Seneca INNOVATION

ANNUAL REPORT

2021/22


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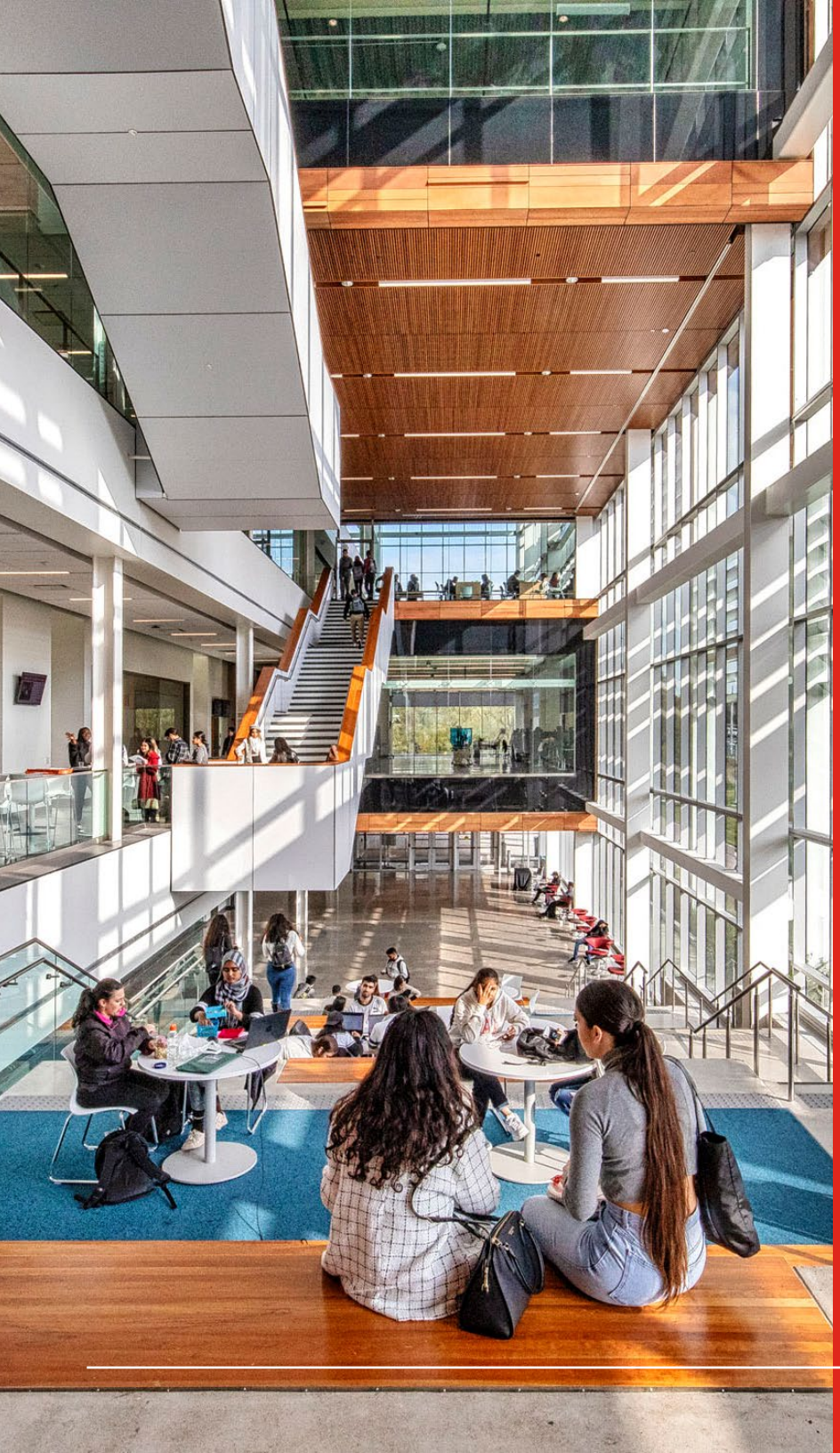
Seneca
HELIX


Seneca



"If you want to change the future, start living as if you're already there."

LYNN CONWAY
American Computer Scientist, Innovator and Transgender Activist

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Letter from the Dean

In reflecting on this past year, to an outside observer it would be difficult to be optimistic about the future. Unthinkable facts about our country's colonial history have been brought to the forefront of our collective attention. Greed and the struggle for limited resources have brought suffering to millions through war and food insecurity. The growing gap between the wealthy and the poor, amplified by the pandemic, was on flagrant display. However, in building the future, innovators cannot ignore history or the current environment. Innovators ask what can we learn from the past? What can we do differently now? How can we make things better?

The past year's theme for Seneca Innovation was "Unmasking Innovation" — a hopeful view of the end of the pandemic and associated safety measures — which speaks to the importance of removing barriers to innovation faced by equity-deserving populations. Assuming everyone has access to innovation and the tools that support innovators is a mistake. Unmasking innovation is a statement about what needs to be done, rather than what has been achieved. This year, Seneca Innovation ramped up its efforts to identify and remove barriers faced by students, faculty, staff and community partners in accessing our services.

Like other innovators, Seneca Innovation is investigating what we can do differently and how we can make things better for our community. Last September, we announced the launch of HELIX RISE. Funded by a donation of $300,000 from Scotiabank and inspired by ScotiaRISE (Scotiabank's commitment to foster economic inclusion and resiliency among disadvantaged groups), HELIX RISE will provide supports, knowledge, events and resources for women-led ventures, helping female entrepreneurs to succeed and closing the innovation gender gap. In July 2021, Seneca Innovation launched the Urban Agriculture Enterprise Support Program with $360,000 in funding from the Natural Sciences and Engineering Research Council of Canada (NSERC). The program will address food insecurity and increase access to healthy food in urban communities through training, mentorship and microfinancing for small urban farms. Urban agriculture is realistic means of food security for many people and Seneca is working on new research projects in this area.

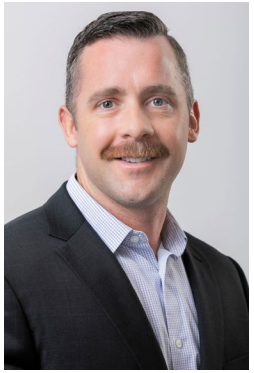
Unmasking innovation for everyone at Seneca and within our community is a process that will require continued effort. Making equity, diversity and inclusion priorities within our organization is key to our continued success and growth.

Ben Rogers
Dean, Seneca Innovation

Seneca INNOVATION Meet the Team

Andrew Paton
Research Manager

Atani Gopalasingam
Senior Manager, Operations & Finance



Ben Rogers
Dean, Seneca Innovation

Chris Dudley
Director, Entrepreneurship

Huy-Tung Bui
Communications & Admin Assistant, HELIX

Kate Collins
Project Manager, HELIX

Namrata Barai
Director, Applied Research

Ralph Lisak
Research Manager

Sally Yeung
Seneca Innovation & REB Co-ordinator

Samara Rincon Rodriguez
Co-ordinator, HERizons

Sophie Sagias
Co-ordinator, Career Recharge

Thushanthini Selvarajah
Grants & Operations Assistant

Valeryia Shydlouskaya
Project Co-ordinator

Recognition of Funders and Donors

Seneca Innovation is honoured to recognize and thank Seneca and various organizations and government funding agencies for their continued support. We would like to acknowledge the following organizations and individuals for their significant contributions throughout the year:

Canada

INNOVATION.CA
CANADA FOUNDATION FOR INNOVATION | FONDATION CANADIENNE POUR L'INNOVATION

CENTRE FOR AGING + BRAIN HEALTH INNOVATION
Powered by Baycrest

CIBC

global innovation&skills development canada

HSPP
Humber Seneca Polytechnic Partnership

Jane Forbes

Jess Joss

MARKHAM

Mike Shaver

Mitacs

NSERC CRSNG

OCI
Where Next Happens

Peter Gilgan Foundation

Seneca

Seneca ALUMNI

SSF SENECA STUDENT FEDERATION

Scotiabank

TAZWIZ

TD READY COMMITMENT

TORONTO

Vretta

York Region

Seneca Innovation Funding

		Applied Research	HELIX	Total Seneca Innovation
Federal Funders		$1,920,463		$1,920,463
Municipal Funders			$55,666	$55,666
Provincial Funders		$7,500		$7,500
Not-for-Profit Funders	Cash	$10,000	$27,500	$37,500
	In-Kind	$28,510		$28,510
Partners	Cash	$260,511	$324,350	$584,861
	In-Kind	$352,880	$46,250	$399,130
	Total (all sources)	**$2,579,864**	**$453,766**	**$3,033,630**

ventureLAB is a leading founder community for hardware technology and enterprise software companies in Canada. Located at the heart of Ontario's innovation corridor in York Region, ventureLAB is part of one of the nation's biggest and most diverse tech communities. Their initiatives focused on raising capital, talent retention, commercializing technology and IP, and customer acquisition have enabled thousands of companies to create more than 4,000 jobs and raise more than $200 million in investment capital. ventureLAB strives to grow globally competitive tech titans that build to scale in Canada for global markets.

ventureLAB and Seneca have had a strategic partnership for many years to foster the innovation and talent ecosystem. Entrepreneurs at Seneca's incubator, HELIX, work with ventureLAB to scale their businesses. Likewise, through work-integrated learning, regional businesses in ventureLAB's network can hire skilled interns. Seneca Applied Research also works with ventureLAB to connect businesses with Seneca students and faculty to carry out industry-directed research projects, with funding support from federal and provincial governments.

ventureLAB's Hardware Catalyst Initiative and Seneca's **School of Electronics & Mechanical Engineering Technology (SEMET)** have been collaborating on a number of opportunities in the hardware and semiconductor industry to foster a stronger talent pipeline. Students working on SEMET capstone projects have an opportunity to gain real-world, integrated learning experiences and access to state-of-the-art lab equipment through ventureLAB's Hardware Lab. The collaboration inspires innovative solutions and builds valuable industry connections and job opportunities for recent graduates.

SOSCIP

SMART COMPUTING FOR INNOVATION

The **SOSCIP Consortium** is a groundbreaking collaboration between Ontario's research-intensive postsecondary institutions and small- and medium-sized enterprises across the province. SOSCIP is driving the uptake of artificial intelligence (AI) and data science solutions. It is also enabling the development of a knowledge-based and innovative economy in Ontario by supporting technical skill development and delivering high-quality outcomes.

SOSCIP supports industrial-academic collaborative research projects through partnership-building services and access to leading-edge advanced computing platforms, fuelling innovation across every sector of Ontario's economy. By tapping into world-leading research expertise at southern Ontario-based postsecondary institutions, SOSCIP makes it easy for companies to access the latest in advanced computational AI and data science technologies while developing the talent needed to sustain long-term growth.

