

MISSISSAUGA / ST. GEORGE / SCARBOROUGH

University of Toronto

MAGAZINE

What if...

Spring 2022

22 WAYS U OF T'S DEFY GRAVITY CAMPAIGN WILL HELP BUILD
A MORE JUST, PROSPEROUS AND SUSTAINABLE WORLD FOR ALL



PHOTOGRAPH BY COLE BURSTON



A ROOM OF THEIR OWN

DATE: FEBRUARY 9

TIME: 5:45 P.M.

CAMPUS: ST. GEORGE

Students at the Daniels Faculty of Architecture, Landscape, and Design were among six teams that participated in this year's Winter Stations design competition, held annually at Toronto's Woodbine Beach. The theme of this year's event was "resilience."

Inspired in part by the "infinity rooms" of Japanese artist Yayoi Kusama, the students' entry featured a simple wood-framed box with mirrors on all four interior walls, creating an endless series of reflections. They constructed their pavilion between classes during the first several weeks of term, and, in this photo, begin to assemble it for the first time – shortly before hoisting it onto a truck for transport to the beach.

The group aimed to make the station's limited space seem larger than it was, says team leader Christopher Hardy. But they also wanted to encourage visitors to take a good look at themselves – and see their own resilience through the pandemic. "We wanted people to feel joy about leaving their homes and not have to worry about COVID," he says.

The project brought together 10 students, giving them a common goal to bond over. But it also gave them an opportunity, under the guidance of Prof. Fiona Lim Tung, to use the skills they've been developing as architects – from designing to budgeting to construction – on a very public project. "Working on something we actually get to build is every architecture student's dream," says Hardy.

—**Scott Anderson**

SNOW DAY

DATE: FEBRUARY 24

TIME: 3:36 P.M.

CAMPUS: SCARBOROUGH

The snow had already started to melt, but that didn't stop a group of students living in residence from strapping on snowshoes and exploring the Highland Creek Valley as part of U of T Scarborough's outdoor recreation program.

For some participants, it was their first outdoor activity in months. Under normal circumstances, the winter portion of the program involves downhill and cross-country skiing, snowboarding and skating. But with pandemic restrictions, only snowshoeing was offered this year.

Alvin Qi, a first-year international student, says he had rarely experienced snow or engaged in winter sports in his native Hong Kong. "My parents saw a photo and were excited to see I was getting familiar with Canadian winters."

Started in 2015 by Athletics and Recreation, the year-round program also makes use of U of T Scarborough's proximity to Rouge National Urban Park and Lake Ontario, offering students a chance to try activities such as hiking, dragon boating and rock climbing.

More importantly, it provides students with the physical and mental health benefits that come with outdoor exercise, says program coordinator Laurie Wright. "The hope is they fall in love with an activity and will continue doing it after they finish school," she says.

—Don Campbell



PHOTOGRAPH BY DON CAMPBELL



SEEDS OF DISCOVERY

DATE: MARCH 8

TIME: 9:49 A.M.

CAMPUS: MISSISSAUGA

Kamola Khaitova, a work-study student at the campus greenhouse, carries a fresh batch of wheatgrass. Each week, staff at the rooftop facility harvest the bright green shoots for Angela Lange, a U of T Mississauga biology professor who needs a continuous supply for her research into locusts.

Located atop the Davis Building, the greenhouse supplies many of the plants needed for undergraduate biology lab assignments at UTM. The facility, which is a bit larger than a tennis court, is also home to some annuals, including beans and corn (for experimentation, not eating), and has a permanent collection of flora that includes hibiscus, orchids, mosses, peppers, cotton, banana and fig.

Locusts, when they swarm, devour all crops in their path, making them an especially devastating pest. Lange and her students study their nervous and endocrine systems to see how these systems control reproduction in the female. Their research – which couldn't proceed without the greenhouse's weekly contribution – could lead to new ways to control locust populations, Lange says.

—Patricia Lonergan



PHOTOGRAPH BY NICK IWANYSHYN



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UNIVERSITY OF
TORONTO

DEFY
GRAVITY

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U of T's new Emerging and Pandemic Infections Consortium will advance our knowledge of how pathogens infect human cells – and how to defeat them. p. 30



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ON THE COVER



We chose a view of Earth from space to convey the sky-high aspirations of U of T's new "Defy Gravity" campaign - and its emphasis on inclusivity and sustainability. Read about some of the bold projects the campaign will support, starting on p. 21



The Donor, The Baritone, and The Barber of Seville

One U of T student's dream came true when he stepped on stage as Figaro at U of T Opera. Talent and determination got Danlie Rae Acebuque (MMus 2022) this far. Now a scholarship is taking him even further. Danlie is the first recipient of the Ivan Alexandor Chorney Opera Scholarship—the legacy of a music lover who wanted to ease the financial burden for young opera singers. Thanks to the Chorney bequest, students like Danlie can give their art the time and energy it deserves.

Include U of T in your will and help student potential soar at:
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Talk. Debate. Inspire.

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TEDx U of T is a student-run series that showcases leading speakers and their bold ideas. Ideas that spark conversation, open minds, and help us understand each other. When you purchase U of T affinity products from our financial and insurance partners, a portion of the proceeds goes to TEDx U of T and other initiatives that inspire our students and alumni.

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DEFY
GRAVITY



My grandfather taught me how to drive a car and operate a boat, which he would never have been able to do without insulin

CONRAD SIEGEL, BComm 1955,
HARRISBURG, PENNSYLVANIA

Best, MacLeod and Collip, but also very proud to highlight Dr. Gladys Boyd and many lesser known but equally significant leaders in insulin research over the last century.

NEIL ORFORD, BEd 1987, ORANGEVILLE, ONTARIO

My grandfather, Abraham Sherman, was one of the first people to be saved by insulin. He retired at age 44 and spent a lot of time with me, which I thought was wonderful because my mother and father worked hard and didn't have much time for me. My grandfather taught me how to drive a car and operate a boat, which he would never have been able to do without insulin.

CONRAD SIEGEL, BComm 1955,
HARRISBURG, PENNSYLVANIA

I have had Type 1 diabetes for 63 years and have followed all the treatment changes. Improvements in monitoring have helped to make life better for people with diabetes but they are not a cure. The 100th anniversary reminds us that there is still a long way to go.

SANDRA DAVIS, BA 1967,
NEWMARKET, ONTARIO

Thank you for this refreshing outline of the historical research to alleviate diabetes, as well as information about other medical breakthroughs at U of T. In the context of the pandemic, this story helps underscore the importance and promise of scientific research.

COLLEEN HEFFREN, BA 1991,
MEd 1993, EdD 1999, TORONTO

There is an omission in your otherwise excellent article about insulin: any mention of the late Prof. Michael Bliss's groundbreaking 1982 book, *The Discovery of Insulin*. A long-time member of the university's history department, Bliss's prodigious research confirmed that Frederick



Insulin's Miracle

Our Autumn 2021 cover story about insulin's discovery also looked at new research into treating diabetes. Some readers shared their own stories of how they were affected by the discovery.

Gladys Boyd, my mother's cousin, graduated from U of T in 1918 with a Bachelor of Medicine degree. She was appointed the head of endocrine services at the Hospital for Sick Children in 1921 and held this position until 1950. In his Nobel Prize lecture, Fredrick

Banting noted the establishment of an insulin clinic at the Hospital for Sick Children in Toronto in 1922, "in association with Dr. Gladys Boyd." In that first year alone, 18 diabetic children benefited from insulin treatment in the clinic Dr. Boyd oversaw. Three were the first to recover from diabetic coma, which until then had nearly always been fatal.

DAVID BAILEY, BScPhm 1968, MSc 1970,
PhD 1973, LONDON, ONTARIO

Your otherwise fine article about the discovery of insulin made no mention of the partnership between U of T and Defining Moments Canada, which led the national commemoration for "Insulin100" under contract with the Ministry of Canadian Heritage and other partners across Canada. We were proud to share the stories of Banting,

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copies:** University of Toronto Magazine,
21 King's College Circle, Toronto, ON, M5S 3J3

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University of Toronto Magazine is published
twice a year by U of T Communications.
Views expressed or implied do not necessarily
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or the U of T Communications team.

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Publications Mail sales agreement
No. 43500088

Non-profit postage paid Buffalo, NY

Permit No. 3415. U.S. Postmaster
send address corrections to
P.O. Box 29, Lewiston, NY 14092
Printed in Canada by TC Transcontinental
Printing Inc. ISSN 1499-0040



UNIVERSITY OF
TORONTO

Banting, Charles Best, James
Collip and J.J.R. Macleod all
played key roles in the miracle.
The book also became the basis
for the acclaimed 1988 Canadian
film, *Glory Enough for All*.

ALLAN LEVINE, MA 1979, PhD 1985,
WINNIPEG



Come from Away

*In the Autumn 2021 issue, we
profiled international students
and alumni who are making
scholarly and cultural
contributions to life at U of T.*

Your article revived memories of
when I visited U of T in the
1970s to enquire about applying
to law school. After attending
high school in Ontario, I earned
a BA from the University of
Cambridge in England. A U of T
law school official described my
academic background as “hazy”
and then informed me that the
school didn’t need to take
students from outside Toronto let
alone outside Ontario. How times
have changed – for the better!

ANNE THACKRAY, MA 1974, TORONTO



Searching for E.T.

*The digital edition of the Autumn
2021 issue (magazine.utoronto.ca)
included a profile of astronomer
Sara Seager, who looks for
evidence of life on other planets.
I have had a lifelong interest*

in the stars and in the possibility
of the existence of other life
in the universe. I congratulate
Dr. Seager on her stellar
accomplishments and I look
forward to reading her book.
I wish her luck with setting up
Starshade and with her
atmospheric studies. She is an
inspiration to so many, and her
work with others who have
autism spectrum disorder is
most commendable.

DR. ED HUSSMAN, BSc 1973,
MD 1977, TORONTO

An enjoyable article about
a fascinating individual on
a fascinating subject. If
geochemistry can merge into
biochemistry on Earth
(metabolism plus membrane
plus memory equals life),
then I think there is a high
statistical probability that it
can do so on some exoplanets.
Good luck, Dr. Seager.

DAVID M. MCKEE, BA 1960,
MD 1964, AURORA, ONTARIO

As a U of T astronomer, I knew
Sara well. Recently, I heard
her give a very well-received
lecture to a large group of skilled
amateur “citizen scientist”
astronomers in the U.S. about
her work and how they could
collaborate with her. She is a
super science communicator,
as well as a super scientist. I
have read her brilliant memoir
*The Smallest Lights in the
Universe* and would recommend
it to any reader.

