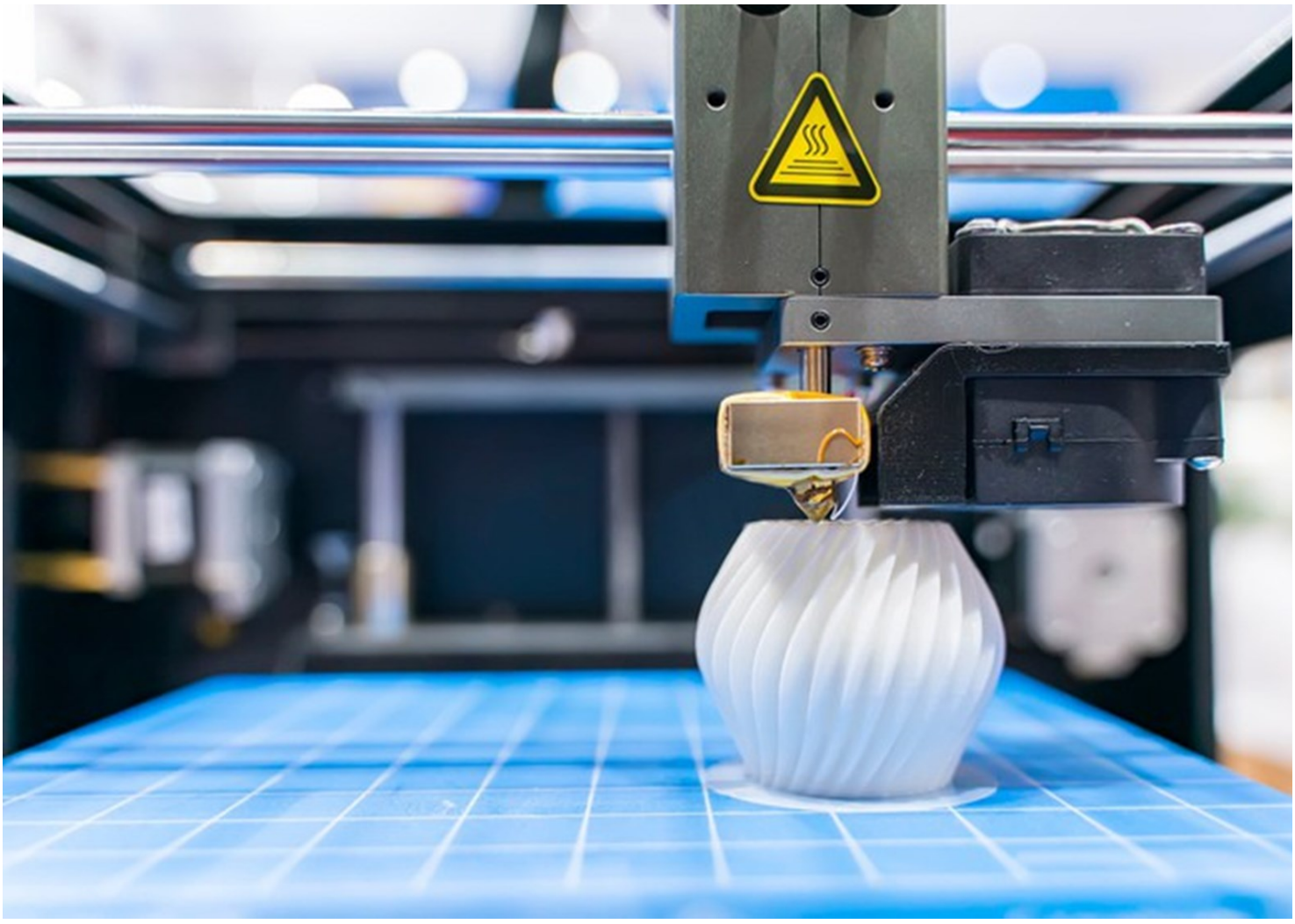
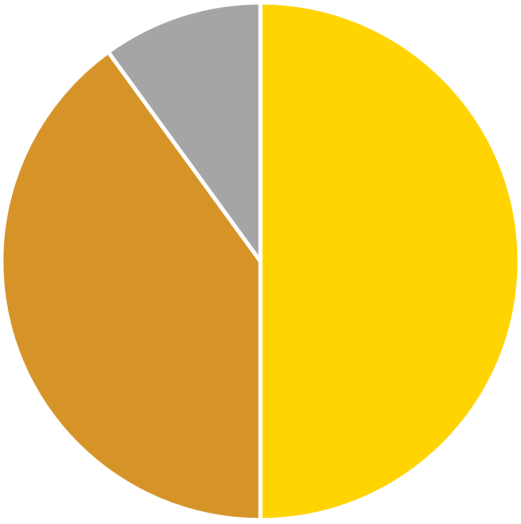
- 27 BUILD Applicants
- 17 Interviews
- 12 Deep-tech Founders
- Technical space, tools, support
- **Innovacorp** seminar on funding
- 9 Months product development
- $100,000 Material Resources
- Demo Day Resources