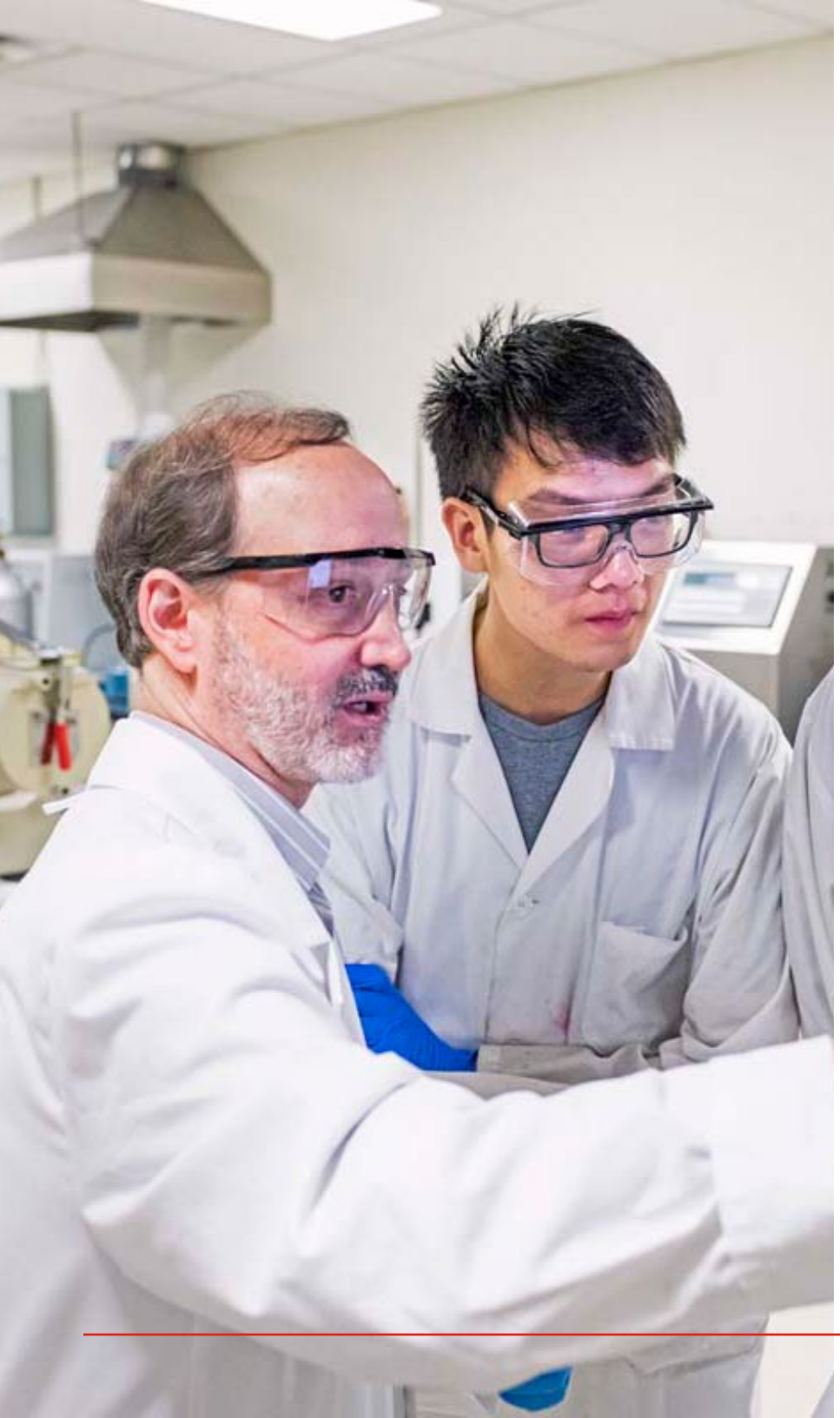
Seneca joined SOSCIP in 2018 and has benefited from SOSCIP's platforms for research in blockchain implementation, audio and video analysis using machine learning, natural language processing and neural networks.

Kingbridge Centre

The **Kingbridge Centre** is a world-class institute specializing in meetings, learning, problem-solving and leadership development. Leveraging the power of place, network and infrastructure, Kingbridge brings together community members, entrepreneurs, businesses, government, academic and research partners to collaborate with each other and develop solutions around unique problems that drive long-term economic prosperity.

The Kingbridge Innovation Hub is designed to complement York Region's thriving innovation ecosystem as a unique platform where innovators can bring forth ideas, prototype solutions and develop scale-up strategies within a collaborative and co-creative environment. The Innovation Hub is supported by a living laboratory that acts as an interactive, exploratory and discovery platform where small-scale demonstrations of sustainable technologies, practices and protocols are supported and validated through applied research before scaling for global impact.

Through shared resources in business development and applied research, Seneca and Kingbridge Centre collaborate on challenges related to technology, infrastructure and sustainability. Seneca's contributions to the initiative include applied research infrastructure, faculty expertise and access for aspiring entrepreneurs to HELIX, Seneca's innovation and entrepreneurship incubator. Kingbridge Centre and its affiliated entity, Ekagrata Inc., leverage innovation expertise, executive management strengths and risk capital investment experience, as well as a robust global business network to collaborate on joint projects, venture referrals and extension of training and education programs.



Research Ethics Board

The Research Ethics Board (REB) ensures that research involving humans — conducted with the support of or on the premises of Seneca — meets the highest scientific and ethical standards. All research studies involving human participants must partake in a REB review and obtain approval before any recruitment or data collection may start. The REB application process can take up to 10 business days if the proposed study poses minimal risk to participants. If the proposed study is deemed to be above minimal risk for participants, the study will be reviewed at full board meetings to determine if the study can commence. It is extremely important that the REB reviews each and every study involving human participants, as it is their duty to protect participants from any potential harm. The REB is an integral part of Seneca Innovation. Without the REB, important projects and studies may not have been able to continue.

REB Metrics

Applications to the REB are divided into three categories: student, staff/faculty and external applications. Seneca students engaged in curriculum-based research must submit their proposals to the REB for review if they choose to work with human participants. Seneca staff and faculty are also able to carry out research while working at Seneca. Lastly, applications by external organizations who wish to work with Seneca students or staff as research participants must also be approved by the REB.

A total of 156 applications were reviewed in fiscal year 2021/22. Some notable mentions are ***Academic Skills for Pathways Students (faculty-led project)*** and ***Urban Agriculture Enterprise Support Program (applied research project)***. Both projects were faculty-led, external applications. Two examples of student applications to the REB were ***Perceived Mental Health Impacts of Green Spaces on Postsecondary Students: A Look at Concrete Versus Green Campuses*** and ***Barriers to Mental Health Among Pilots: Has Anything Changed Since the 2015 Germanwings Disaster?***

Number of REB applications (2021/22)

Processed applications	156
Above minimal risk applications that were assigned for full board review	3
Minimal risk applications assigned for delegated review	153
Applications by student researchers	132
Applications by staff/faculty/external researchers	24

SAFS Ethics Review Committee

According to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (2018), the REB may delegate minimal risk, course-based research activities by students to the department or faculty. The **School of Accounting & Financial Services (SAFS)** Ethics Review Committee was piloted with the intention to enable a timely review process for student curriculum-based research activities. The committee is responsible for reviewing, assessing and evaluating any proposed or ongoing research application submitted to the committee by students from SAFS and rendering their assessment of its compliance with Tri-Council Research Ethics Standards.

Committee members

Ebhana Hardy-Henry, **Professor**
Husam Wafaei, **Professor**
Mariam Mehtab, **Professor**
Raj Chopra, **Professor**

REB Members

Adam Norman
Professor, School of English & Liberal Studies

Carly Prusky
Professor, School of Early Childhood Education

Chris Robertson
Professor, School of Information Technology Administration & Security

Dana Nassif
External member

Farah Jindani
Professor, School of Community Services

Husam Wafaei
Professor, School of Aviation

Jennifer Sullivan
Professor, School of Early Childhood Education

Kent Peel
Professor, School of Legal, Public & Office Administration

Lesley Rutledge
Professor, School of Biological Sciences & Applied Chemistry

Mahdi Pirmoradian
External member

Malini Persaud
Professor, School of Nursing

Peter Babiak
Professor, Facility of Continuing Education & Training

Randa Mouammar
Professor, School of Management & Entrepreneurship

Rania Nafea
Professor, School of Human Resources & Global Business

Sara Potkonjak
Academic Program Manager, Faculty of Continuing Education & Training

Steven Litt
Professor, School of Marketing & Media

Varinder Gill
Professor, School of Human Resources & Global Business

Applied Research Report

Seneca APPLIED RESEARCH

SENECA CENTRE FOR INNOVATION IN AI TECHNOLOGY (CIAIT)

SENECA CENTRE FOR INNOVATION IN LIFE SCIENCES (SCILS)

SENECA CENTRE FOR HEALTH & SOCIAL INNOVATION (SCHSI)

OPEN SOURCE TECHNOLOGY FOR EMERGING PLATFORMS (OSTEP)

Director's Message

As I reflect on my first year at Seneca Innovation, I am proud of everything our team has been able to achieve despite enormous challenges posed by the ongoing COVID-19 pandemic. We have adapted and even thrived! The team has been resilient and steadfast in delivering against our many commitments to Seneca faculty, students and our partners.

I have made many connections this year and have learned so much about Canada's college and polytechnic ecosystem, local industry needs and Seneca expertise. Our local companies and organizations are eager to innovate. Partnerships with our faculty and students add tremendous value to our partners by helping them solve technical, societal and business challenges. However, access to funding to support these applied research initiatives is a challenge that will only grow as we emerge from the pandemic and demand increases. Our focus for the upcoming year is to strengthen our partnerships so we can collectively achieve much more than the sum of our individual parts.

This year we launched the Seneca Centre for Innovation in AI Technology (CIAIT), which builds on our solid foundation of applied research activity in software development and data sciences. We are grateful to the Natural Sciences and Engineering Research Council of Canada (NSERC) for funding through the Applied Research and Technology Partnership (ARTP), which enabled this for us. I am delighted that the centre is open for business with several active and ongoing projects, as well as a pipeline of future projects.

The theme for this year's Annual Showcase was "Unmasking Innovation" and this will remain our guiding principle as we move forward from the pandemic. Uncovering innovation trends and ensuring that we build capacity to support these advancements is pivotal. Whether it be circular solutions for a sustainable economy or data-driven solutions for a digital economy, Seneca Applied Research will continue to strive to be the partner of choice by offering unparalleled expertise and state-of-the-art labs.

I look forward to another great year with many new success stories to share.

Best Wishes,

Namrata Barai
Director, Applied Research

Applied Research Metrics

Seneca Applied Research External Funding

Federal Funders	Cash Total	$1,920,463
Provincial Funders	Cash Total	$7,500
Partner Funding	Cash	$270,511
	In-Kind	$381,390
	Partner Total	$651,901
	Total (all sources)	$2,579,864

Funded Applied Research

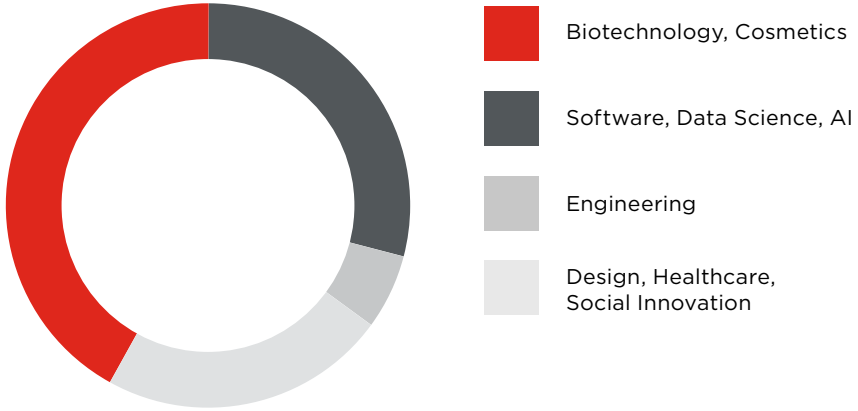
Research Partnerships	110
Seneca Applied Research Supported Projects	48
Faculty Investigators	38
Student Research Assistants	87

Curriculum-based Applied Research

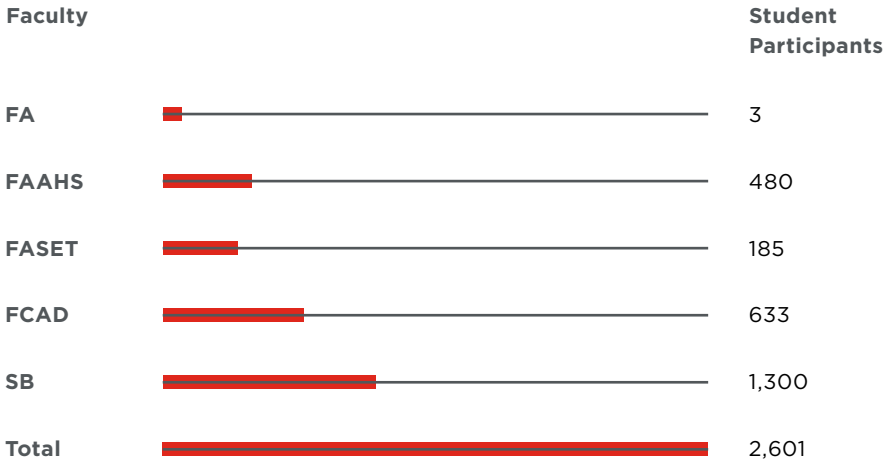
Students involved in Applied Research	2,601
Total Courses Surveyed	3,093
Courses Reporting Applied Research Activity	103
Research Intensity (% of courses involving applied research)	3.33%