JOHN PERCY, BSc 1962, MA 1963,
PhD 1968, TORONTO

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Magazine welcomes comments
at uoft.magazine@utoronto.ca.
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clarity, civility and length.



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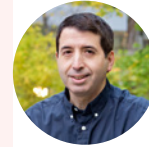


A DAY IN THE LAB

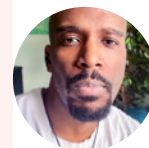
There are pros and cons to working at U of T’s high-security biosafety lab. A big plus: conducting research that could prevent a future pandemic. A comparatively small minus: getting in and out of the elaborate protective equipment every time you want to eat or use the washroom. The logistics can be challenging, but researchers such as Steven Ahn say they structure their day carefully to make the best use of their allotted time in the lab — and to ensure their experiments proceed on schedule. “It’s all about the planning,” he says.

Read about U of T’s efforts to prevent the next pandemic, p. 30

↑
Researcher Steven Ahn geared up for safety



As a science journalist, **DAN FALK** (MA 2014) is interested in what happens when researchers from different disciplines, with different kinds of expertise, come together to solve a problem — as is happening at U of T’s Acceleration Consortium (p. 46). Falk spoke with director Alán Aspuru-Guzik, who explains how insights from the field of artificial intelligence are promising to speed up the process of invention, leading to new kinds of materials with all sorts of applications. Falk co-hosts the podcast *BookLab* and is the author of three books. He is based in Toronto.



NOEL RANSOME spent years covering culture and entertainment for *Vice* magazine before becoming a freelance journalist in early 2020. That transition to running his own operation gave him a sense of affinity with the Black business leaders who are

part of U of T’s Black Founders Network, a resource for Black entrepreneurs. (p. 51) “It was incredibly humbling to hear from people who were using their own experience to make things easier for the next generation,” he says. “Black voices shouldn’t have to stand on their own — in business, entertainment or journalism.”



Photographer **ALEX JACOBS-BLUM** says she found shooting Bruce Stonefish, who is working with U of T linguists to preserve the Munsee language of the Delaware Nation, “incredibly inspiring” (p. 60). She says his work will create a valuable legacy for the Indigenous community, “uplift youth through language” and “project Indigeneity into the future.” Jacobs-Blum, who belongs to the Lower Cayuga Nation of Six Nations of the Grand River, has freelanced for *Maclean’s* and the *Globe and Mail*, and is currently doing a curatorial residency at Hamilton Artists Inc.

Want to contribute? Send your ideas to scott.anderson@utoronto.ca.

PHOTOGRAPHS BY (AHN) NATHAN CYPRIYS; (FALK) SARA DESJARDINS; (RANSOME) SELFIE; (JACOBS-BLUM) MARC LESAGE; ILLUSTRATION BY STUDIO WYSE



**U OF T
MISSISSAUGA
OUTDOOR ART
BRINGS WHALE
SONGS TO
THE WOODS**

A stroll along U of T Mississauga's forest paths offers invigorating scenery, glimpses of local wildlife, fresh air and ... whale songs?

The underwater symphony heard in the woods for most of each day is courtesy of contemporary artist Jana Winderen. Her four-channel audio composition features soundscapes from the Barents Sea, located off the northern coasts of Norway and Russia.

It's one of three multisensory outdoor art pieces in the Living with Concepts exhibition, presented by

the Blackwood Gallery and curated by gallery director Christine Shaw.

The exhibition, which runs until 2024, also features Dylan Miner's *Agamiing*, which uses salvaged old-growth lumber and copper to evoke Indigenous past, present and future, and Tania Willard's *Liberation of the Chinook Wind* – poetry generated by live weather data on themes of Indigenous storytelling, water protection and resilience.

Works are supported by the Canada Council for the Arts, Ontario Arts Council, U of T Mississauga and the UTM50 Anniversary Fund.

**U OF T
SCARBOROUGH
EARTH DISTRICT
WILL BE A HUB
FOR GREEN-TECH
TRAINING AND
INNOVATION**

Plans are underway to create an environmental research and green technology centre at U of T Scarborough.

The new Environmental and Related Technologies Hub (EaRTH) is a consortium of five post-secondary institutions across the eastern Toronto region aimed at developing the sustainable technology sector through research, job training and commercialization.

Plans for EaRTH include using U of T Scarborough's existing Environmental

Science and Chemistry Building and constructing Canada's first net-zero vertical farm dedicated to urban agriculture. A later phase will include facilities for developing sustainable industrial technologies and fostering green-tech entrepreneurship.

Projects connected to EaRTH already underway include creating techniques to reverse groundwater pollution, using brake systems to recharge electric vehicle batteries, and using microbes and smart materials to create alternative fuel sources.

**ST. GEORGE
U OF T'S
NEWEST GLOBAL
PARTNERSHIP**

U of T has entered into a three-way alliance with the University of Manchester and the University of Melbourne that will foster student exchanges and joint research projects, drawing on the universities' combined resources to address global challenges, such as the climate crisis.

The alliance will also take advantage of new ways of studying and conducting research that emerged during the pandemic. For students, this means "global classrooms" that enable them to interact with faculty on three continents through virtual lectures, seminars

and practical classes. Each university will host student exchanges, giving undergrads global experiences to broaden their horizons and boost their career prospects.

Researchers will gain the opportunity to collaborate on joint research programs in areas such as sustainability, cancer treatment and advanced materials.

"Bringing together intellectual resources from three leading universities has the potential to greatly accelerate academic progress," says U of T President Meric Gertler. "The possibilities are huge."

TOGETHER, WE CAN DEFY GRAVITY

U of T's visionary new campaign will engage volunteers and donors in fulfilling our commitment to inclusive excellence



The University of Toronto has been on a remarkable trajectory since its founding in 1827. In that time – not such a long stretch when compared to our counterparts in Paris and Oxford, or even Cambridge, Massachusetts – we've grown from a provincial college to one of the world's top 10 public universities,

consistently recognized as a global leader across the humanities, sciences, social sciences and professions.

Along the way, our faculty, staff, students, alumni and affiliated hospitals have left their mark in every field, from the discovery of insulin to the identification of stem cells, from the invention of peacekeeping to the reinvention of literary criticism and the global revolution in artificial intelligence. U of T is the academic anchor of North America's third-largest and fastest-growing technology hub. And our graduates – a global community of some 640,000 alumni – have earned an outstanding reputation, from Hong Kong to Tel Aviv, from London to Silicon Valley, and pretty much all points in between.

Most importantly, we're distinguished among our global peers by our distinctive vision of excellence. For us, excellence means *inclusive excellence*. The University of Toronto is a world leader because we welcome the best and brightest from all backgrounds and every postal code. We are deeply committed to equity and diversity, and determined to provide our students with a top-quality educational experience, with all the tools and supports they need to flourish. We've played a prominent role in addressing the historic challenges our society has faced in recent years, including Canada's response to COVID-19. And we have enormous potential to make even greater contributions in the years to come.

Our next century

U of T has been around for almost 200 years – but really, we're just getting started. So now, as we prepare to embark on our third



ONE CAMPAIGN, TWO GOALS

1.

The Defy Gravity campaign aims to inspire **225,000 alumni** to get involved with U of T and contribute their time and talent one million times collectively.

2.

The campaign also seeks to raise **\$4 billion** for the university's highest priorities.

century, the U of T community has every reason to look forward with confidence. It's incredibly exciting to imagine what else we can achieve together, for the good of the city around us, our country and the planet we share with all humanity.

In that spirit, in December 2021, we launched Defy Gravity, a visionary new campaign for the University of Toronto, with two ambitious goals. For the first time ever, we have set our sights on an alumni engagement target – to inspire 225,000 alumni to engage with us as volunteers, mentors, donors, participants, and leaders across a broad range of activities, and to encourage them to contribute their time and talent to the university one million times collectively.

The campaign will also seek to raise \$4 billion for the university's highest priorities. These include scholarships and bursaries to ensure access for all qualified students; new programs to promote equity, diversity and inclusion; interdisciplinary research to break new ground and transform entire fields; incubators and accelerators to drive innovation and train the next generation of entrepreneurs; and new facilities to support top-quality teaching and research for decades to come. Investments in these priorities will support the university's commitment to inclusive excellence and enable us to find solutions to the critical challenges facing Canada and the world today.

An urgent mission

That's why we're launching the Defy Gravity campaign now, at this particular time in history. In the past few years, the climate crisis has grown ever more urgent. Economic and social inequalities have widened. We face a reckoning with systemic racism and injustices against Indigenous peoples. The greatest pandemic in a century is not yet behind us. And now, the invasion of Ukraine reminds us of the devastating human toll of war, and the plight of displaced peoples around the world.

At the same time, society is increasingly divided. The rise of populism, followed by extended periods of isolation during the pandemic, has led to a dramatic erosion of trust, tolerance and civility. Combined with the polarizing effect of social media, people

are finding it more challenging than ever to argue with one's peers without alienating them, and to learn from dissent and disagreement. Instead of building bridges, we are retreating into insular silos with seemingly irreconcilable worldviews.

In the face of all this, the mission of the University of Toronto is more crucial than ever. We're one of the few research institutions with the breadth and depth of talent required to solve the toughest problems. And, through the global reach of our alumni community, we've shown that we can transcend borders as well as disciplines. We can create new knowledge and solutions that make a major difference in the lives of individuals and communities everywhere.

Above all, in fulfilling our unique responsibility as a university, we can foster a deeper understanding of complex issues, bring people together to learn from each other through dialogue, and advance the human condition globally through education, discovery and outreach. Because of our distinctive strengths and values, and with the support of our global community, the University of Toronto has the potential, quite simply, to *defy gravity*.

The engagement and generosity of our alumni and friends have always been foundational to the university's success. With your help, through this bold new campaign we can make U of T an even more powerful engine of progress and opportunity. At a time when so many forces are working to pull us down, we'll show how we can rise together, and lift the world to new heights of justice, creativity and hope, for generations to come.

This issue of *University of Toronto Magazine* features 22 ways the campaign will enable us to redefine what's possible for students, researchers – and the world. Readers are invited to enjoy these snapshots – and to join us in realizing the wonderful vision they represent.

MERIC GERTLER



UNIVERSITY OF
TORONTO

Rising to the challenge of climate change



The science is clear. Our planet is warming at an ever-accelerating rate, and we have a brief window to prevent the most severe effects of climate change.