Breakdown of Industry

One of the goals of the Emera ideaHUB is to help early-stage deep tech start-ups grow with the support of the programming throughout the Innovation Ecosystem. The following start-ups have joined the BUILD program after participating in Dal Innovates programming:



Our 2025 Performance Goals

Indicators	Since 2019	2025 Goals (5-year cumulative)	5-year Goal Achieved in 2022
Increase Innovation & Entrepreneurship (I&E) education, including courses, co-ops and experiential learning.			
Number of Capstone projects sponsored	15	25	
Number of co-ops with HUB companies	27	50	
Expand Research related to I&E that generates IP, commercialized research, and industry partnerships.			
Value of R&D partnerships with Dalhousie.	$5,150,000.00	$6,000,000.00	
Patents	54	75	
Trademarks	21	15	✓
Copyrights	12	15	
Trade Secrets	116	50	✓
Enhance Inclusion & Diversity in I&E Programs.			
Outreach to under-represented groups and participants	21	50	
HUB participants from under-represented groups	102	100	✓
Support more student led I&E skills development			
Number of hackathons and design challenges	15	25	
Number of workshops/seminars for students	55	75	
Grow student, faculty, and recent graduate participation in programs to explore and experience ideation, I&E, including starting a new business or social enterprise.			
Number of Young Innovators	75	75	✓
Young Innovators starting their own companies	28	25	✓
Contribute to the economic impact of the region.			
Total number of ventures participating in HUB programming (BRIDGE, BUILD, Young Innovators)	78	100	
Financing secured by current and recent alumni ventures (Investment, Loans, & Non-Dilutive)	$34,000,000.00	$75,000,000.00	
New ventures' survival rates after one year (the number of ventures that are still active or have been acquired after one year)	72	75	
Number of job positions created in current and recent alumni ventures	162	250	✓
Revenue and paid pilots generated by current and recent alumni ventures	$6,750,000.00	$25,000,000.00	
Number of residents and recent alumni ventures accepted into later stage incubators and accelerators	54	50	✓
*Approximately 50% of alumni and current companies reported			

A Message from our Director

As the Emera ideaHUB charts its growth as the region's deep tech incubator, we have so many relationships to be grateful for. It is said that it takes an ecosystem to raise a start-up, and we have taken that ethos to heart by introducing and strengthening the organizations, leaders, and experts with whom we work. This past year has brought in experts from the MIT Martin Center for Entrepreneurship, whose experience with start-ups and exceptional facilitation using the Disciplined Entrepreneurship methodology bolsters our deep tech learning programming. Within Dalhousie University, we have expanded our collaboration with the Dal Innovates group to ensure our founders access Innovation & Entrepreneurship education that's fit for their stage and is complementary to our programming. And regionally, our collaboration with accelerators across Atlantic Canada including Genesis, Volta, Propel, Ignite and COVE, has enabled us to be more founder-centric with start-ups that can benefit from adjacent services, and has helped create unique opportunities for piloting work in rural areas or with promising customers. Each of these relationships help us serve founders in the most focused way so that we can ensure the funding we've been provided is used effectively and efficiently.

Our purpose of enabling early-stage deep tech innovation is one that will guide us to our 5-year milestone, and beyond. With three years of progress toward our goals we see our continued growth being dependent on the expansion of relationships in this ecosystem with a special emphasis on industry. The founders we support have deep expertise in a range of engineering disciplines and bring incredible capabilities to the innovative products they are developing. And yet, the success they hope to achieve is dependent on identifying and forging strong relationships in industry where they'll be able to iterate and refine their products in a way that can only happen with industry and customers engaged. We are looking for leaders in industry across Atlantic Canada who want to see their businesses expand through innovative partnerships and collaboration with emerging start-ups. From small businesses to enterprise players, the partnerships that will fuel our founders will also fuel the success of existing industry. This is how our economic impact will be realized.

The Emera ideaHUB was born out of a passion for building excellence in engineering innovation, and a deep commitment to strengthening Atlantic Canada. We have Emera to thank for this, and so many other industry leaders whose contributions have helped us build a strong foundation. Now we are looking for more leaders to join the group of industry that wants to see our economy grow further through partnerships and collaboration: this is your invitation to be part of a thriving, innovative deep tech network.