Faculty Specific Metrics

Funded Applied Research Projects



Curriculum-based Applied Research



	Total	Faculty of Arts (FA)	Faculty of Applied Arts & Health Sciences (FAAHS)	Faculty of Applied Science & Engineering Technology (FASET)	Faculty of Communication Art & Design (FCAD)	Seneca Business (SB)
Courses Reporting Applied Research Activity	103	1	32	23	25	22
Faculty Engaged in Research Activities	27%	20%	28%	27%	29%	30%

Applied Research Report

Seneca APPLIED RESEARCH

SENECA CENTRE FOR INNOVATION IN AI TECHNOLOGY (CIAIT)

SENECA CENTRE FOR INNOVATION IN LIFE SCIENCES (SCILS)

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OPEN SOURCE TECHNOLOGY FOR EMERGING PLATFORMS (OSTEP)

Seneca Centre for Innovation in AI Technology

In the last three years, close to 70 per cent of the applied research projects initiated at Seneca in the software and information technology fields involved artificial intelligence (AI) techniques. The Seneca Centre for Innovation in AI Technology (CIAIT) builds on this established foundation. CIAIT focuses on three key application areas: business decision support, content analysis and management, and cybersecurity. All three areas of focus can be applied to a broad range of industry sectors that generate the bulk of Ontario's gross domestic product: advanced manufacturing, commerce, agriculture and food processing, creative and media, and life sciences. The main AI techniques that are being used to support those three areas include data and predictive analytics, machine learning, natural language processing and computer vision. CIAIT researchers collaborate with industry partners on business challenges such as improvement in live transcription through AI speech modelling, analysis of legal contracts to identify areas of concern, and prediction of battery energy storage system health and its performance optimization. Through these and future industry projects, CIAIT will continue to support local small and medium-sized companies interested in the development of AI technologies that support and enhance their core business outcomes.

CIAIT Metrics

10 Projects

10 Faculty Investigators

26 Student Research Assistants

Seneca researchers teach machines to help video editors

Project integrates AI into content management and curation

Ask anyone who's done it — video editing is time-consuming, tedious work. And with demand for new content across countless platforms higher than ever, the editor's work is never done.

But thanks to Seneca Innovation's artificial intelligence (AI) video categorization project with industry partner, **Vubble**, human editors will now have some high-tech help.

Vubble, an IT and communications company based in Toronto and Waterloo, has tapped into the machine-learning expertise of Seneca's **School of Software Design & Data Science** to integrate an automatic video categorization recommender into the manual editing process.

"This work is typically very labour intensive and expensive," said Tessa Sproule, Co-founder and Co-CEO of Vubble. "We are at a pivotal moment in our communications world where we need technology to help us decipher and interpret the quality and validity of all the content we produce."

The multi-year collaboration has resulted in Vubble being able to tag video content more quickly with appropriate category recommendations based on visual and audio information. This has enabled the company to meet the needs of a growing customer base that includes CTV News, TFO, Channel 4 News (U.K.) and the Canadian Film Centre.

The applied research project was led by Dr. Vida Movahedi, Professor, School of Software Design & Data Science, and was funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) with support from the Southern Ontario Smart Computing Innovation Platform (SOSCIP).

For Dr. Movahedi and her students, developing a video categorizing system involved training and evaluating machine learning models that could predict appropriate categories based on content. That meant teaching the machines to understand what is happening in videos by inputting the right images and audio transcripts.

"Using machine learning techniques, we can avoid manual categorization," Dr. Movahedi said. "Even if it's not 100 per cent accurate, the suggested categories are still helpful recommendations to the editors and curators."

Using the Seneca platform, Vubble is now building a live audio transcription model that uses words and patterns to pick up cues in podcasts and videos so the content can be categorized accordingly.

"All AI starts with humans teaching machines," said Ms. Sproule, who is former head of digital at CBC. "What we want to do is try to replicate the human curation skills in a machine form. We want to build a world based on not just what people want to see, but also what they need to see."

> All AI starts with humans teaching machines. What we want to do is try to replicate the human curation skills in a machine form. We want to build a world based on not just what people want to see,but also what they need to see."
>
> **— Tessa Sproule, Co-founder and Co-CEO of Vubble**

Applied Research Report

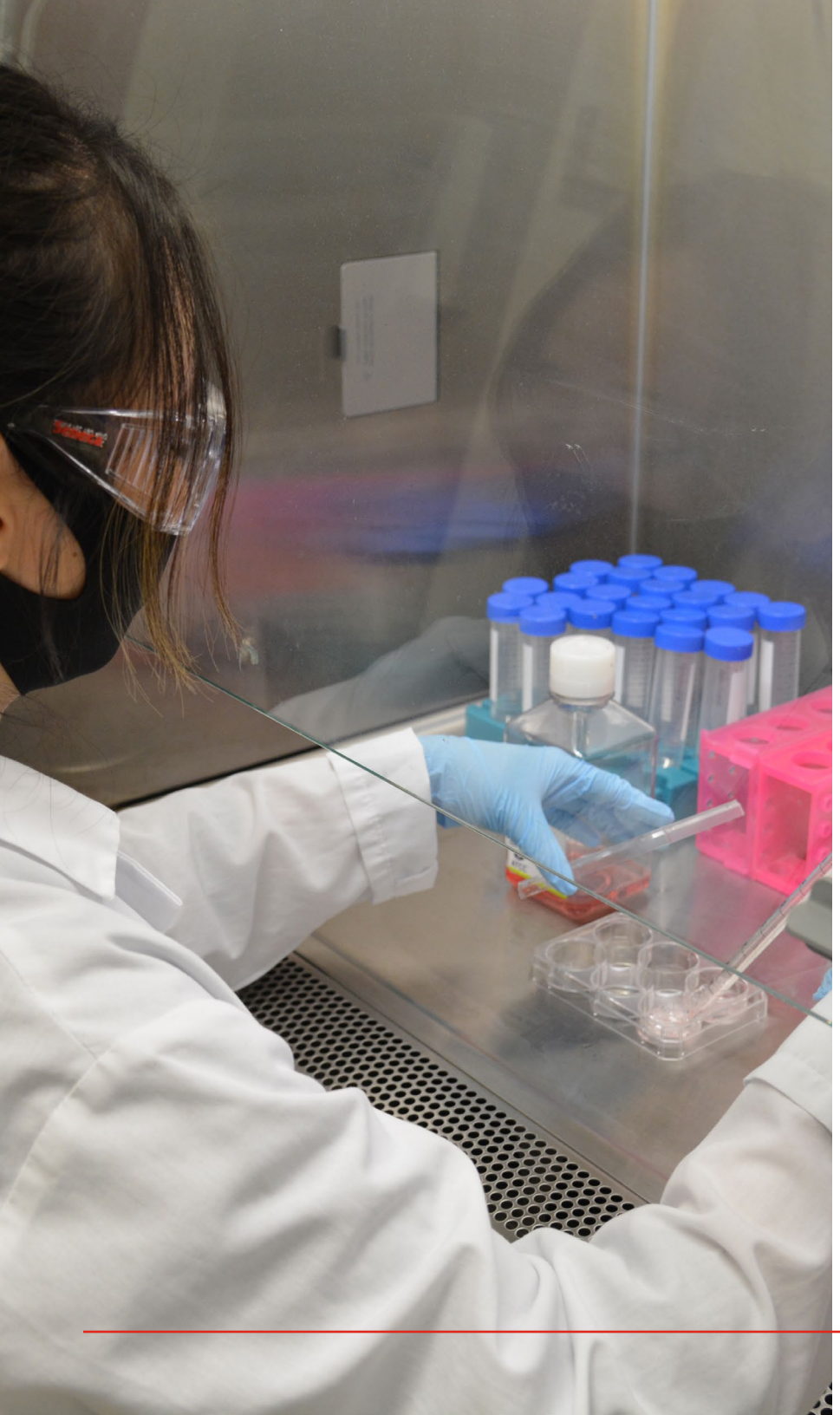
Seneca APPLIED RESEARCH

SENECA CENTRE FOR INNOVATION IN AI TECHNOLOGY (CIAIT)

SENECA CENTRE FOR INNOVATION IN LIFE SCIENCES (SCILS)

SENECA CENTRE FOR HEALTH & SOCIAL INNOVATION (SCHSI)

OPEN SOURCE TECHNOLOGY FOR EMERGING PLATFORMS (OSTEP)



Seneca Centre for Innovation in Life Sciences

Located at Seneca@York Campus, the Seneca Centre for Innovation in Life Science (SCILS) serves a previously unmet need among small and medium-sized enterprises in Ontario. SCILS enables industry-academic partnerships to further develop to enhance and validate life sciences technologies and products in the areas of diagnostics and cosmetics. As an integral component of the life sciences innovation ecosystem, and through partnerships with regional innovation centres, incubators and industry associations, SCILS connects enterprises with Seneca faculty and students to collaborate on applied research projects. Ultimately, through its focus on life sciences talent and investment in research and development, SCILS plays a significant role in the growth of the life sciences sector in Ontario, enabling early-stage diagnostics and cosmetics companies to reach commercialization and scale their businesses.

SCILS Metrics

19 Projects

10 Faculty Investigators

31 Student Research Assistants

Harnessing the 'most powerful immune system of any land animal'

Seneca partners with ostrich farm for cosmetics, antibody applied research

Forget celebrities and their high-priced moisturizers. A team of Seneca Cosmetic Science students has developed an all-natural face cream that may just hold the secret to softer and smoother skin.

And they have Yelena Anikeyeva and her ostriches to thank.

"If you touch my skin, you'll see how crazy soft it is," said Ms. Anikeyeva, founder and CEO of **Ostrich Land** and owner of its online store, Power of Ostrich, which is partnering with Seneca on a suite of applied research projects looking at the benefits of ostrich oil and ostrich egg white, yolk and shells.

Ms. Anikeyeva, her husband, Vladimir, and their son, Alexsey, are ostrich farmers in the Niagara Region. They initially teamed up with Seneca on a cosmetic science capstone project, for which the Seneca team developed a moisturizing face cream using ostrich oil and egg yolk.

"Ostriches have the most powerful immune system of any land animal," Ms. Anikeyeva said. "For some people, ostrich oil works like a miracle. Look at me, I work outside every day, but my skin looks like I work in an office."

Ms. Anikeyeva is now working with the Seneca Centre for Innovation in Life Sciences on two new projects.

Hariti Gulati and Amanda Miranda Savoini are student research assistants studying in the **Biotechnology – Advanced** diploma program. They work to remove the ostrich egg from the shell while Andrew Collop, a professor in the **School of Biological Sciences & Applied Chemistry**, watches.

The first is to design and formulate an eczema cream infused with ostrich oil and yolk. It will be co-led by Sonal Kamath and Sharon Robertson, both professors in the School of Biological Sciences & Applied Chemistry. They will supervise a Cosmetic Science student, who will be a full-time research assistant on this project.

Hariti Gulati (left) and Amanda Miranda Savoini are student research assistants studying in the Biotechnology – Advanced diploma program. They work to remove the ostrich egg from the shell while Andrew Collop, a professor in the School of Biological Sciences & Applied Chemistry, watches.

The resulting prototype cream will add to Power of Ostrich's product line.

"With an ostrich egg, you get more fatty acids because it's bigger than a chicken egg," Ms. Robertson said. "You are putting all this concentrated stuff into a very thick yolk, which has a lot of antioxidants to help the skin to rejuvenate itself. It's like you are double dipping and getting twice the amount of the good things."

The second project with Power of Ostrich will investigate antibodies found in ostrich eggs and extracting them to potentially fight eczema, acne and other skin disorders. This project will be co-led by Dr. Frank Merante and Bryan Chalk and supported by two part-time student research assistants.

Dr. Merante, who previously worked on developing chicken antibodies as part of his PhD, says they will get about four to five grams of antibodies from each ostrich egg.