At the University of Toronto, we're actively working on solutions. Our Climate Positive Energy Initiative leverages more than 100 researchers across three campuses. In collaboration with government, industry, and community partners, we're developing the scientific, technical, and societal solutions needed to achieve net-negative carbon emissions by 2050.

This urgent mission will require sustained efforts over the years ahead—but how to make a positive difference now? That's where you come in.

Your support will help us power a clean-tech revolution, as we work to re-envision energy systems, create high-impact clean energy solutions, and promote an equitable transition to sustainable energy.

You can help power solutions to the climate crisis.

Visit engage.utoronto.ca/positivechange or contact Devorah Lindsay at 416-946-7017 to donate.


**DEFY
GRAVITY**

Is it time to reset the way you protect your loved ones?

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What if...

...the U of T
community helped
build a more just,
prosperous and
sustainable world
for all?

Read how, with your support, U of T's Defy Gravity campaign will bring together talented people from every conceivable background to generate new ideas and discoveries that redefine what's possible for the good of our city, our country and our planet. 

WHAT IF ... WE COULD ELIMINATE CARBON EMISSIONS MUCH FASTER?

SUPPLYING RENEWABLE ENERGY IS GETTING CHEAPER,
BUT WE STILL NEED TO FIGURE OUT HOW TO STORE IT – AND
MAKE IT ACCESSIBLE TO ALL CANADIAN COMMUNITIES

Last summer, the settlement of Old Crow flipped a switch and started generating electricity from newly installed solar panels. The small Yukon community, located just north of the Arctic Circle, had until then been completely dependent on diesel generators. The solar panels allow it to run on clean energy during the long Arctic summer days, and will eventually create more electricity than the community can use.

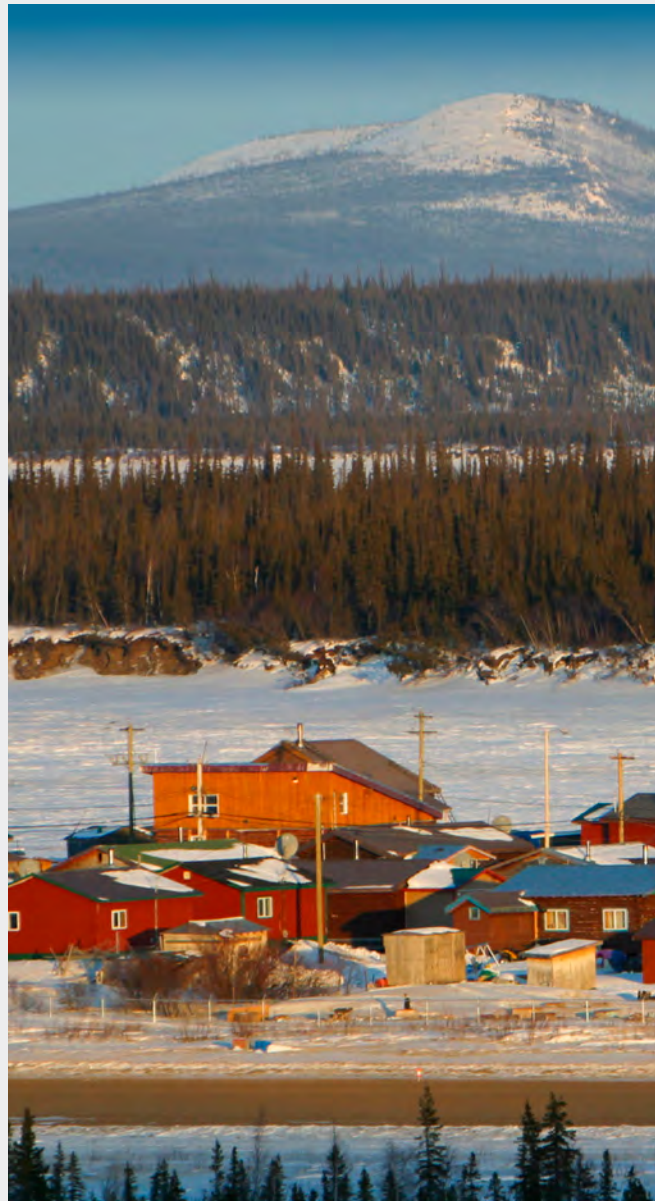
But when the extended winter nights come, Old Crow will still rely on the generators. There is simply no good way to store all that surplus electricity for use after the sun stops shining.

A project led by U of T could change that. Old Crow has agreed to take part in a new initiative called CanStore Energy, which will draw electricity from green sources such as solar, wind and hydroelectric and use it to create a carbon-neutral fuel. If residents decide it makes sense for the community, Old Crow could eventually manufacture its own fuel using solar electricity in the summer and substitute it for at least some of the diesel it uses in the winters.

CanStore Energy, conceived in 2020 by U of T and several other university partners, is intended to help address climate change with a technology called carbon dioxide conversion. The project includes scientists and engineers, but also political and social scientists, economists and business specialists from U of T and the other universities.

Over the next six years, CanStore will focus on two case studies – one in Canada's Far North and one in the south, with an emphasis on working closely with community partners. "The whole approach of CanStore Energy is to assess the communities' needs first. What sort of energy sources do you have? What do you need? What's the gap?" says the project leader, David Sinton, a U of T professor in the department of mechanical and industrial engineering and the Canada Research Chair in Microfluidics and Energy.

He notes that this level of community engagement is uncommon for these kinds of projects. "Usually engineers – and I'm guilty of this too – are like, 'Oh, gosh, let's just get going.' I think it's a bit surprising for some that





Old Crow, Yukon, is a test site for a new U of T initiative that aims to help communities across Canada transition to clean energy

←

the fastest way to deployable technologies is to start with the community.”

CanStore Energy is one piece of a much larger effort at U of T called the Climate Positive Energy Initiative, which Sinton also directs. This initiative brings together more than 100 faculty from a variety of disciplines across the three campuses, as well as a large network of graduate students and postdoctoral fellows, to collaborate on the global challenge to reduce greenhouse gas emissions from energy. The goal is to help Canada and the rest of the world achieve net-negative carbon emissions by 2050, while ensuring that all communities, regardless of location or income level, gain access to clean energy.

“For my work within the initiative, one of the things that we think about is how we can make this clean energy transformation in a way that doesn’t just keep exacerbating inequalities, but instead tries to address them so that people can live better lives as well as being powered by sustainable energy,” says Laura Tozer, an assistant professor in the department of physical and environmental sciences at U of T Scarborough.

“We have to think about who bears the consequences and who benefits as we make this transformation,” she says.

Although solar power and wind power have become inexpensive to produce, they only produce electricity when the sun is shining or the wind is blowing. “That’s one of the biggest reasons you don’t see solar cells and wind power everywhere today,” says Brandon Sutherland, the executive director of U of T’s Alliance for AI-Accelerated Materials Discovery, and a contributor to the project. “They’re actually really cheap. But storage is too expensive.”

The carbon conversion technology being developed by CanStore Energy uses electricity to transform carbon dioxide into fuel or other chemicals. The idea is to either capture the carbon dioxide from smokestacks before it can be released to the atmosphere or pull it directly out of the air.



PHOTOGRAPHS BY DEDEDA/ALAMY



Once you have the carbon dioxide, you use clean electricity and water to make it into fuel, such as ethanol or methanol, or an economically useful chemical. This process does not contribute to net carbon emissions.

BUILDING COMMUNITY TRUST IS KEY

Kate Neville, an associate professor of environmental politics at U of T, is leading the part of the Old Crow project that focuses on community concerns. She has studied issues such as local resistance to energy proposals. The key to success, she says, is to make sure that the solution truly works for the people affected.

For instance, the Old Crow community instigated – and was fully involved with – the solar panel project. When it was suggested that the best place for the panels was in a clearing where people picked berries, the Elders pushed back. In the end, the panels were placed among the berry patches in a way that didn't destroy the patches and allowed picking to continue.

“One of the things we have seen again and again with technologies is that if communities are not involved in developing them, they often are a mismatch,” Neville says.

One of the research partners in CanStore's northern pilot project is Michael Ross (BASc 2008), the Industrial Research Chair in Northern Energy Innovation at Yukon University. He emphasizes that building trusting relationships is vital for projects to succeed. “There's a track record of snake-oil salesmen going into the North and saying, ‘Yes, we could solve these problems,’ but they don't. There's



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Solar panels in Old Crow, Yukon, are reducing the community's reliance on diesel fuel

a level of distrust,” he says, which needs to be addressed.

After the community has outlined its needs and the technologists have proposed a solution, another team will analyze the proposal to consider environmental, social and economic implications throughout the life of the project. Leading that effort is Heather MacLean, a U of T professor in the department of civil and mineral engineering and the Canada Research Chair in Sustainable Systems and Technology Assessment. Her team will look at larger systems issues, like where the carbon dioxide will come from, how much energy it will take to provide it and whether the technology is a good fit for the community. “Understanding the implications of large-scale use of these

technologies is going to be really critical,” she says.

For CanStore's pilot project in southern Canada, the researchers are considering teaming up with an industrial partner to capture carbon dioxide from smokestacks. In this case, the project could still produce net-zero fuel, but it might be more useful to create chemicals that the industrial partner could either use or sell to another company.

By the time the case studies are complete six years from now, Sinton hopes the technology will have developed to the point that it can attract investment and expand into a commercial or government solution for clean energy in all parts of the country.

In the meantime, he says the larger Climate Positive Energy Initiative will aim to develop a wide range of clean-energy solutions – always with an eye on human and societal considerations, such as who benefits from new renewable energy projects, and who suffers negative consequences from where they are placed or how they are operated.

“CanStore Energy is just a small part of what the Climate Positive Energy Initiative is going to be,” he says. “It's letting us flex that muscle, but it's just a warm-up exercise.” —Kurt Kleiner

“We have seen again and again with technologies that if communities are not involved in developing them, they often are a mismatch”

WHAT IF ... INSIGHTS FROM BUSINESS AND PSYCHOLOGY COULD STEER PEOPLE TOWARD BETTER DECISIONS?

People often make decisions that are detrimental to themselves – or society. They smoke cigarettes. They don't save enough for retirement. They neglect to get the flu shot. Researchers at Behavioural Economics in Action at Rotman (BEAR), a group that operates at the intersection of psychology, economics and management, are interested in what influences people's decisions – and how these factors can be used to nudge them toward more positive results.