"This is desirable as an ostrich can lay up to 100 eggs a year in Africa and 50 in Canada, and they can live for 60 years in captivity," he said. "The avian species are clever. They load up their yolk with antibodies, which then get transferred into the embryo. Everything the mother bird is immune to gets passed on the chicks."

With the same theory in mind, the team has been monitoring an ostrich farm in British Columbia working on developing antibodies against COVID-19.

"If an ostrich is vaccinated against COVID-19 using a vaccine or similar protein, then the yolk from her eggs could theoretically contain antibodies against the virus or another pathogen of interest," said Dr. Merante.

The goal for Seneca's ostrich egg-related applied research is to develop a procedure that can be implemented for large-scale productions of antibodies for cosmetic and immunodiagnostic applications.

"Utilizing ostrich eggs as a resource could be really impactful across several disciplines, including cosmetics, diagnostics and therapeutics," Dr. Merante said. "It's fascinating."

"Utilizing ostrich eggs as a resource could be really impactful across several disciplines, including cosmetics, diagnostics and therapeutics. It's fascinating."

— Dr. Frank Merante, Professor, School of Biological Sciences & Applied Chemistry

Indigenous cosmetic company partners with Seneca for skin care product

Project showcases 'commitment to real change and innovation'

A face mist developed by a team of Seneca applied researchers could bring Canadian-sourced cosmetic ingredients to a global market ... and make your skin smoother.

"I put it on my face every day whether I'm wearing makeup or not," said Sharon Robertson, who teaches in the **School of Biological Sciences & Applied Chemistry**. "In my opinion, it's better than anything out there."

In collaboration with **Cheekbone Beauty**, Ms. Robertson led a project to create a face mist containing Canadian-sourced raw materials used in traditional Indigenous medicine.

The request came from Jenn Harper, founder and CEO of the Indigenous-owned cosmetic company based in St. Catharines, Ont.

"By design, I wanted Cheekbone Beauty to be a more circular business — to be restorative and regenerative, benefiting both people and planet," said Mrs. Harper, who pitched her business on *Dragons' Den* three years ago.

"By using these ingredients, we are actively drawing upon our Indigenous roots. I always say that Indigenous Peoples are the OGs — originators — of sustainability, and circularity has been a way of life for Indigenous Peoples worldwide for millennia."

Mrs. Harper came to Seneca with the goal of launching Cheekbone Beauty's first skin care product and improving its in-house product development and manufacturing capabilities for a wider range of products.

"Seneca has an incredible cosmetic science program, and with their commitment to innovation and new technologies, we knew they would be the right partner

Jenn Harper, founder and CEO of Cheekbone Beauty, partnered with Seneca's School of Biological Sciences & Applied Chemistry to develop a face mist containing Canadian-sourced raw materials used in traditional Indigenous medicine.

for us," she said. "As a small business with a strong focus on sustainability, we always want to be at the cutting edge of new technology, and Seneca is a great partner for any business with that goal."

Funded by the Natural Sciences and Engineering Research Council of Canada (NSERC), the project saw research assistants from Seneca's **Cosmetic Science** graduate certificate program work with Ms. Robertson to develop a water-based mist that would dry in one to two minutes.

For background research, the team combed through an Indigenous treatise containing 547 plant-based ingredients. Through investigating the plants and their benefits, and talking to Canadian raw material suppliers, they were able to determine which ingredients were available and most beneficial for the formula.

In the end, five Canadian-sourced, raw materials were used: Black Spruce bark extract from naturally growing trees, White Pine bark extract from Canada's boreal forest, Willowherb from the northern Canadian Prairies, beet liquid extract and a new anti-aging agent called GlycolastinTM developed by Ottawa-based Sussex Research Laboratories Inc.

"Some of these ingredients have been used for centuries," Ms. Robertson said. "At the same time, we are the first to use GlycolastinTM, which is a novel ingredient in the cosmetic industry. And it's Canadian."

Cheekbone Beauty is currently making some tweaks to the formula as they prepare to bring the mist to market. They are confident the product will have appeal for its quality and its sustainable composition and production.

"The truth is that people want to see companies with an understanding of social and environmental impact," Mrs. Harper said. "Projects like this are how we as a company show our commitment to real change and innovation."

"The truth is that people want to see companies with an understanding of social and environmental impact. Projects like this are how we as a company show our commitment to real change and innovation."

— Jenn Harper, founder and CEO of Cheekbone Beauty

Applied Research Report

Seneca APPLIED RESEARCH

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OPEN SOURCE TECHNOLOGY FOR EMERGING PLATFORMS (OSTEP)

Seneca Centre for Health & Social Innovation

For many years, Seneca faculty and students have worked with community partners, not-for-profit organizations and some for-profit businesses to solve social and health-related challenges. Innovation in these areas includes new programs, products, initiatives or services that serve a community and result in improved social or health outcomes for the community.

This year, Seneca Innovation formalized the Seneca Centre for Health & Social Innovation with the development of a new internally funded and administered grant program — the Seneca Social Innovation Research Fund. The grant provides Seneca faculty and student researchers with a modest amount of funding to carry out externally partnered research projects that have the potential to create positive social or health outcomes for societies. It also serves as a stepping stone towards larger, multi-year social innovation projects funded through the Natural Sciences and Engineering Council of Canada's College and Community Social Innovation Fund.

Most researchers in the centre are faculty members or students in Seneca Business or the Faculty of Applied Arts & Health Sciences.

SCHSI Metrics

15 Projects

19 Faculty Investigators

39 Student Research Assistants

Seneca awarded $360,000 for applied research benefiting urban farmers

Project brings together science, business, sustainability

A major Seneca-led applied research project is aiming to help urban farmers tackle one of their biggest problems: how to develop strong and sustainable businesses.

"We'll be looking at innovative financing methods," said Dr. West Suhanic, a professor in Seneca's **School of Accounting & Financial Services**. "What makes our project unique is that we'll be bringing science, business and sustainability together in one package."

Armed with a PhD in systems design engineering, Dr. Suhanic will be collaborating with Dr. Lesley Campbell, an associate professor at Toronto Metropolitan University and an expert in urban agriculture, plant evolution and global climate change. They will lead a team of 12 to 15 Seneca student research assistants and work with community partners Greenest City and **Toronto Urban Growers**.

The project was awarded $360,000 by the Natural Sciences and Engineering Research Council of Canada and the Social Sciences and Humanities Research Council.

"One of our goals is to work with the local community of urban growers and help them turn ideas into businesses," Dr. Suhanic said. "We want to help them enhance their operations through better access to knowledge and training."

Rhonda Teitel-Payne is Co-ordinator for Toronto Urban Growers, which boasts a network of more than 1,000 urban growers and supporters. She says one of the issues urban farmers face is that most of the financial development resources out there are not geared toward their needs.

"There's training and research for rural and industrial farming, and loans, too, but there's not that much for urban growers," she said.

As urban agriculture plays an important role in providing ecological services in urban settings, this program will be designed to incorporate training, mentorship and microfinancing specifically for urban farmers in communities across Canada.

"Personally, I'm very excited about this," said Dr. Andrew Paton, Research Manager, Seneca Innovation. "Our student research assistants will be interviewing existing and potential urban farmers to identify gaps and gain a better understanding of what is needed for successful urban agriculture."

Dr. Paton, who has a PhD in chemical engineering and applied chemistry, will be managing the project. He also hopes to see the resulting urban agriculture enterprises helping to address food insecurity and increase access to healthy food in urban communities.

"We want to recruit people who are serious about starting an urban agriculture enterprise," he said. "We will put them through our training program and help them run a sustainable business growing food closer to home."

> "One of our goals is to work with the local community of urban growers and help them turn ideas into businesses."
>
> **— Dr. West Suhanic, Professor, School of Accounting & Financial Services**

Older adult newcomers 'forgotten', Seneca researchers find

Report details crisis 'magnified' during pandemic

While day-to-day life is difficult for many seniors in Canada, a Seneca applied research project has found the challenges older adult newcomers face have become even more pronounced during the pandemic.

"Senior immigrants told us how their hardships were magnified during the pandemic," said Dr. Bahar Biazar, who teaches at Seneca's **English Language Institute**. "This got my research team and me thinking how the entire settlement process in Canada is geared toward attracting and supporting productive young immigrants. The older group is being forgotten."

With funding from Seneca Innovation, Dr. Biazar partnered with the **Intercultural Iranian Canadian Resource Centre** (I2CRC) to conduct research on how older adult immigrants from I2CRC coped during the pandemic. She was assisted by Sasha Mozaffari, an **Honours Bachelor of Commerce – Human Resources Management** student, and Crystal Kwan, an Office Administration – Executive graduate, who now teaches in the **School of Legal, Public & Office Administration**.

Their report, Senior Newcomers Coping With Crisis, details stories resulting from interviews with nine older adult newcomers from Iran, two caregivers who provided support to a senior newcomer during the pandemic and two I2CRC board members.

Dr. Biazar said the research findings were unexpected.

"The level of isolation and loneliness experienced by these seniors was more than what most people experienced," she said. "Some of them hadn't talked to anyone for days. One of them had 15 books in her house when the lockdown began, and she had read each one five times."

Others were getting forgetful and struggled to read their mail, the research also revealed. Many didn't know the language or their local bus route. Some had mobility issues and lived on poverty-level pensions. People were communicating with neighbours across the street by switching lights on and off.

"In some cases, these are life-and-death situations that bring on a significant level of mental health issues," Dr. Biazar said. "A lot of the seniors were doing 'second-hand therapy' in which the person who could afford the therapy told the others what the therapist said. Some were having imaginary conversations with their therapist. Some were outright crying."

While the participants were all Iranians, Dr. Biazar, who is also Iranian, said the hardships the older adults experienced were not cultural.

"The ethnicity or nationality didn't play that much of a role," she said. "The issues that came up were a lack of extended family, no networks or knowledge as to navigating the systems here. They were not specific to the Iranian Canadian community."

Through policy changes, Dr. Biazar hopes things will start to improve for older adult immigrants.

"COVID-19 revealed many things in our society," she said. "My hope is that when policy makers get together to review what is needed and what is lacking, that they don't forget this population."

"In some cases, these are life-and-death situations that bring on a significant level of mental health issues."

— Dr. Bahar Biazar, Professor, English Language Institute

Researchers help enhance tax filing system for low-income residents

Collaboration between Seneca, City of Toronto, Prosper Canada

Many people need help filing their taxes each year, often turning to professionals or software for guidance. But for some low-income Canadians, getting the help they need is not so easy.

A recent Seneca applied research project has evaluated ways to make Canada's tax filing system more accessible for vulnerable populations, such as those with disabilities, new immigrants, single adults and seniors.

"Our goal was to propose potential solutions responding to the unique needs of these groups," said Dr. Varinder Gill, Professor and Co-ordinator, **Honours Bachelor of Commerce – International Business Management** degree program.

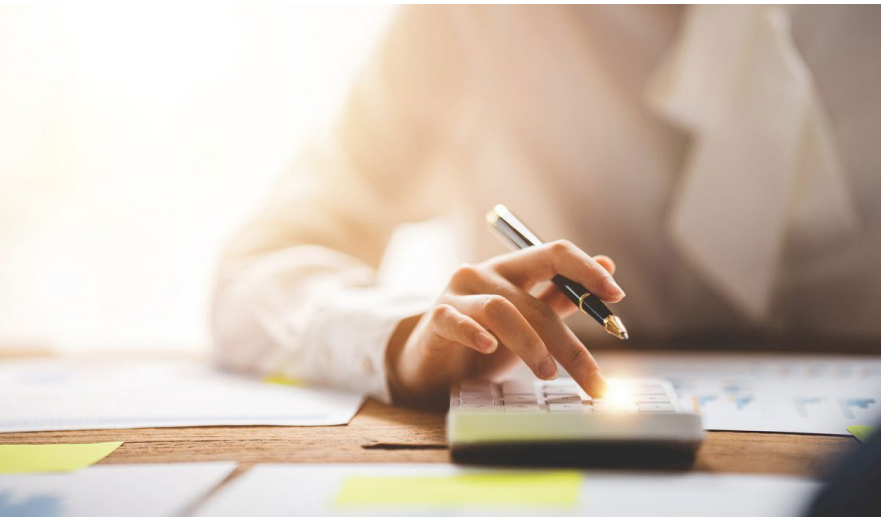
One of the project's key recommendations is to increase awareness of tax benefits and the support available for those in need when filing their income tax — some of whom simply do not complete this process.