Take organ donation, for example. To meet the demand for organ transplants in Ontario, we need more organ donors. But convincing people to sign up for the program isn't easy; only about a third of Ontarians have done so. Nicole Robitaille, a former PhD student with BEAR (and now a professor at Queen's University), led a study that analyzed Ontario's process for registering donors and then tested a series of low-cost changes informed by behavioural economics. The result? Enrolment rates rose 80 per cent. Here is what she and her research team did:

› **They simplified the registration form.** The previous form was long and complicated, says Robitaille. The researchers removed unnecessary information and made it clearer.

› **They tested the impact of adding prompts to the form,** such as: "If you needed an organ transplant, would you have one? If so, please help save lives and register today." The researchers tested three statements, as well as a separate brochure with information about

organ transplants. The goal of each was to trigger a desire to help, and get visitors to register as an organ donor, says Robitaille.

› **They handed out the form at the beginning of the Services Ontario visit** rather than the end. This gave visitors the chance to read and fill out the form as they waited.

Dilip Soman, the director of BEAR, says the group has worked with more than two dozen organizations, in Canada and internationally, to help them generate better outcomes on everything from vaccine uptake to pension contributions. With additional funding, he says, the group hopes to develop a science around using behavioural science. It plans to establish an open online course, build a digital lab to help organizations become more evidence-based, and develop courses in behavioural economics for undergraduate and master's students.
—Scott Anderson



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WHAT IF...

YOU COULD MAKE CONNECTIONS THAT LAST A LIFETIME?



A retired educator, **Evelyn Man** (PhD 1997 OISE), serves as a governor of the U of T (Hong Kong) Foundation.

"Volunteering with U of T is great for building lasting connections. The idea of collaboration and teamwork, and of belonging to an alumni community, are extremely important to me. No individual or institution – no matter how talented or wealthy or determined they are – will go far unless they are part of a team."



→
Student
Chen Yang
advises a new
U of T research
initiative that
aims to improve
the mental
health of
post-secondary
students



PHOTOGRAPHS BY WADE HUDSON

WHAT IF ... U OF T STUDENTS COULD HELP IMPROVE THE MENTAL HEALTH OF YOUTH WORLDWIDE?

During the fall of 2020, Chen Yang noticed that some of her fellow students were in distress. On top of the usual academic demands and personal worries, the pandemic showed no signs of ending and virtual learning was still relatively new. As someone who had struggled with her own mental health in the past, Yang – a student at the Daniels Faculty of Architecture, Landscape, and Design – tried to help friends by sharing the wellness strategies that worked for her. But there was only so much she could do. Then she heard about a chance to improve students’ mental well-being on a much larger scale.

A university-wide email arrived inviting students to support a major new research initiative focused on post-secondary student mental health. “I didn’t hesitate to take this opportunity,” says Yang, who, along with eight others, was chosen from more than 270 applicants to be student advisers for U of T’s new Student and Youth Mental Health Research Initiative. “I often felt angry, upset and powerless since my influence is so limited. I wanted to turn my

emotions into the motivation and action that would improve the mental health environment for students on campus.”

The initiative, which launched earlier this year, will produce research-based solutions to the complex challenges identified by U of T’s 2019 task force on student mental health. Created in response to a dramatic increase in Ontario post-secondary students reporting depression and anxiety and surging demand for counselling and related support, the task force recommended better access to mental health resources. In response, a redesign of campus-based services is ongoing. So far, it involves a new online portal that makes it easier for students to find mental-health resources across the three campuses, the expansion of same-day and drop-in counselling, and a new partnership with the Centre for Addiction and Mental Health (CAMH) that creates more options for students needing complex and acute care.

The task force also called for the development of a research network that includes: U of T faculty from different disciplines and staff, from across the three

campuses; CAMH and other community partners; and students. “In recent years, there has been a lot of media focus on the ongoing mental health needs of students in post-secondary institutions,” says Kristin Cleverley, chair of the research initiative and a professor in the Lawrence S. Bloomberg Faculty of Nursing. She acknowledges that the sense of alarm has been warranted. In one 2019 national survey, for example, almost 70 per cent of post-secondary students reported feeling overwhelming anxiety within the last year and about half reported feeling so depressed that it was difficult to function.

“Now we’re generating evidence to address what many are calling a crisis,” says Cleverley, who is also the CAMH Chair in Mental Health Nursing Research. “To my knowledge, this is the first time a university in Canada has put focused resources into studying post-secondary mental health at this scale. And we’re taking the innovative approach, at least in this subject area, of conducting every step of the research with students. From formulating the questions to disseminating the findings, they will be partners.”

There is a research gap on the unique mental health needs of post-secondary students, says Andrea Levinson, the initiative’s clinical lead and the director of psychiatric care at U of T Health and Wellness. “We’ve relied on youth mental health research, which is relevant, but it doesn’t account for the interface with education. And there hasn’t been dedicated time and infrastructure to bring together researchers committed to student mental health with frontline professionals and students themselves. Now we’re creating a central hub to funnel great ideas and fund key projects.”

Lexi Ewing, another student adviser and a PhD candidate at the Ontario Institute for Studies in Education, belongs to a new

Kristin Cleverley,
chair of the Student
and Youth Mental Health
Research Initiative



generation of researchers exploring post-secondary student mental health. “There’s not a great understanding of what determines students’ risk and resiliency for the development of mental health concerns,” says Ewing, whose thesis is investigating how students cope with the transition to university, stressful events in college and university settings, and the effect of those coping behaviours on their well-being. “I’m especially interested in the first year of school, when we often see a decrease in mental wellness. I had a hard time then, and I want to know why this happens and



Emma McCann is
the initiative’s
engagement lead

how we can support others who are having that same experience.”

Cleverley asked colleague Emma McCann (BSc 2019 UC) to act as a liaison between the faculty working on the project and the student advisers, to ensure the students have the knowledge and resources they need to contribute on an equal footing. McCann says students are vital to the research process because they help researchers ask the right questions. “They can tell us which campus mental health issues are most important to them, where they’re going for help, what’s working and what’s not, and what’s missing.”

The student advisers include domestic and international students from a range of academic backgrounds on all campuses. Yang says it’s crucial to consider the distinct challenges – from language barriers to the strain of being separated from family – of international students such as herself in any research. “I know



personally that these things can be overwhelming and can hold someone back from seeking help.”

The students’ backgrounds in mental health are also varied. Some have sought mental health services for themselves or others; some have conducted research in the field. Despite this diversity, however, McCann acknowledges that no single group can speak for all U of T students. “Our current focus is building connections in the broader student community – including recent alumni – and creating multiple routes to shape the research,” she says. This may involve surveys, focus groups or community forums. “Not everybody wants to raise their hand and say, ‘Hey, I’m struggling with my mental health,’” says Cleverley. “So, one avenue of research will be evaluating the effectiveness and cultural appropriateness of these and other methods of getting students’ perspectives on mental health.”

Other research priorities include the impact of socio-economic factors (such as financial security and access to social support) on students’ mental health, and the distinct mental health needs of students at key moments in their academic careers. The pandemic has also raised many issues for future investigation, says Levinson. “We need to increase our understanding of the role of in-person versus online support, for example, and how to foster social connection during lockdowns.”

Students have already influenced the direction of the initiative in several ways. “They’ve told us that we need to cover the continuum from mental wellness to mental illness,” says McCann, “and they’ve consistently underscored the importance of making sure the research reflects the student population’s diversity on all fronts.”

Beyond adding students’ voices to the conversation, the initiative is designed to offer them professional development and training



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PhD candidate Lexi Ewing is investigating how students cope with the transition to university

opportunities at the local and international level. Cleverley recently received a Connaught Global Challenge Award for a project that will build a global research network on student mental health and fund international training, such as exchanges, for students. “We’re aiming to transform the landscape of student mental health research worldwide,” says Cleverley. “U of T is positioned to do that because of our size, our diversity, our internationally leading researchers and student affairs professionals, and our students, who are driven to be part of positive change.”

Ewing says she looks forward to more students hearing about the initiative in the year ahead and getting involved. “I hope they see that this is rooted in true compassion and wide recognition of the need to strengthen mental health not just for – but with – students.” —Megan Easton

WHAT IF...

HAVING A SEAT AT THE TABLE WAS JUST THE START?



Solomon McKenzie (JD 2019), an associate at McCarthy Tetrault, volunteers with the Black Future Lawyers program at U of T Law.

“Traditional models of inclusiveness have focused on giving diverse groups of people seats at the table. But real inclusivity means more than that: it means making sure they feel comfortable at the table – and want to stay at the table. It’s important to me to invest my time in programs such as Black Future Lawyers that not only talk about getting folks into law school but also make sure they thrive there.”

WHAT IF ... WE COULD PREVENT THE NEXT PANDEMIC?

While many researchers remain focused on bringing the COVID-19 pandemic to an end, Scott Gray-Owen, a professor of molecular genetics at U of T, has his sights set on preventing the next one.

Gray-Owen is the inaugural director of a new, forward-looking initiative at U of T called the Emerging and Pandemic Infections Consortium (EPIC). Its aim is to combat new infectious diseases and prevent the rise of future pandemics. “COVID showed us a lot of weaknesses in our understanding of and response to infections,” he says. “It’s important we keep focused on the health burden that infectious diseases cause, even after the pandemic ends.”

Typically, with the outbreak of a new disease, governments make significant investments in public health and research. When the crisis appears to be over, attention and resources shift elsewhere. This happened following the outbreak of severe acute respiratory syndrome (SARS) in 2003 and left us poorly prepared for COVID-19, resulting in the staggering loss of lives and livelihoods that we’ve seen, says Gray-Owen. He hopes the creation of EPIC will help prevent this from happening again.

The seeds of the new consortium were planted more than two years ago during the initial days of the pandemic. In early 2020, as cases of COVID-19 began to pop up across Canada, Gray-Owen, who is the academic director of the Combined Containment Level 3 Unit, a biosafety facility at the Temerty Faculty of Medicine, started fielding inquiries from researchers across Toronto about using the lab to study the biology of SARS-CoV-2, the virus that causes



“If we can understand the processes within human cells that viruses rely on to survive, then this could open up new ways to defeat them”

PHOTOGRAPHS BY NATHAN CYPRIYS

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Jessica Lam checks cell culture flasks at U of T's high containment biosafety facility



COVID-19. Some, such as clinicians and public health experts, wanted to figure out how to treat the disease and predict how the pandemic would unfold.

“It was a very scary time,” Gray-Owen says. “And a lot of eyes looked to us.”

From his unique vantage point, Gray-Owen began to see how the lab could form the heart of a co-ordinated effort among U of T and its hospital partners to help Canada stave off dangerous infections in the future. He recognized the potential to bring together everyone from cancer researchers to policy-makers – and the next generation of student researchers – to study the lessons of COVID-19 and think about infection more broadly. “During the pandemic, anyone who wanted to work with the virus or test a drug came to us to support their research,” says Gray-Owen. (EPIC’s hospital partners include the Hospital for Sick Children, Unity Health Toronto, Sunnybrook Research Institute, University Health Network and the Lunenfeld-Tanenbaum Research Institute at Sinai Health.)

As the pandemic progressed and activity at the lab broadened and intensified, Gray-Owen’s idea for EPIC coalesced around what he saw as three main priorities: investigating the biology of disease-causing microbes and how human cells respond to infection; supporting research in clinical settings to help scientists and company partners develop effective treatments for patients; and ensuring that underserved communities don’t suffer disproportionately from new infections in the future.

A virus is essentially a snippet of genetic code – a microscopic organism that replicates by infecting a host’s cells. Countless millions of viruses exist, but only about 220 are known to infect humans. Scientists have been studying many of these viruses for decades but only recently have they had the advanced tools needed to understand these organisms at a molecular level. As a result, many fundamental questions remain about their biology and how they infect human cells. One of EPIC’s goals is to support investigation of each step of a virus’s life cycle. What is happening at the molecular level when a virus invades a cell?

Which parts of a human cell are critical for a virus to replicate? If we can understand the processes within human cells that viruses rely on to survive, then this could open up new ways to defeat them, says Gray-Owen.

To accomplish this mission, he sees the consortium as a big tent, bringing together scientists who study topics that may not, at first glance, relate to microbiology. Take cancer researchers. They don’t study viruses or bacteria but are very interested in how cells work and what goes wrong to cause them to reproduce uncontrollably. This knowledge has proven useful in understanding how a virus such as SARS-CoV-2 infiltrates a cell’s defences – and could eventually allow us to repurpose existing cancer or other drugs against a viral infection, says Gray-Owen. “That’s really exciting because those drugs are ready to use. They don’t have to go through toxicity studies or clinical trials.”

Gray-Owen sees other opportunities for EPIC to collaborate with U of T researchers on the fundamentals of cell biology. Alan Cochrane, a professor of molecular genetics, has been studying the process by which human cells use RNA to make proteins – and how HIV harnesses this system to replicate itself. Cochrane has identified a molecule that changes the RNA processing system in a way

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Prof. Scott Gray-Owen, director of U of T’s Emerging and Pandemic Infections Consortium





that suppresses HIV’s ability to replicate, without causing harm to the cell. It turns out this same technique works with coronaviruses and influenza viruses, suggesting an avenue to create antiviral treatments that work against multiple viruses – including, potentially, ones we don’t yet know about.

EPIC is also helping to develop therapies that tackle the manifestations of infectious disease. As was discovered early in the pandemic, SARS-CoV-2 can cause the body’s immune system to overreact and attack its own healthy cells and vital organs. One approach to treat this is with steroids, which help patients by “turning down” the immune system. The challenge is that you don’t want to impede the immune response when it’s needed to fight off an infection. “The question is how can we precisely turn down the disease-causing components of the immune system, but still allow the parts of the immune system that are effective at controlling the virus to remain fully operative,” says Gray-Owen.

EPIC is working with Edesa Biotech on a solution. The Toronto-area company, led by alum Michael Brooks, is developing a drug that dampens the body’s overly aggressive immune response to bacterial infections in the blood. The drug has been found to have a protective effect against some viral infections, and EPIC is now investigating its effect on SARS-CoV-2 infection. Says Brooks: “For

us, U of T was an obvious place to go.”

Besides Edesa, the consortium is working with about a dozen organizations, says Gray-Owen. Recently, his team at the high containment lab tested the efficacy of masks with an antimicrobial coating for a Canadian company specializing in microbe-killing technology. “These kinds of partnerships will enable us to help translate made-in-Canada technologies from the lab into our hospitals and communities,” he says.

New treatments and interventions such as these bolster the pandemic

toolbox – but whom do they actually help? Dr. Sharmistha Mishra, an assistant professor in the department of medicine and an infectious disease epidemiologist and mathematical modeller with Unity Health, investigates why epidemics behave differently in different parts of the world. She believes we need to address the reasons why some communities fared worse than others against COVID-19 and how biases in research and health care can amplify health inequities during pandemics.

“We need to be critical about what we did, what worked, what didn’t and why – and for whom. Who was doing the decision making? Who was doing the epidemiology and the modelling?” she asks. “Participation, equity and social justice have to be the next steps forward in pandemic science.”

When Gray-Owen thinks about the future of EPIC, he admits he sees a variety of potential threats: an avian influenza virus crossing over into humans, tick- and mosquito-borne infections such as Lyme and Zika disease, bacteria that are fully resistant to antibiotics. “We can’t let our guard down.” But, he adds, hopefully, “We have the experts to solve these problems. The COVID-19 pandemic has been devastating. And yet science saved us.” —**Catherine Annau**



WHAT IF ... NO STUDENT EXPERIENCED FINANCIAL HARDSHIP WHILE ATTENDING U OF T?

As director of the Master of Science in Sustainability Management program at U of T Mississauga, Prof. Shashi Kant has seen up close how some students have struggled during the pandemic with lost employment or income. He became concerned: how would they pay rent and put food on the table? He wondered how he might support students as they navigate these challenges.

So last year, he made a donation to create the Equity and Diversity Award, which grants \$2,500 annually to one student in the Master of Science in Sustainability Management program. Because he wanted the award to go to students for whom it would make the biggest difference, he stipulated that financial need – not academic merit – be the main qualifying criterion.

For Kant, sustainability is rooted in love for the planet and all living things. He says taking care of each other is how we achieve social progress. “Love and sustainability are two sides of the same coin. You cannot do sustainability unless there is love,” says Kant.

Kant understands that fostering Canada’s next generation of sustainability leaders also requires being inclusive. He observes that the United Nations’ sustainable development goals include inclusive and equitable

quality education for all. To attract students from a wide range of backgrounds, Kant structured the award to also give preference to students who are Black or Indigenous or who are registered

with UTM’s Accessibility Services office. “A diverse mix of voices and perspectives is essential to address climate change and create a sustainable world,” he says.
—Sharon Aschaiek



ILLUSTRATION BY CHOI HAERYUNG

WHAT IF...

EVERY STUDENT HAD A MENTOR?

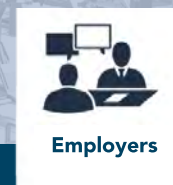


Jim Hartley (BA 1980 UTSC) is a mentor in U of T Scarborough’s Partners in Leadership Program.

“When a student says to me, ‘I never thought about it that way,’ or ‘I appreciate your perspective’ – these words are very nice to hear. They make me feel that my advice has been useful. Sometimes mentoring also prompts me to think in a different way about my own life experiences.”

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WHAT IF ... WE DID MORE TO SUPPORT BLACK SCHOLARS?



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Prof. Caroline
Shenaz Hossein
studies informal
banking arrangements
within Black
immigrant communities

Hossein, an associate professor of global development and political science at U of T Scarborough, has spoken with hundreds of members of these associations in Canada and the Caribbean for a book she's writing. (In Jamaica, the associations are known as "pardnas" and, in Trinidad, "susus.")

As a child, Hossein remembers her parents pooling resources with some Caribbean friends another way – by sharing goods. "Being a new immigrant can be a lonely time," she says. "You rely on your community to get through."

Associations such as pardnas and susus follow a variety of formats, she explains. One example: Each month, every member contributes the same

sum, and one person receives a payout of the total collected that month. For example, if there are 15 people each paying \$200, then each month, one person in the group receives \$3,000. This continues for 15 months – until each person has received one payout. It's like a forced savings plan.

For immigrants to Canada from Africa and the Caribbean who can't get access to traditional loans, the answer to their financial needs is sometimes each other. A group of acquaintances will come together to create what

is essentially an informal banking co-operative.

To academics, this practice is known as a "rotating savings and credit association" or ROSCA. The groups are little-known to most Canadians, but Caroline Shenaz

ROSCAs don't always function perfectly says Hossein, but they are more than transactional, operating as a kind of mutual support system built on camaraderie and trust. "They give people a place to discuss the issues of the day, but also to attend to their financial needs so they can realize their life goals," she says. "Yes, you're taking care of your own household, but you're also assisting one another."

Hossein observes a similar sense of mutual benefit and community-building behind a new Black scholars' group at U of T that aims to support research like hers.

Launched in late 2021, in the echo of a global reckoning on race, U of T's Black Research Network aims to promote Black excellence at the university and enhance the research capacity of Black scholars. The organization, which is open to Black-identified faculty, students and librarians, is still ramping up, but Hossein says she already finds it offers a "safety net" of like-minded intellectuals "who are pushing against the norms of how we do research" and providing recognition "when mainstream systems ignore us."

Beth Coleman, founding director of the Black Research Network and an associate professor of data and cities at UTM's Institute of Communication, Culture, Information and Technology and at the Faculty of Information, says the network was created with four goals in mind: to support research excellence, provide mentorship and training opportunities, foster collaboration and a sense of community, and fund new research.

She says the network will also help diversify academic culture at U of T – to the benefit of the university and society more broadly. "Monocultures do not produce the insights or innovations, or the societies we want to live in," she

says. "Diversity drives innovation."

The network recently received \$250,000 from U of T's Connaught Fund to support Black-led research addressing global challenges. It continues to build relationships with other granting organizations to support future research.

It is also holding events to promote a sense of community among its 1,000-plus members. In January, the network teamed up with U of T's Women and Gender Studies Institute to host a virtual read-a-thon in honour of bell hooks, the late author and academic. Guest readers from across the academic world took



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Prof. Beth Coleman,
director of the Black
Research Network

turns reading their favourite passages from hooks' oeuvre. "We honoured this radical Black thinker who had touched the lives of everyone in that room – and countless others beyond," says Coleman, "And we built community with each other."

As with the ROSCAs, building that sense of mutual support is integral to the network's mission; in future, says Coleman, it will include everything from brown bag lunches with fellow members sharing their research, to speaker series and conferences – and an annual gala.

For Hossein, there's comfort in belonging to a group that intuitively "gets" her and her research interests. "When you have an amazing group of Black intellectuals at U of T, it's quite profound to be in that space," she says. "I don't have to justify why I'm looking at critical economics through the lens of Black feminist theory. They all understand why lived experience – and why the African diaspora experience – matter." —**Raqueal A. Russell**

WHAT IF...

ALUMNI OF ALL AGES GOT INVOLVED WITH U OF T?