"If social service delivery organizations can collaborate to engage non-filers, then awareness can be increased about the benefits and services available," said Dr. Gill, a PhD in economics.

Led by Dr. Gill, the project saw research assistants from the **School of Human Resources & Global Business** and **School of Management & Entrepreneurship** collaborate with the City of Toronto and **Prosper Canada**, a national charity dedicated to expanding economic opportunities for Canadians living in poverty.

The team worked with the city's Employment & Social Services division to focus on Toronto's low-income residents and investigate the challenges they faced, including those compounded by the pandemic.

The project was funded by Mitacs and Maytree and took nearly eight months to complete.



"I was quite excited to work on this project," Dr. Gill said. "We are contributing to the community by working to improve the financial well-being of vulnerable populations."

Initial findings have been used by Prosper Canada to develop a model for providing a more co-ordinated tax filing supports to low-income Torontonians.

As well, the output will help to inform City of Toronto policies in the future, including work related to the Toronto Poverty Reduction Strategy.

"We collaborated with Seneca to undertake research on the challenges and barriers faced by low-income individuals when filing their income taxes," said Paolo Staffieri, Manager Community and Labour Market at Toronto Employment and Social Services. "The research findings will support future program enhancements for Toronto residents receiving social assistance."

"We are contributing to the community by working to improve the financial well-being of vulnerable populations."

— Dr. Varinder Gill, Professor & Co-ordinator, Honours Bachelor of Commerce – International Business Management

Applied Research Report

Seneca APPLIED RESEARCH

SENECA CENTRE FOR INNOVATION IN AI TECHNOLOGY (CIAIT)

SENECA CENTRE FOR INNOVATION IN LIFE SCIENCES (SCILS)

SENECA CENTRE FOR HEALTH & SOCIAL INNOVATION (SCHSI)

OPEN SOURCE TECHNOLOGY FOR EMERGING PLATFORMS (OSTEP)

Open Source Technology for Emerging Platforms

The Natural Sciences and Engineering Research Council of Canada (NSERC) Industrial Research Chair for Colleges in Open Source Technology for Emerging Platforms (OSTEP) was established to help local small and medium-sized enterprises increase their global competitiveness. The program focuses on the development of open-source software for emerging enterprise platforms such as ARM64, DevOps (Software Development and IT Operations) technologies and methodologies, and applications in super-embedded systems. The OSTEP program, led by Chris Tyler in the **School of Software Design & Data Science**, advances the state of open-source software to make it possible for local companies to migrate from legacy computer systems to these emerging platforms, taking full advantage of new features, including reduced space, power and cooling requirements that are now demanded by the market.

OSTEP Metrics

3 Projects

2 Faculty Investigators

14 Student Research Assistants

Seneca applied research project helps fight off cyberattacks

Collaboration with technology company makes working from home safer

Fighting off cyberattacks could soon be as easy as plugging a small device into your home wireless network.

With more people working from home, residential computer networks have become gateways to larger networks and a bigger target for hackers. In response, a team of Seneca applied researchers has developed a solution that enables an enterprise-class security system to be easily deployed in a home or small office — protecting both the local and connected corporate networks.

The secret weapon? ProtechSuite software from the Mississauga-based technology company **J-SAS**.

"J-SAS has created a new level of security using artificial intelligence to monitor the traffic behind the scenes and identify if information is leaking," said Chris Tyler, Professor, Faculty of Applied Science & Engineering Technology.

In collaboration with J-SAS, Mr. Tyler worked to bring ProtechSuite's enterprise-level cybersecurity platform to home and small branch offices. He was supported by research assistants from Seneca's **School of Software Design & Data Science** and **School of Information Technology Administration & Security**.

The project was funded by the Natural Sciences and Engineering Research Council of Canada (NSERC).

Mr. Tyler, who is also the NSERC Industrial Research Chair for Colleges in Open Source Technology for Emerging Platforms, says there has been a new wave of attacks during the pandemic.

"These are very real threats from a robust and well-organized criminal industry," he said. "The level of sophistication has been steadily increasing."

When a home router is compromised, it allows the attackers to scan what is on it, infect attached devices and potentially use your network to access an employer's network.

"Once they are in your router, they can see what devices you have," Mr. Tyler said. "They can watch your entire network."

To help J-SAS expand its line of products for individuals working from home or companies with small branch offices, Mr. Tyler created a compact device that can self-configure with larger networks and interact with users through a smartphone app.

"It's essentially a security appliance that plugs into your network," he said. "It self-configures and will identify the normal usage of your devices, doing what an IT professional would do automatically."

Sase Janki, CEO of J-SAS, says their next step is to integrate the appliance into the ProtechSuite Home Office Platform.

"We were pleased with the outcome of our work with Seneca," he said. "It opened the door to enable our product to integrate with popular home and small office networks."

"

J-SAS has created a new level of security using artificial intelligence to monitor the traffic behind the scenes and identify if information is leaking."

— Chris Tyler, Professor, School of Software Design & Data Science

Applied Research Participants and Recognition

Seneca APPLIED RESEARCH

Research Leader of the Year

Winner

The award is presented to a faculty research leader (principal investigator) who has made a significant contribution to applied research at Seneca this year and who has gone over and above to provide mentorship and guidance to research assistants. The winner is nominated by research assistants.

Dr. Bahar Biazar

English Language Institute

Project Partner Organization

Intercultural Iranian Canadian Resource Centre

Term of Project

January 2021 to September 2021

Statement From Nominator

“Dr. Biazar is passionate, intelligent and caring. She always supported and assisted the team through weekly meetings and emails. She was able to share her project vision with us clearly and provide us with the resources needed to accomplish the project. Our team had a very positive environment and enjoyed the research and meetings we had. She is an outstanding leader.”

Seneca APPLIED RESEARCH

Social Innovation Research Fund Recipients

The Seneca Social Innovation Research Fund (SIRF) is an internally funded and administered grant, which supports applied research in social innovation done in collaboration with an external partner. The SIRF is designed to strengthen networks among students, faculty, staff and external partners in areas such as health and well-being, climate change, sustainability, community and societal development, and integration of vulnerable and equity-deserving populations.

Alla Yakerson
Partner: Community and Home Assistance to Seniors (CHATS)
Exploring the Experiences of Front Line Home Health Care Workers Amid the COVID-19 Pandemic: A Phenomenological Inquiry

Aras Azimipanah
Partner: Nexus Health
NexHUB Medication Manager Enhancements

Matthew Wood
Partner: York Regional Police
The themes in the memes: Evaluating police culture through an examination of social media memes

Seneca APPLIED RESEARCH

Faculty Principal Investigators

Abdur Rahman
School of Electronics & Mechanical Engineering Technology

Alex Sochaniwskyj
School of Electronics & Mechanical Engineering Technology

Ali Taha
School of Electronics & Mechanical Engineering Technology

Allan Randall
School of Software Design & Data Science

Asad Norouzi
School of Software Design & Data Science

Asma Paracha
School of Software Design & Data Science

Bahar Biazar
School of English & Liberal Studies

Barkev Keoshkerian
School of Biological Sciences & Applied Chemistry

Bethany Kopel
School of Public Safety & Behavioural Studies

Braden G. Evans
School of Recreation & Environmental Studies

Bryan Chalk
School of Biological Sciences & Applied Chemistry

Camie Condon
School of Public Safety & Behavioural Studies

Catherine Leung
School of Software Design & Data Science

Chris Tyler
School of Software Design & Data Science

David Guevara
School of Biological Sciences & Applied Chemistry

Elnaz Delpisheh
School of Software Design & Data Science

Enza Badolato
School of Community Services

Frank Merante
School of Biological Sciences & Applied Chemistry

George Clark
School of Biological Sciences & Applied Chemistry

Hla Wynn
School of Biological Sciences & Applied Chemistry

Jane Davey
School of Recreation & Environmental Studies

Kyle Valdock
School of Electronics & Mechanical Engineering Technology

Lisa Li
School of Information Technology Administration & Security

Mariam Daoud
School of Software Design & Data Science

Mark Shtern
School of Information Technology Administration & Security

Mark Tucci
School of Public Safety & Behavioural Studies

Seneca APPLIED RESEARCH

Faculty Principal Investigators

Matt Clark
School of Biological Sciences & Applied Chemistry

Monica Fontana
School of Creative Arts & Animation

Mufleh Al-Shatnawi
School of Software Design & Data Science

Paul O'Brien
School of Biological Sciences & Applied Chemistry

Paula MacLeod
School of Biological Sciences & Applied Chemistry

Reid Kerr
School of Software Design & Data Science

Sharon Robertson
School of Biological Sciences & Applied Chemistry

Sonal Kamath
School of Biological Sciences & Applied Chemistry

Tanvir Alam
School of Software Design & Data Science

Varinder Gill
School of International Business & Management

Vera Borsos-Matovina
School of Biological Sciences & Applied Chemistry

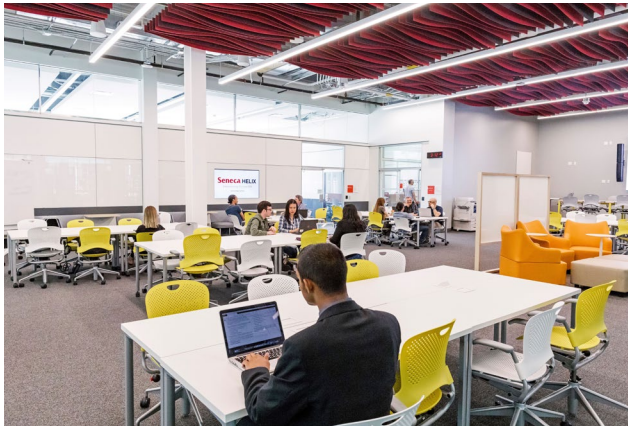
Vida Movahedi
School of Software Design & Data Science

West Suhanic
School of Accounting & Financial Services

Seneca APPLIED RESEARCH

Student Research Assistants

Aaron Hipple
Aayushi Baral
Adam Fernandez-Criado
Adam Gariba
Alex Quan
Amanda Savoini
Amy Lin
Angel Alexa Bebeb Calumpang
Anh Kien Nguyen
Anita DiNardo
Anton Biriukov
Aya Torbah
Bahar Mahmoudi
Calvin Ho
Carmen Mei
Chanel Sin
Chirag Arora
Chloe Li
Christopher Belsanti
Chryzle Balikig
Crystal Kwan
Cyrille Odinne Reyes
Deborah Kuo
Dongwoo Kang
Doreen Fang
Ehda Dolatabadi
Eric Ebata
Fernanda Motta
Gabby Ko
Hariti Gulati
Helen Sosonna
Inaam Mourad
Jaeung Jeong
Janet George
Jasmin Khan
Jeison Coronel
Jeronimo Ospina Ramirez
Jessica (Jingmin) Zhou
Joever Padura
John de Loyota
Julius Soriano
Justin Bonsu
Krisha Dave
Krupesh Vinaykumar Patel
LaChae Hood
Lana Yunaev
Le Xuan An Ho
Manreet Kaur
Mansi Prathmesh Shah
Maria Camila Lau
Maryam Taheri-Shirazi
Maya Hudon-Kaide
Menaahel Zahid
Meng-Chen Lee
Dang Minh Tu (Michelle) Tran
Monica Hong
Nataliia Shagarova
Neha Sharma
Oleksandra Sakhnatska
Patricia Perrault
Phan Y Nhi Nguyen
Pratikkumar Patel
Purva Devendra Joshi
Qiwen Ling Ning
Quang Vu Bui
Quoc Viet Nguyen
Rishabh Sharma
Ruiqi (Ray) Yu
Ruri Lee
Rutvi Patel
Sasha Mozaffari
Selvini Devagasayam
Sergio Hernandez
Seville Scarcello
Shu-Ping (Jennifer) Chen
Smitkumar Kotadia
Tien Phat Vu
Tristan Taylor
Xiomara Velasquez
Yanhao Lei
Yoonkyung Kim
Yu-Chen Lin
Yuhang Zhao
Yuri Yoon
Zachary March
Zufishan Ali



Seneca HELIX

Unmasking Innovation

Seneca HELIX

Director's Message

Guided by Seneca's Au Large initiative, HELIX has continued to refine and deliver virtual interactive programming to encourage the growth of the innovation mindset. I am very gratified by the work the team has done to expand, with purpose, HELIX programming and to better support equity-deserving groups, consistent with Seneca Innovation's theme of "Unmasking Innovation". I am deeply proud of the passion, commitment and dedication of our Seneca HELIX team, and thank them for inspiring students, alumni and community members to learn and develop their innovation mindset to support their entrepreneurial and intrapreneurial dreams.