Andria Allen (MSW 2005) is president of the Factor-Inwentash Faculty of Social Work's alumni association and has served as a member of the faculty's diversity and equity committee.

"After you graduate, it's easy to get caught up in your career. Coming back feels like a reunion. It's been an honour to meet people who graduated 20 or 30 years before me and find out they are still motivated to be involved with the faculty. We've had people at some of our events who are in their 80s. It's so exciting to see them alongside the next generation of social workers."

WHAT IF ... WE COULD BUILD ROBOTS FOR ALMOST ANY PURPOSE?

With micrometre-level precision, today's factory robots can assemble thousands of components into a powerful electronic device such as the phone in your pocket. They can perform these intricate and repetitive tasks with great dexterity – in highly controlled settings such as manufacturing plants.

But the world is bigger – and more unpredictable – than a factory floor. Tomorrow's robots will need to be able to adapt on the fly to changing real-world situations. Consider an autonomous vehicle trying to drive safely through a sudden snowstorm, or search-and-rescue robots seeking earthquake survivors in difficult and shifting terrain. Advances in AI have enabled computers to better understand what they “see” and “hear,” but many challenges remain.

“These are tough problems, but also really exciting ones,” says Hallie Siegel, the associate director of strategy and operations at U of T's Robotics Institute. Established in 2019, the institute connects about two dozen faculty members, making it one of Canada's largest research and innovation hubs for robotics and related fields such as AI, controls and sensors. With undergraduate and graduate degree programs, the institute also serves as a training ground for the next generation of robot innovators.

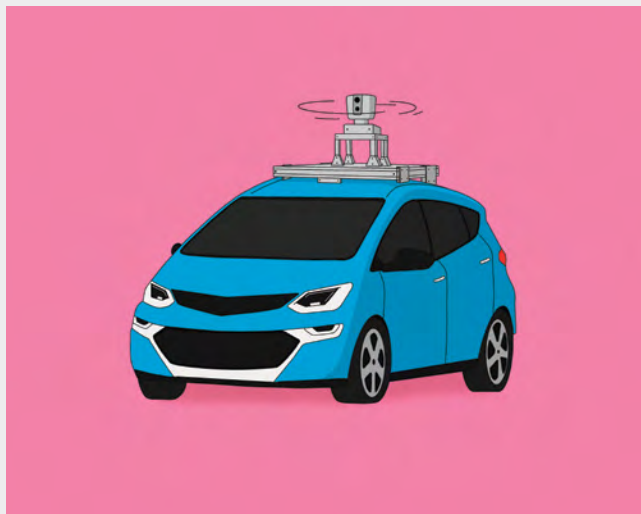
“There is a lot of fundamental research happening in robotics at U of T right now,” says Siegel. “Our faculty and students are working on some of the most challenging questions in the field.”

Here are six ways U of T scientists are helping to advance robotics.



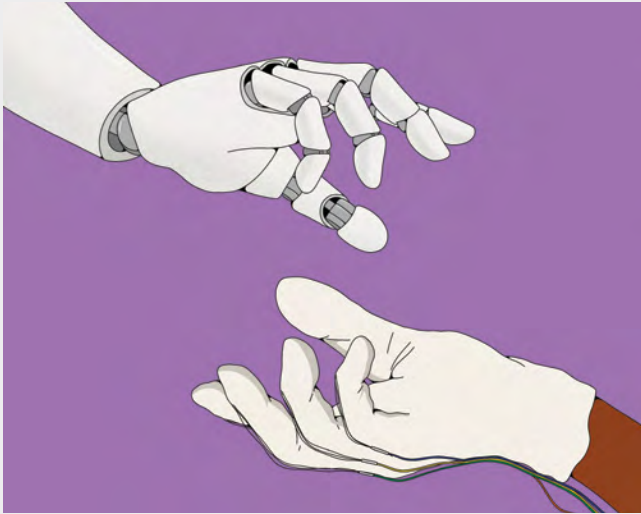
ROBOTS THAT LEARN FROM EACH OTHER

In controlled environments, robots can perform intricate tasks, but they are less adept in situations they have not been programmed for. Animesh Garg, an assistant professor of math and computer science at UTM, wants to help build robots that can perceive and adapt to new circumstances so they perform better in the real world. Garg is crowdsourcing datasets of successful robot operations in numerous environments, and using an algorithmic approach called “imitation learning” to enable robots to learn from each other. If a robot programmed to operate in a kitchen finds itself in an unfamiliar place, it can learn from the experience of a robot that has operated in a similar context in the past.



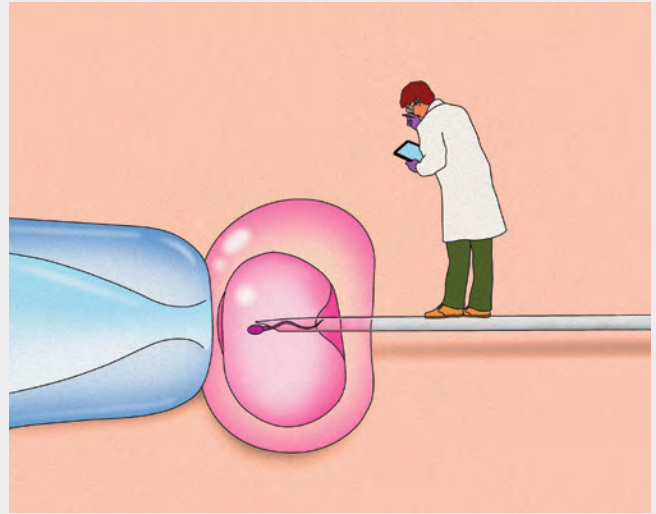
AUTONOMOUS VEHICLES THAT WORK IN ANY WEATHER

Autonomous vehicles will need to “see” and react appropriately to cyclists, pedestrians and other cars with perfect accuracy – even in difficult road conditions such as dense fog, blowing snow or torrential rain. Steven Waslander, an associate professor at the Institute for Aerospace Studies, is using AI to improve how cameras see “through” the weather. By combining this technology with other sensors, such as Light Detection and Ranging (LiDAR), Waslander is able to improve the identification of hazards on the road, even in low-visibility conditions that can cause other sensors to fail.



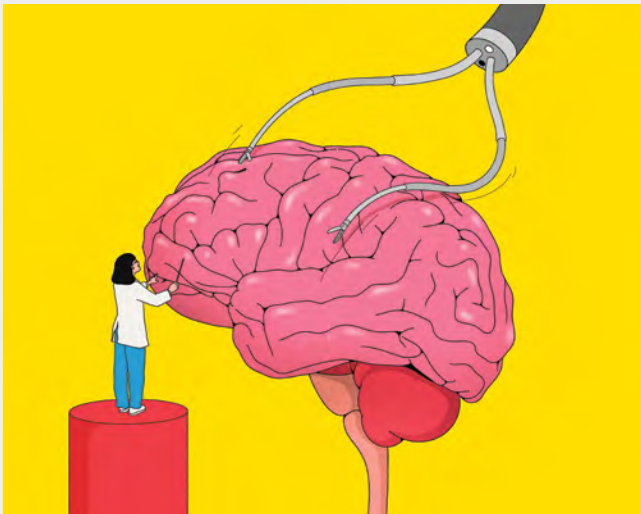
ROBOTIC “SKIN” THAT COULD AID IN REHABILITATION

Traditional robots are made of rigid materials such as steel and hard plastic, but softer materials could help usher in a new generation of robotic technologies worn directly on the human body. Xinyu Liu, a professor of mechanical and industrial engineering, uses stretchable soft plastics to create a novel kind of robotic skin. “iSkin” can convert physical movement into electrical impulses, which allows it to monitor vital signs and measure the body’s range of motion. It can help track injury rehabilitation more precisely, and in the future, might be used as part of exoskeleton suits that provide extra support to muscles and speed up rehabilitation from injuries or strokes.



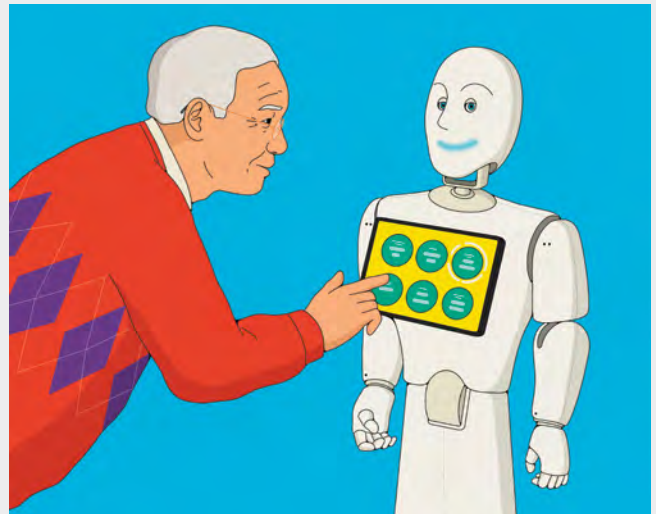
A ROBOTIC SYSTEM TO BOOST THE SUCCESS OF IN VITRO FERTILIZATION

In vitro fertilization is a complex – and often unsuccessful – procedure that can cost tens of thousands of dollars. (Fewer than a third of all IVF treatment cycles lead to a live birth.) Yu Sun, the director of U of T’s Robotics Institute, is using robotics and AI to improve this success rate. He has developed a computer vision algorithm and AI to select sperm with the least damaged DNA (based on parameters from the World Health Organization). Once this single sperm cell is selected, his robotic system immobilizes it and draws it into an extremely fine needle. An ultra-precise robotic hand then inseminates the sperm into an egg through repeated, gentle taps on the egg’s elastic membrane – like a minuscule woodpecker tapping on the bark of a tiny tree.



TINY ROBOTS TO ASSIST WITH SURGERY

Surgeons already use robotic assistance to eliminate hand tremors when performing open heart surgery, but Eric Diller, an associate professor of mechanical and industrial engineering, is working on tiny robots that could soon be used to make brain surgery less invasive. He is developing a gripper robot that is only a few millimetres wide that can be controlled wirelessly with electromagnets. Inserted through a small borehole in the skull, the robot can grasp, pull and cut, and one day could be used to remove some brain tumours, for example, or deliver targeted epilepsy treatments – speeding recovery time and lowering costs.