Last year, HELIX hosted more than 130 virtual entrepreneurship and innovation events supporting more than 13,000 individuals. HELIX coaches and mentors provided more than 1,310 hours of virtual mentoring. In this report, you will learn about some of our amazing HELIX ventures, such as HypraCycle, Dine and Dash, Beaut and others.

I would like to thank our HELIX Advisory Committee and subcommittee members. These external partners and internal stakeholders have provided guidance and support to HELIX throughout the year. The HELIX Venture Fund Subcommittee guided the Catalyst Fund, which provides up to $5,000 in non-repayable micro-grants to approved HELIX ventures. These funds enable HELIXers to deliver a visible improvement to their venture and demonstrate plausibility and scalability. The HELIX Women's Initiatives Subcommittee explored ways for HELIX to better enable those that identify as women and visible minorities. The subcommittee has endorsed new initiatives including a Gender Equality Entrepreneurship Training Plus (GEET+) program audit, HERizons professional development programming and the HELIX RISE Conference — for women by women.

With more than 1,000 subscribers, HELIX's *TouKEEPINGch*, a weekly e-blast designed to keep the HELIX community up to date on supports, events and funding resources during COVID, sent out its

Seneca HELIX

100th edition this past fiscal. Now counted on as a trusted repository of supports, the e-blast will continue beyond the pandemic. HELIX has also been active in the entrepreneurship ecosystem, including being a founding member of the Ontario College Incubator Network. This network pulls together all college and polytechnic incubators in Ontario to share ideas, best practices and partner on innovation and entrepreneurial events.

Working with Seneca International, HELIX continues to deliver innovation and entrepreneurship training and support to international partnerships. For example, MasterCard funding through CICan enabled HELIX to assist two Kenya universities with their blue economy programming.

Finally, I would like to thank our internal collaborators, external partners and funders for another incredible year. Without their support, we would not be able to continue to positively impact innovation and new venture development.

Sincerely,

Chris Dudley
Director, Entrepreneurship

Seneca HELIX

Supporting the world's future intrapreneurs and entrepreneurs

Since 2014, HELIX, Seneca's innovation and entrepreneurship incubator, has supported Seneca students, graduates and members of the community in developing their innovation mindset.

HELIX's innovation programming enables participants to grow and develop as an entrepreneur or intrapreneur.

> **For entrepreneurs**, HELIX provides resources and supports designed to assist participants in developing, launching and scaling their venture. Supports for entrepreneurs include coaching/mentorship, co-working space, networking introductions and events, guest speaker presentations, funding application assistance, enhanced experiential learning opportunities and ecosystem engagement.
>
> **For intrapreneurs**, HELIX provides participants with key transferable skills designed to allow them to quickly adapt to new situations and tools to enter, re-enter or move forward in their chosen career.

HELIX is accessible, actively inclusive and welcoming in nature, offering both in-person and virtual resources. HELIX is barrier-free — there is no cost for services, nor does it take a percentage of the company or intellectual property developed with the support of HELIX.

HELIX is not focused on only one sector. It provides essential supports and knowledge to develop ventures and positively impact all sectors of the economy.

HELIX ensures participants have easy access to key knowledge in a supportive environment, meeting individuals where they are on their journey and supporting them at every stage of their entrepreneurial/ intrapreneurial journey.

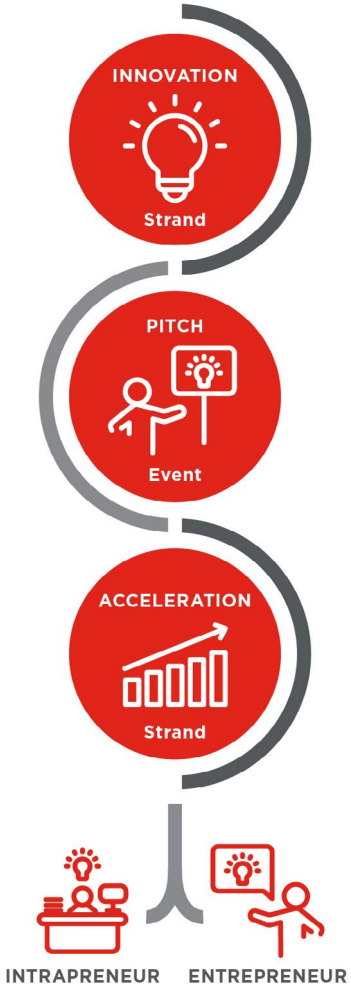
Since Inception (2014)

35,438
Participants in HELIX Innovation Programming

600+
Ventures Accelerated in HELIX

Seneca HELIX

HELIX Model



The HELIX program begins with the INNOVATION Strand, which is a series of entrepreneurial workshops and sector-specific support activities.

Upon completion of the INNOVATION Strand, the PITCH Event allows participants to provide a persuasive elevator pitch of their venture idea. This PITCH Event must be completed by all those that want to enter the ACCELERATION Strand of HELIX.

Those that have completed the INNOVATION Strand and have pitched their idea move into the ACCELERATION Strand. Here they receive additional supports to drive their ventures to the next level.

April 2021 to March 2022

130
Innovation/Entrepreneurial Events

12,778
Individuals in Innovation and Entrepreneurial Events/Workshops

1,310+
Mentor/Coaching Hours

27
New Ventures Pitched to ACCELERATION Strand

HELIXers Unmasking Innovation

BEAUT

beaut.ca

Postpone Foam by Beaut (beaut.ca) is a plant-based, rinse-free shampoo that cleanses hair between washes. This product is a game-changer, poised to take a bite out of the $3-billion dry shampoo market by addressing customer concerns about harmful chemicals and aerosols. Postpone Foam's consistency makes it quick and easy to use, while its sleek, simple packaging is free of gimmicks, warning labels and the typical laundry list of unpronounceable chemical names.

"This product will revolutionize the way people think about dry shampoos," said Beaut founder, Kim Ng, a Seneca graduate and member of HELIX. "My goal is to stock the shelves of national retailers across North America and globally."

Like any successful entrepreneur, Ms. Ng's story is one of passion, determination, collaboration and openness to new ideas. She is rightfully thrilled to be launching a product, which is the realization of an idea she conceived while completing her diploma at Seneca. But getting to this point was not easy and the story of Beaut has pivoted a few times before arriving here.

Ms. Ng has been cutting and styling hair since she was 14 years old and is still a hairstylist today. She has always been intrigued by the combination of art and business that hairstyling presents, and she enrolled in Seneca's **Business Administration – Entrepreneurship & Small Business** diploma program in 2013 with the goal of launching her own salon. In building her client base using an online web and social media presence, Ms. Ng quickly observed that clients with very specific needs were willing to try a new hairstylist based solely on a description. This sparked a concept for a new venture known as Beaut, which initially provided a web-based, matchmaking service pairing clients with specialized hairstylists. Ms. Ng joined Seneca HELIX in 2014 to access networking and learning opportunities, co-working space and mentorship in an effort to design and launch the Beaut concept.

The COVID-19 pandemic forced Ms. Ng to rethink the concept of Beaut. With hairstyling services prohibited for many months as a result of lockdowns, the business was no longer viable. Working with her HELIX mentor, Paul Rivett, she identified a way to meet the needs of her clients in the unusual circumstances presented by the pandemic. Clients who were unable to see a hairstylist were also cut off from access to expert knowledge about haircare products.

Seeing a pain point for her clients, Ms. Ng was able to access COVID-19 support funding from HELIX to pivot her business and develop a new website, which matched clients to specialized haircare products based on their specific needs and shipped products directly to them. However, in a short period of time, she realized that in spite of partnerships she had established with local suppliers and discounts she was able to access as a professional hairstylist, the margins in the haircare resale business were too small to build a viable standalone business. The greatest opportunity was in the products themselves and this conclusion marked the beginning of Postpone Foam.

HELIXers Unmasking Innovation

BEAUT

beaut.ca

Armed with the experience of launching two services, knowledge gained from her diploma and support from Seneca HELIX, along with her consistent mantra of solving problems for clients, Ms. Ng went back to the rinse-free shampoo idea she had during her Seneca diploma program and started figuring out how to turn it into a marketable product.

As a haircare professional, she knew the key issues with existing dry-shampoo products, but to understand what her clients really needed, she developed a customer survey. The results of this survey (with more than 140 respondents) validated her theory that people are generally not happy with dry-shampoo products, and that they are concerned about aerosols and harmful chemicals. Competitive analysis revealed a large market for dry-shampoo products, laden with chemical sprays and products that make hair feel better but do not cleanse it.

Seneca offers the only graduate program in cosmetic science in Ontario. Students in the final semester of Seneca's **Cosmetic Science** graduate certificate program complete a capstone project requiring the development of a personal care or cosmetic product, including market evaluation, formulation, quality control, regulatory assessment and packaging. Through HELIX and Seneca Innovation, Beaut was connected with the cosmetic capstone course instructor, Sharon Robertson, and applied to participate in the winter 2022 course.

Beaut's project was selected to proceed in the capstone course, based on Postpone Foam's market potential and technical fit for the program, and was assigned to a team of six students (Hind Al-Shamali, Nazafarin Asadollahnejad, Leah Gamble, Erika Laura Hao, Tracy Luc and Rita Veseli). With an information package of product characteristics and a nominal cash contribution from Beaut to cover the costs of formulation and packaging, over a period of four months the student team developed a non-toxic, plant-based, foam cleanser, which removes excess oil and sweat while balancing pH. Ms. Ng's trust in the student team paid off — the capstone project was so successful that the student team won four awards (marketing, formulation, regulatory and team) judged by an independent panel of industry representatives. "This project gave my team and I the opportunity to develop a product from concept stage through the complete product development life cycle," said Nazafarin Asadollahnejad, a member of the student research team. "Our sponsor, Beaut, contributed to the development process and was always open to new ideas."

With an award-winning product in hand, Beaut is launching a Kickstarter campaign to generate pre-sales and raise funding for manufacturing scale-up of Postpone Foam. Ms. Ng's passion and determination, openness to ideas from customers and mentors, and willingness to trust her collaborators have worked in her favour. "I like solving problems and finding solutions," she said. "Entrepreneurship is a form of art and provides me with an opportunity to be creative in a very different way."

HELIXers Unmasking Innovation

When Jimmy Battaglia joined HELIX, Seneca's innovation and entrepreneurship incubator, he was looking for guidance from like-minded people to take his startup to the next level. He had developed a web platform called Panda Portal to help postsecondary recruiters learn more about the institutions they promote to international students.

"The journey of an entrepreneur is very lonely," he said. "I was looking to expand the offerings I had. I was not looking to sell my company."

That was last year.

Since then, the HELIXer has developed the first and only online international education industry training platform for recruiters and has sold his company to ApplyBoard, a Canadian edtech unicorn company valued at $4 billion.

The acquisition also included the condition that Mr. Battaglia join ApplyBoard to head up his platform, now rebranded as TrainHub, which currently works with more than 150 partner educational institutions worldwide.

"At the end of the day, it's all about the students," he said. "When you are choosing education, you are choosing your future. Recruitment agents really need to have the knowledge to help students make informed decisions."

Mr. Battaglia moved to Canada from Venezuela 13 years ago. He learned English at a language school in Toronto and supplemented his advertising degree from Caracas with a diploma in advertising and graphic design from Humber College.