SOCIAL ROBOTS TO HELP SENIORS LIVE INDEPENDENTLY

Dementia is often a factor when people transition into long-term care, but robots can help seniors age in the comfort of their own homes. Goldie Nejat, a professor of mechanical and industrial engineering and the Canada Research Chair in Robots for Society, is developing socially assistive robots designed to prolong independent living. Nejat’s in-home robots can help seniors get dressed, exercise and play memory games. Her team has also developed a social robot that assists older adults in the kitchen by suggesting recipes and meal preparation steps, and even reminding them of where the ingredients are stored.

Discovery Pharmacy is a new accredited pharmacy on the St. George campus that supports hands-on learning for students
↓

During the pandemic, pharmacies have become community hubs for distributing personal protective equipment and testing kits, as well as for administering vaccinations. But well before COVID-19 emerged, U of T's Leslie Dan Faculty of Pharmacy was already re-envisioning the role of pharmacies in Canadian health care and determining what this means for how it trains pharmacy students.

Last October, the faculty launched the Discovery Pharmacy, an accredited community pharmacy located on the third floor of the faculty's St. George campus building that provides hands-on learning for students and conducts research into best pharmaceutical practices. The facility, which is the first of its kind in Canada, is training future pharmacists to do much more than dispense medication, says Lisa Dolovich, the faculty's dean. It is helping them become key members of health-care teams who focus on disease prevention and management, and health promotion.

"Because pharmacists have become much more involved with patient care than they used to be, we wanted to create a centre for experiential teaching, research and development and holistic care – where new ideas can be developed and refined in the real world of patient care," Dolovich says.

Guided by pharmacy and other health-care professionals from U of T's partner



hospitals, students benefit from hands-on training in everything from consulting with patients to developing care plans. They learn in collaboration with students in other U of T health sciences programs, such as medicine and nursing, as well as those in disciplines such as business and engineering.

"I think it's a really great concept,

because we have the opportunity to test new ideas and prepare for how the profession is evolving," says student Dina Carovska, who completed a five-week rotation at the pharmacy this past winter that involved giving COVID-19 and flu shots. "We could think critically about every step."

Discovery Pharmacy will eventually move to a permanent site on the faculty's main floor, where it will offer U of T community members in-person and digital services such as support for quitting smoking, mental health programs and reproductive health care.

As part of its research mission, the Discovery Pharmacy will investigate how to provide health-care services in the safest, most effective and cost-efficient way, including the impact of virtual care in medication management and delivery. Says Dolovich: "We are imagining the pharmacist of the future, in the hope of achieving improved health for everyone." —Sharon Aschaeik

WHAT IF ... WE REIMAGINED THE ROLE OF PHARMACISTS IN CANADIAN HEALTH CARE?

RENDERING BY NAVEEN SOBTI; END DESIGN; PHOTOGRAPHS BY (RIGHT BOTTOM) COURTESY OF KARLIE NORDSTROM; (RIGHT TOP) ISTOCK

WHAT IF ... INDIGENOUS PEOPLES HAD A GREATER SAY IN THE LAW?

Originally from Treaty Six territory in Saskatchewan, Karlie Nordstrom is now in her final year of a law degree at U of T. She spoke recently with *University of Toronto Magazine* about why she wanted to attend law school, the importance of Indigenous representation in the legal profession, and why the financial support she received from the Norman and Gay Loveland Bursary for Indigenous students was so helpful.

“My undergraduate degree was business.

To finance my degree, I worked as a server in bars and restaurants, where a lot of women face harassment. At the same time, I was taking some employment law courses. The juxtaposition between what I was learning and what the law looks like on the ground in that industry fascinated me.

“When I first decided to go to law school,

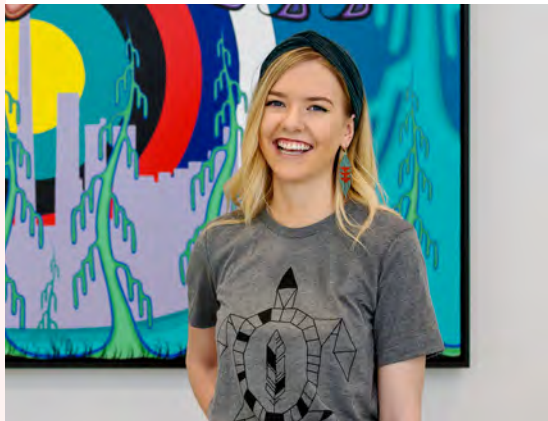
U of T wasn't an option for me. Money had always been tight when I was growing up. U of T Law's financial aid program is the only reason I was able to consider coming here. I'm so grateful to the Lovelands for the bursary.

There is an immense need for support for Indigenous students because many of us can't afford a university education. It's important for the field, too. The law has a complicated

relationship with Indigenous people and communities. It's huge for Indigenous people to attend law school and be able to potentially change the legal profession.

“A lot of the challenges that Indigenous people face today are because of the law.

The law played a major role in colonialism – and still does. Regardless of where you fit into the legal profession, your work will affect Indigenous people, so I think there's a responsibility to be well versed in the issues. Even in business law, where I intend to practice, it's relevant. Infrastructure projects or resource development projects massively affect Indigenous people, for instance. And it's important to know how your own role in the legal system affects Indigenous people.”



WHAT IF ... MORE PEOPLE UNDERSTOOD THE IMPACT OF CLIMATE CHANGE ON BLACK COMMUNITIES?

Elementary school children in Ontario are learning about the science of global warming, but Fikile Nxumalo, an assistant professor at OISE, thinks they may be missing an important piece of the climate change picture: its effects on health and well-being, particularly in Black communities.

Studies have shown, for example, that Black and immigrant neighbourhoods tend to be in parts of Toronto that lack easy access to green space and record higher levels of air pollution. Drawing from her own experience, Nxumalo says her grandparents' farm in her native Eswatini (formerly Swaziland) is experiencing more frequent drought conditions – likely due to climate change.

To get a better sense of the environmental concerns of Black families in Toronto – and of how the families interact with the natural landscapes around them – Nxumalo is planning to hold focus groups with Black parents of young children. She will encourage them to bring photos of themselves at parks, waterways and lands that are meaningful to them, and will ask what environmental issues trouble them most. She also wants to know how the parents would like to see these issues reflected in their children's environmental education. Nxumalo's research is funded by U of T's School of Cities. Karen Chapple, the school's director, says the research will help cities grow and adapt to climate change in a way that is more equitable and just.

According to Nxumalo, Ontario's curriculum lacks an understanding of how Black communities interact with the natural environment. She points to groups such as the Toronto Black Farmers and Food Growers Collective to demonstrate that Black communities have a strong connection to and deep concern for the natural spaces around them. While her research focuses on Toronto, Nxumalo believes the findings could be applied to cities across Canada.

She hopes her work will help ensure that Black families are better represented in learning materials about climate change.

—Andrea Yu

WHAT IF...

ASPIRING
ENTREPRENEURS
COULD LEARN
FROM ALUMNI
BUSINESS
OWNERS?



Nuha Siddiqui
(BCom 2018 UC),
CEO of Erthos,
speaks at events
hosted by U of T
Entrepreneurship
and the Rotman
School of
Management,
and serves as
a resource for
other young
entrepreneurs.

“Starting a business while attending U of T taught me that university was the best time to take a chance. I share with students my perspective that building your own startup is a viable career. And if you’re not ready to start a business now, there are always opportunities to join other incredible Canadian startups.”

WHAT IF ... WE MADE BETTER USE OF COMPLEX DATA TO GAIN VALUABLE INSIGHTS ABOUT THE WORLD?

Data, data everywhere – but what to do with it all? While today’s technologies are very good at generating data, they’re not so good at analyzing it – especially massive volumes of it. For instance, powerful new telescopes will soon create more data each year than the entire internet. How do we turn all that data into information that can guide discovery in many different fields, from health care to astrophysics?

That’s where data science comes in. Data scientists are specialists who identify which real-world questions need answers in a certain field, analyze and validate the relevant data from various sources, and interpret meaning from it. They do this by developing and using mathematical, statistical and computational tools, including artificial intelligence. Then, acting as bridges, they communicate their findings to the experts in the field. For instance, data science could help an oncologist decide which of several cancer therapies would be most likely to benefit an individual patient, an urban planner improve traffic flow in a major city, or an environmental scientist predict the impact of climate change in a particular region.

To this end, U of T launched its new Data Sciences Institute last September, with an aim to create and fund collaborative research teams and connect them with statisticians and other computational experts. Barely half a year old, the institute already has a membership of

more than 800. Members include those with a primary appointment at one of U of T’s three campuses or its hospital partners, as well as students, research associates and trainees who will ultimately form the next generation of data scientists. “The Data Sciences Institute will offer so much opportunity for collaboration and integration, in life sciences, physical sciences, social sciences, humanities and other fields,” says Lisa Strug, the institute’s inaugural director and a professor in the departments of statistical sciences and computer science. “It’s a recipe to make huge advancements, blowing open doors across all kinds of different domains.”

The institute will emphasize two main themes. The first is inequity, which has been an issue in fields such as medical research. For instance, precision medicine uses data generated from genome samples to create tools that can be used to predict risks for specific diseases, discover new drug targets and tailor treatments. Here’s the problem: a large majority of genomes that have been studied come from people of European descent, since the biggest genome-sequencing efforts are based in Europe and the United States. But more than half the residents of Toronto are *not* of European descent – nor is the vast majority of the world’s population – which means that these powerful new tools may not work as well for them.

Systemic inequities affecting historically oppressed people have fuelled

ILLUSTRATION BY CHOI HAERYUNG

some people's mistrust of institutions and research, making efforts to diversify this data challenging. Strug, who is also a senior scientist at Toronto's Hospital for Sick Children, believes one solution is to empower marginalized groups to drive the research process; the institute aims to support research projects with these communities. "To make sure no Canadians are left behind, we must diversify the data we use to develop these health-care tools."

The institute's second theme is reproducibility, which is a kind of quality control for research studies. It involves the ability to take a published study and reproduce it using the same computational methods as the original, in order to validate the findings, ensure the

"To make sure no Canadians are left behind, we must diversify the data we use to develop health-care tools"

research is sound and build upon it. But the original researchers are not always transparent about their approach. "They don't share the computer code, they don't share the data they use to build the models, and they don't share the models themselves," says Benjamin Haibe-Kains, a professor in the department of medical biophysics and a senior scientist at Toronto's Princess Margaret Cancer Centre. It's sometimes possible to

reproduce a study without that information, but it's time-consuming. "What should take you an afternoon becomes a six-month project, and that is a massive waste of resources."