For his internship, Mr. Battaglia worked at the International Language Academy of Canada (ILAC). He was eventually hired by ILAC, becoming its head of marketing before leaving to start his own company.

"I've been working in international education for many years," he said. "I've learned a lot, and it's close to my heart."

While with ILAC, Mr. Battaglia had the opportunity to work directly with Seneca. He came to HELIX four years ago with an idea to create a social platform for international students.

That idea didn't work out, and Mr. Battaglia pivoted to the training platform, which he brought back to HELIX.

"I reapplied to join HELIX because it gave me a structure," he said. "It taught me the fundamentals and helped to pull my ideas together."

Mr. Battaglia says he benefited the most from pitch events and interactions he had with fellow entrepreneurs. He also met regularly with his HELIX coach, Shelly Markel, who worked with him on perfecting his pitch and coached him on how to protect himself in negotiations.

"HELIX takes entrepreneurs anywhere in their journey," said Ms. Markel, Professor, **School of Human Resources & Global Business** and **School of Management & Entrepreneurship**. "Jimmy was a bit further along in his venture when he came to HELIX the second time. This helped him focus his efforts. I'm thrilled he's now an important part of a growth company like ApplyBoard."

trainhub.com

Launched with the Support of Seneca HELIX

HypraCycle

HypraCycle's mission is to break down barriers to cycling. They design, produce and sell products that make cycling safer, easier and more secure. They believe that by tackling pain points cyclists face, they can make this affordable and sustainable method of transportation a viable and appealing commute method for more people.

To tackle this goal, HypraCycle is developing a series of innovative products for the DIY E-Bike community. Their angle is to make E-Bike conversion an approachable option for more people without sacrificing features and alienating enthusiasts. E-Bike technology makes cycling a viable commute option for people who live in suburbs and may be poorly served by public transit. E-Bike conversion is a great way to get on board with E-Bike commuting affordably.

This HELIXer venture is a proud recipient of HELIX Catalyst funding.

Dine and Dash

Dine and Dash is a solution aimed at helping restaurants improve customer experience by streamlining the order and pay process. Their dine-in ordering platform enables customers to order and pay directly from their smart devices through the Dine and Dash app by simply scanning a QR code. Orders go directly into the point-of-sale (POS) system, making adoption quick and easy for restaurants.

Popular delivery apps, often not integrated into POS systems, can cause friction points and require staff to re-enter orders into their own system. The Dine and Dash platform is directly integrated into the POS system, making changes to menu items easy and instantaneous while minimizing mistakes, delays and unnecessary work.

This self-service option can keep customers and staff safe by minimizing contact while increasing revenue by decreasing wait time between the end of meal and payments. Dine and Dash technology offers customized items with high profit margins based on customers' past order history, boosting overall profitability. Their data-driven analytics create opportunities to reach potential customers by using location-based push notifications.

This HELIXer venture is a proud recipient of HELIX Catalyst funding.

Launched with the Support of Seneca HELIX

Michelle's Skin Shines

Michelle's Skin Shines is an online store (via Shopify) and skincare vlog founded by Toronto-based beauty influencer Michelle Herbert. This HELIX venture allows customers to purchase skincare products and accessories through skinshines.ca. Ms. Herbert's online vlog demonstrates the benefits of simple, at-home, skincare solutions for adults ages 18 and over and often includes videos on common skin conditions such as dehydration, lines/wrinkles, mild acne and hyperpigmentation.

This HELIXer venture is a proud recipient of HELIX Catalyst funding.

Proton Fuels

Proton Fuels is a company founded with the goal of using the massive and untapped potential of hydrogen fuel cell technology for a more sustainable future of transportation. Hydrogen fuel cell vehicles (FCVs) are 100 per cent electric vehicles, with the only difference being that they store energy in the form of hydrogen gas rather than a battery pack. FCVs provide countless advantages to battery electric vehicles. Consumer interest for FCVs has been shown to be large, however, their limiting factor is the fuelling infrastructure to resupply drivers with hydrogen gas.

Proton Fuels has developed a system that adequately addresses the current market issues through their compact, self-contained hydrogen fuelling system. This HELIX venture's strategy is based around a full-scale, fully operational pilot prototype that will be debuted and demonstrated, gathering the necessary public interest and credibility to access immediate opportunities for expanding the network and enabling the use of underutilized FCV technology for a cleaner world.

This HELIXer venture is a proud recipient of HELIX Catalyst funding.

Launched with the Support of Seneca HELIX

We-Watch

We-Watch is the next generation of Neighborhood Watch. This HELIX social enterprise is focused on developing and deploying a free mobile application, designed to help witnesses and/or victims of an incident. The We-Watch platform allows individuals to report, investigate and seek justice. We-Watch users can log an incident they have seen (captured on a dashcam or mobile phone) or experienced as a victim. The platform alerts other potential witnesses by location proximity and serves as an information and media-sharing platform for all users. The platform will serve all individuals, businesses and authorities by streamlining how they report and solve incidents.

This HELIXer venture is a proud recipient of HELIX Catalyst funding.

Seneca HELIX CAREER RECHARGE

PRESENTED BY

TD READY COMMITMENT

Launched in June 2019, Career Recharge is a series of interactive workshops and networking events designed to address the challenge of re-skilling mid-career individuals by helping them develop critical skills, build resilience and be strong intrapreneurs.

This program targets those who want to prepare for their career-future, whether that be re-entering the workforce, advancing in their existing field, changing careers or starting a venture.

Career Recharge has been financially supported by TD since its inception and is currently under a three-year funding agreement with TD until December 2024.

Our Participants

Our workshop participants:

- **94%** were satisfied with their experience
- **97%** would recommend to others

Participants in Career Recharge identify as:

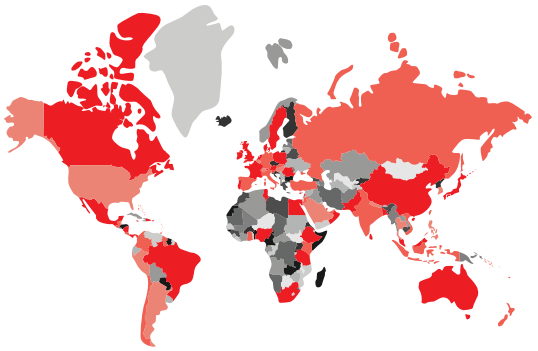
- **46%** visible minority
- **73%** female
- **82%** over the age of 29
- **31%** unemployed
- **14%** working in contract positions
- **8%** self-employed

Our Reach Since 2019

16,500+
Total participants

10,500,000+
Digital ad impressions

Participants in **83** countries have engaged in Career Recharge since 2019. The top five countries in order are Canada, United States, United Kingdom, Australia and India.



Gender-Smart Entrepreneurship Education & Training Plus (GEET+) Initiative

Humber's Centre of Entrepreneurship and Seneca HELIX have partnered to review both incubators using the Gender-Smart Entrepreneurship Education & Training Plus (GEET+) template.

This systematic approach of applying a gender and diversity lens to every area of the incubators, and thereby identifying inclusivity gaps and the levers that drive change, will rigorously consider the incubator makeup and processes at every level.

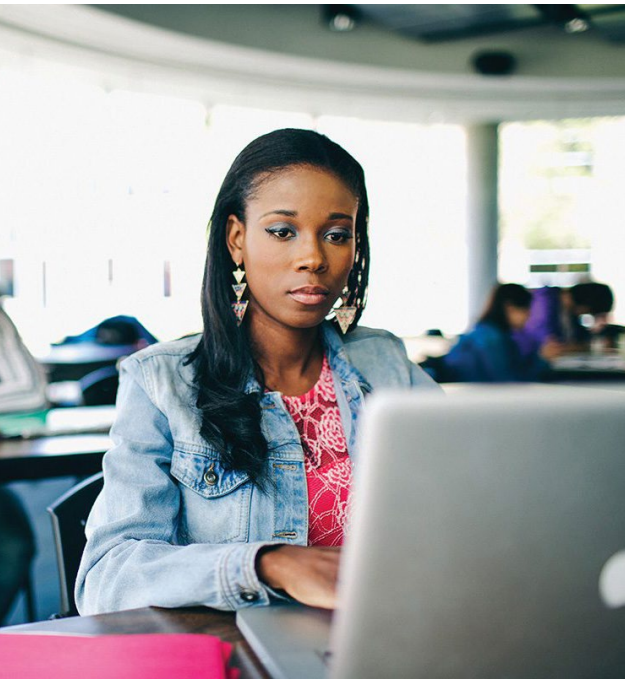
The overarching goal of this initiative is to use the GEET+ framework to reduce gender, racial and occupational stereotypes and unconscious biases associated with entrepreneurship education and training. The entry point of GEET+ is gender, with the understanding that gender is one identity attribute that interacts with others through venture creation, small business management and entrepreneurship education and training. Women entrepreneurs are not a homogenous group. Consistent with the "plus" of gender-based analysis, GEET+ acknowledges that gender-based analysis goes beyond biological (sex) and socio-cultural (gender) differences to include multiple identity factors such as race, ethnicity, religion, age and mental or physical disability.

We use the GEET+ framework to assess the status of equity, diversity and inclusion in entrepreneurship events, activities and programs. The outcomes of the GEET+ framework will guide us in the construction of action plans to address program and/or incubator-level gaps, the development of gender-smart materials and supports to assist in providing greater opportunities and impact by creating a more inclusive and diverse entrepreneurship ecosystem.

Gender-Smart Entrepreneurship Education & Training Plus GEET+

Seneca launches HELIX RISE with $300,000 donation from Scotiabank

Initiative aims to create a more equal playing field for women and equity-seeking entrepreneurs



Seneca HELIX is providing more support for business-minded women and individuals from equity-seeking communities to help them reach their entrepreneurial goals through a new initiative called HELIX RISE.

HELIX RISE represents the next phase of growth for HELIX. It was made possible thanks to a $300,000 donation from Scotiabank, one of HELIX's long-standing partners. HELIX RISE will provide more timely and targeted support for women and individuals from equity-seeking groups, including targeted mentoring, peer groups and workshops.

A 2019 Business Development Bank of Canada (BDC) study estimates that women make up only roughly 28 per cent of all entrepreneurs in Canada. HELIX RISE will provide key supports and knowledge to help individuals who identify as female, and other equity-seeking groups, develop their entrepreneurial and intraprenurial dreams. By supporting women and equity-seeking groups, HELIX RISE will create more inclusive and resilient communities.

HELIX RISE is inspired by ScotiaRISE, Scotiabank's 10-year, $500-million commitment to foster economic inclusion and resiliency among disadvantaged groups.

"We are proud to contribute to the next phase of Seneca's HELIX program," said Sandra Odendahl, Vice-President of Social Impact & Sustainability, Scotiabank.

"HELIX is an important initiative dedicated to helping entrepreneurs get the support they need to bring their visions to life. Through ScotiaRISE, we are committed to helping increase access to opportunities that lead to greater participation in the economy."

HELIX RISE will contribute to the Seneca Au Large mandate to build an equitable and more virtual Seneca. It will develop and bolster existing core programming — in person and online — with a goal of increasing the number of female HELIXers to at least 50 per cent in four years. It will also increase the participation of marginalized HELIXers to at least 60 per cent and the number of HELIX coaches, mentors and facilitators who identify as women or from marginalized groups to at least 50 per cent.

According to a 2020 Ontario Chamber of Commerce report, closing the gender gap in entrepreneurship could add up to $81 billion to Canada's gross domestic product.

"We know that simply creating additional programming is not enough," said Chris Dudley, Director Entrepreneurship. "Every class, workshop, event, coach, mentor, speaker and facilitator must reflect and welcome our whole community."

Seneca HELIX receives $2 million from the Government of Canada to help women prepare for new careers

HERizons will provide free skills development and networking opportunities for those facing adversity

Early in 2022, Seneca was awarded $2 million from the federal Women's Employment Readiness pilot program to launch HERizons. The HERizons initiative will provide those who identify as women with free training and support to build resilience and enable them to make a realistic and achievable plan to enter, re-enter or progress in the workforce as an intrapreneur or entrepreneur.

This initiative will include:

- targeted workshops
- virtual reality simulation learning sessions
- HELIX entrepreneurship supports
- math and literacy skills programming
- wrap-around supports
- career development sessions

The programming for the HERizons initiative will be available in person and virtually across Canada. To support this important initiative, Seneca HELIX has partnered with College of the Rockies and Norquest College to promote HERizons, develop content and host events.

"Seneca is proud to receive funding for this important initiative to help make sure the economic recovery leaves no one behind," said Marianne Marando, Seneca's Vice-President, Academic. "The program's goal to support women facing employment barriers aligns with our vision to help women gain the skills, networks and support they need to find success in their careers."

Launching in September of 2022, HERizons will support women from Indigenous and equity-deserving communities as well as those who lost their jobs during the pandemic. It will build on Seneca's successful Career Recharge program, which has supported thousands of mid-career individuals looking to gain new skills, start a new career or re-enter the workforce.

The Government of Canada has invested nearly $50 million through the Women's Readiness Program to support 26 projects across all 13 provinces and territories. These projects will test and provide foundational and transferable skills training models and offer wrap-around supports, including childcare, transportation and counselling.

"On International Women's Day, we can take stock of the progress that women in Canada have made and recognize the work still ahead," said Carla Qualtrough, Minister of Employment, Workforce Development and Disability Inclusion. "I'm proud to see our government invest in organizations that are leading that vital work by helping marginalized women overcome barriers to employment. This is about empowering more women to create better lives for themselves, while also building the strong, skilled and inclusive workforce Canada needs."

HELIX Change Makers

HELIX coaches, mentors and facilitators are one of the most impactful aspects of HELIX. They are passionate about supporting the development of the innovation mindset in others. They are engaging, approachable and provide relevant strategic and tactical guidance to our HELIXers. They are champions of innovation.

Coaches

- Alan Luk
- Heather Gramlow
- Jason Presement
- Judy Cameron
- Perry Smith
- Shelly Markel

Mentors

- Karen Dubeau
- Paul Rivett
- Ramy Taraboulsi
- Rob Cattle

HELIX Facilitators

Colin Hung
INNOVATION Strand

Elliott Atkins
InCITEful Series Host

Garry Chan
INNOVATION Strand

Heather Crosbie
INNOVATION Strand

Judy Cameron
Finance for the Entrepreneur

Lucas Chang
Summer Institute

Rob Cattle
Summer Institute

Shelly Markel
Improve Your Impact

Career Recharge Facilitators

HELIX's Career Recharge facilitators deliver engaging, interactive virtual workshops every other week to support individuals in developing transferable skills and preparing for their career future.

- Beverley Stevens
- Chris Dudley
- Cindy Zarnett
- Derek Ryner
- Eleanore Fang
- Gus Tzatzanis
- Hana El Kaiss
- Imran Mouna
- Jeff May
- Jerome Cawley
- Judy Cameron
- Judy Chang
- Karen Dubeau
- Krista Lonergan
- Lucas Chang
- Marianne Marando
- Mary Anne Chambers
- Mary Saith
- Orphtee Quarcoo
- Patricia Campbell Hatton
- Rema Tavares
- Rob Cattle
- Samantha Fracassa
- Sean Hale
- Sumit Bhatia
- Susan Thomas
- Talita Gavrilescu
- Zahra Hirji

HELIX Advisory Council

The HELIX Advisory Council is comprised of dedicated leaders who provide advice and leadership on matters such as strategic direction, international growth, program reviews, fundraising and technology/industry trends. As well, HELIX Advisory Council are strong advocates of HELIX in the broader entrepreneurship and innovation ecosystem.

HELIX Advisory Council Members

Balinder Rai
Business Development Manager, Ontario Centre of Innovation

Charles Banfield
Manager Strategic Economic Initiatives, The Regional Municipality of York

Christina Kakaflikas
Acting Director Growth Culture and Entreprenurship, City of Markham

Cristina Italia
Chair, School of Management & Entrepreneurship, Seneca

Jess Joss
President, Equity Angels

Mike Shaver
Founder ScaleDriver, Distinguished Engineer Shopify

Parth Patel
Founder & CEO, Tazwiz

Patrick Clifford
Director of Research & Innovation, Southlake Regional Health Centre (Retired)

Ritik Sharma
President, Seneca Student Federation

Sean Stephens
CEO, Treefrog Inc

Sep Assadian
VP Venture Growth, ventureLAB

HELIX Women's Initiative Subcommittee

Established in April 2021, the Women's Initiatives Subcommittee is focused on exploring ways to make HELIX more equitable to better support those who identify as women and visible minorities in developing their innovation mindset.

Gaps in programming and ways to support these key target groups have been discussed. New initiatives the committee has supported include HERizons, HELIX RISE and GEET+.

HELIX Women's Initiative Subcommittee Members

Charles Banfield
Manager Strategic Economic Initiatives, The Regional Municipality of York

Chris Dudley
Director Entrepreneurship, Seneca

Christianne McMartin
National Small Business Lead for The Scotiabank Women Initiative, Scotiabank

Christina Kakaflikas
Acting Director Growth Culture and Entreprenurship, City of Markham

Julia Clements
Marketing Consultant, Co-operators

Karen Dubeau
Entrepreneur and Innovation Ecosystem Development Advisor, ReMap Network

Kasey Dunn
Co-founder of Hope Pet Food and Project Manager, Centre for Entrepreneurship Humber

Kate Collins
Manager HELIX, Seneca

Lindsay James
Senior Development Officer, Seneca

Samara Ricon
HERizons Co-ordinator, Seneca

HELIX Venture Fund Subcommittee Members

Established in April 2021, the HELIX Venture Fund Subcommittee is focused on developing a framework to remove financial barriers experienced by HELIXers. This is achieved by providing critically needed funding through micro grants to qualified ACCELERATING HELIX ventures, allowing them to move their venture forward to the next level.

HELIX Venture Fund Subcommittee Members

Anand Karat
President, Vretta

Ben Rogers
Dean, Seneca Innovation

Chris Dudley
Director Entrepreneurship, Seneca

Jason Presement
Regional Vice-President, Sales — Canada and CALA at Calix

Jess Joss
President, Equity Angels

Kate Collins
Manager HELIX, Seneca

Lindsay James
Senior Development Officer, Seneca

Mike Shaver
Founder ScaleDriver, Distinguished Engineer Shopify

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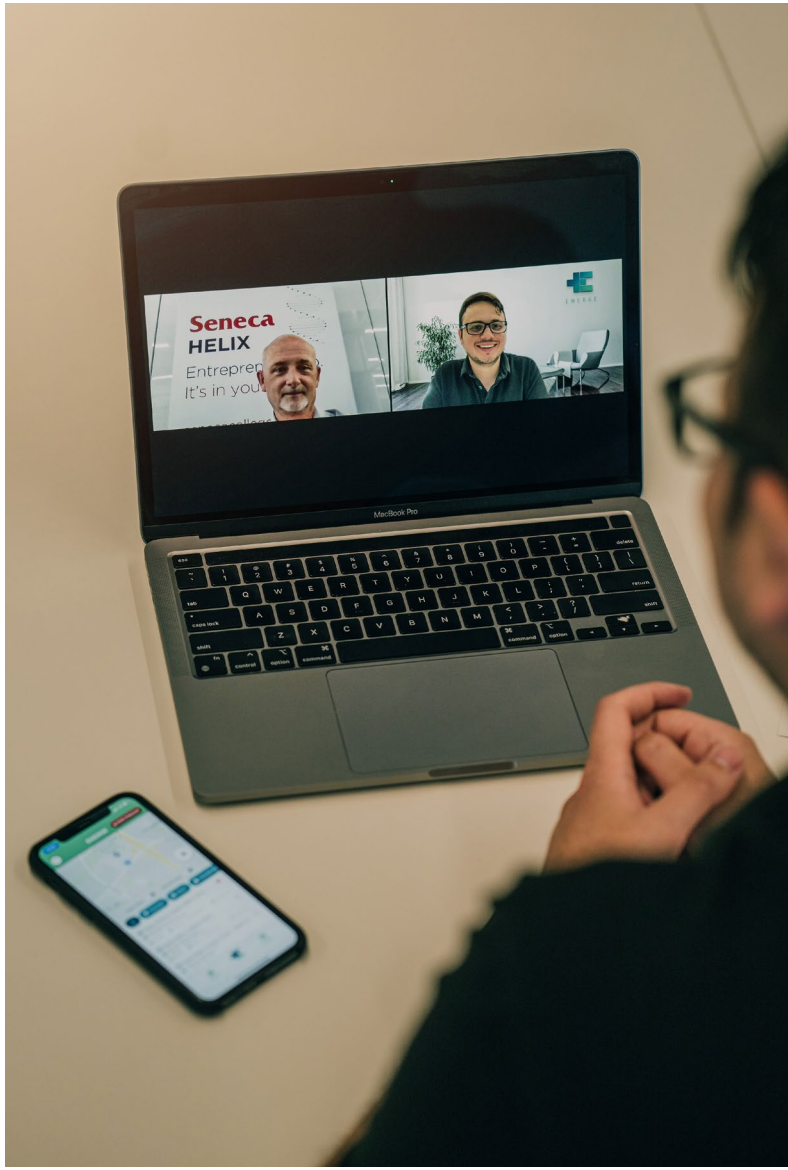

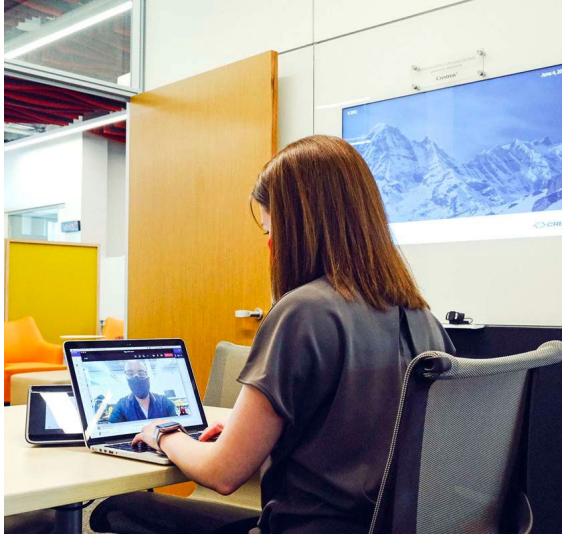

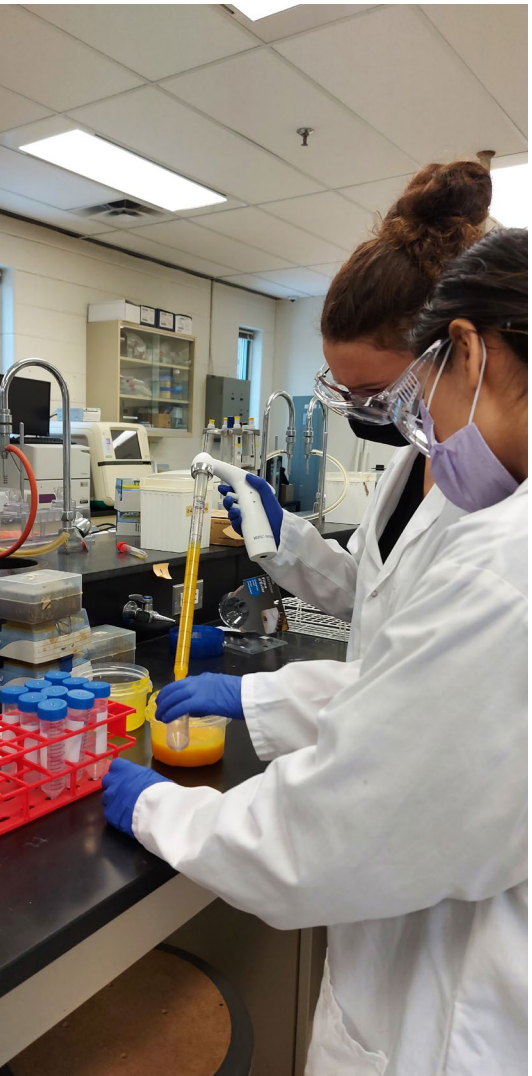


Seneca


Seneca INNOVATION