Sometimes the lack of transparency is due to researchers wanting to protect intellectual property, but often it's because they simply don't know how to make their code reproducible. It's a complex process requiring expertise that

many labs don't have, says Haibe-Kains, who's co-leading the Data Sciences Institute's reproducibility theme. To address this, the institute is organizing educational workshops to help labs take the first steps toward making their research transparent and reproducible, which will benefit the entire global scientific community.

Haibe-Kains, who is a cancer researcher, is eager to see how the Data Sciences Institute will link the research world with the clinical world. He envisions a day when a cancer patient and a clinician can confidently go ahead with a specific drug therapy, knowing that a wealth of high-quality data from diverse sources is driving the decision for that particular patient's age, ethnicity, gender and type of tumour. "Ultimately, when I see that a product of my work will help the patient, that's going to be the peak of my life," he says. "I'm super excited to get the data and the predictive models into the hands of the clinicians and ultimately into the hands of the patients, because there's no reason patients shouldn't have access to those predictions as well." —**Marcia Kaye**



WHAT IF ... ADVANCES IN ARTIFICIAL INTELLIGENCE LED TO A BETTER FUTURE FOR ALL?

Artificial intelligence already powers countless computer applications. As the technology evolves, Gillian Hadfield, the director of U of T's Schwartz Reisman Institute for Technology and Society, wants to ensure that it does so in ways that benefit society. She spoke recently with *University of Toronto Magazine*.

Could you elaborate on the challenge you see with AI?

How well modern societies serve human goals is a function of the billions of decisions people make every day. We use regulated markets and democratic processes to try to ensure that these decisions are good for everyone. The challenge we're facing with rapidly advancing powerful technologies like AI is that we're starting to let machines make many of those decisions – such as sifting job applications or helping doctors diagnose and treat disease. The promise is that machines can help us make better decisions.

But machines powered by AI are not like people. It can be hard to understand why they make the decisions they do. They can see patterns we don't see, which makes them potentially so helpful. Yet this also makes them harder to regulate. We can write rules that hold people and organizations accountable. But the rules we write for humans don't easily translate to

machines – and that's the challenge: how do you get a machine to do what we – society – want it to do?

Can you not program an AI to act in a way that aligns with societal values?

This challenge makes engineers scratch their heads. They would happily encode society's values

into their machines, but societies don't have lists of values to give them. We have diverse and evolving views. That's why we have complex ways of deciding which values we'll pursue in any context – who gets to decide if there will be a mask mandate or how safe a vaccine must be.

The question is how do you ensure that AI is responsive to the



Gillian Hadfield,
director of
U of T's Schwartz
Reisman Institute
for Technology and
Society

←

choices we're making as a society? We don't yet know how to build that kind of AI. We could pass legislation that says, "AI must be fair." But what does that mean? And how would we determine if an algorithm is behaving the way we want it to?

What do you suggest?

We need technologies that can help us achieve our regulatory goals. We may want to ban content on social media that's harmful for children, but how do you check billions of posts every week? As a regulator, you can't send in an army of computer scientists to identify where in the company's algorithm it allows content that's harmful to children. But a technology such as another AI could constantly monitor the platform to see whether harmful content is spreading. I call this "regulatory technology."

Facebook has hired thousands of people to remove posts that violate its guidelines. Wouldn't it be in Facebook's interest to develop this kind of technology?

They *are* building this technology. But here's the key point: why does Facebook get to decide what to remove and what to keep? What if removing the harmful content causes its advertising revenues to drop? Will it act in Facebook's interest or in society's interest?

We need regulatory technologies to be built by entities other than the ones that will be regulated by it. We want to ensure that Facebook is balancing advertising revenues against online harm

in a way that meets society's guidelines. The virtue of a regulatory market like this is that government sets the goals. That balance between revenues and harm is set by our democratic processes.

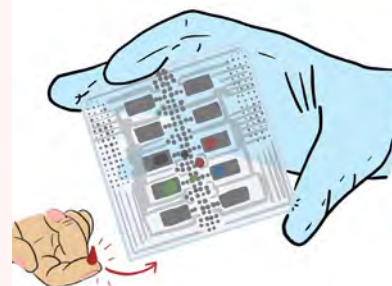
Wouldn't building regulatory technologies require big tech companies to reveal their "secret sauce"? Would they?

This is the radical part. Yes, it will require tech companies to share more information than they currently do. But we need to redraw those lines. Those barriers around proprietary information are something legal thinkers invented at the beginning of the industrial revolution. It was originally intended to protect customer lists or the recipe for Coca-Cola. Now we just take it for granted.

We need to rethink public access to the AI systems inside technology companies because you can't buy the AI and reverse engineer it to figure out how it works. Compare it to regulating automobiles. Government regulators can buy cars and put them through crash tests. They can install airbags, measure what difference these make, and then require them as standard equipment in all new cars. We don't let the car manufacturers say, "Sorry, we can't add airbags. They're too expensive."

What do we need in order to build these regulatory technologies?

Lots of smart entrepreneurial people are starting to think about how to build AI that tests to make sure an algorithm is fair, or AI that enables people to curate their social media content to be healthy for themselves and their communities. We need our governments to get focused on how to nurture these technologies and that industry. We need to work collectively to fill in the blanks in our regulatory infrastructure. Once we build this shared infrastructure, we can all focus on building our organizations in a way that improves life – for everyone.



WHAT IF... WE COULD TREAT HEART FAILURE REMOTELY?

If you're among the one million Canadians living with heart failure – a weak or damaged heart from a heart attack, high blood pressure, disease or a defect – you know how important it is to be monitored regularly. But this can be challenging if you live in a remote area, where getting bloodwork done or seeing a specialist could mean lengthy travel, delays in treatment and poorer patient outcomes.

Now imagine if you had a compact device that, with a tiny pinprick of blood, could measure cardiac biomarkers that indicate a heart attack or worsening congestive heart failure, give results within 45 minutes, and communicate wirelessly with health-care providers who could remotely prescribe treatment?

This cardiac-based "lab on a chip" is one of the projects under development at Transform Heart Failure, an initiative of the Ted Rogers Centre for Heart Research that aims to address inequities in care and revolutionize treatment for all heart failure patients.

Anthony Yong, a master's student in the department of chemistry and a Transform Heart Failure Trainee Award winner, designed the device to use digital microfluidics – tiny droplets of chemicals that are manipulated on a platform of electrodes. The size of a credit card, the device is affordable, accurate and simple to use.

Field testing in Northern Ontario, in partnership with Indigenous health authorities and patients, is expected to begin in the next year or two. "The motivation to increase availability of these tests to Indigenous communities is because they have the least access to treatment," says Yong. —**Marcia Kaye**

WHAT IF... WE USED ADVANCED TECHNOLOGIES TO UNCOVER SECRETS ABOUT ANCIENT TEXTS?



1.

For many people, the story of the book starts with the Romans, climaxes with Gutenberg and slithers to an ignominious finale with Silicon Valley and the e-reader. The folks at The Book and the Silk Roads research project offer a different version of this tale.

Created three years ago as part of a larger project at U of T called the Critical Digital Humanities Initiative, the 60-odd collaborators who make up The Book and the Silk Roads group use a mix of humanist smarts and digital sleuthing to uncover alternative histories of book culture, especially their more pre-industrial, non-Western iterations.

They've used peptide analysis on the adhesives of pre-modern books, a microscope on a 10th century prayer sheet from Dunhuang (in what is now northern China), and a medical imaging technology on the interiors of books otherwise too precious or fragile to open.

In one of the network's first experiments with micro-CT scanning, using a late 15th-century liturgical book from France, they spotted

what they call a "ghost binding" – the cuts and holes left behind by the text's previous binding. For Alexandra Gillespie, a professor of English and Medieval studies at U of T Mississauga and the lead researcher on the project, it was an "aha" moment – proof that advanced technologies could reveal previously unknown details of a book's history and structure. Other scholars have used CT to uncover text hidden within books too fragile to be opened in the conventional way.

For Gillespie, the book itself – its physical incarnation – is at least as interesting as the text it contains. Old books are time capsules, says Gillespie, "examples of how human beings learned hundreds and hundreds of years ago. They're really precious, right down to their string and their glue."

Even their smallest details can tell us much about the way materials and technologies travelled about the pre-modern world. "When one culture comes up with an innovation on how to do something," says Gillespie, "it is remarkable how it moves."

—Brent Ledger



4.



7.



2.



3.



5.



6.



8.



9.

1. A fragile ancient book, or codex, from Ethiopia

2. A Thai palm leaf manuscript

3. A modern reproduction of a 1,500-year old Coptic Egyptian codex

4. PhD students Arkaprabha Chakraborty (left) and Morgan Moore examine historical bookmaking techniques

5. A Belgian early printed codex from 1581

6. Prof. Alexandra Gillespie (right) and PhD students at the Old Books New Science lab examine an early printed codex

7. String holds together the leaves of a palm leaf manuscript

8. Members of the Old Books New Science lab look for the watermark in a 15th-century printed book

9. The map in the lab illustrates global perspectives on book history

PHOTOGRAPHS BY NICK IWANYSHYN

WHAT IF... WE COULD DEVELOP NEW MATERIALS IN A FRACTION OF THE TIME?

Artificial intelligence and machine learning have transformed just about every branch of science and engineering over the last decade or so, and materials science is no exception. U of T's new Acceleration Consortium is poised to take this transformation to the next level, spearheading the rapid development of new, more efficient and more environmentally sustainable materials.

The consortium – a U of T-based global coalition of academia, industry and government designed to harness advances in materials science, robotics and AI to speed the discovery process – will bring new products to market much faster and far more economically than ever before, according to its director, Alán Aspuru-Guzik, the Canada 150 Research Chair in Theoretical and Quantum Chemistry.

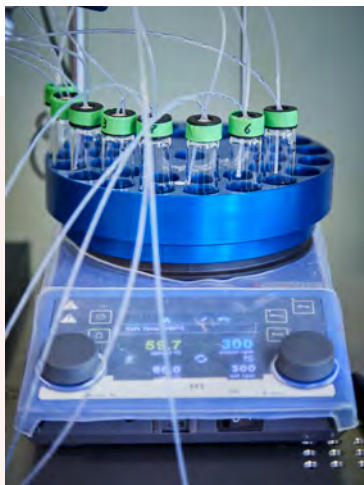
The way Aspuru-Guzik sees it, the laboratory of the future should be like a self-driving car: a lot of expertise goes into setting it up and human scientists still play a vital role in selecting projects and evaluating results. But, to a large extent, the lab should run itself. “What we really want are autonomous labs that can make decisions as they go along.” AI and machine learning are game changers, he says, that can speed up every stage of the development process. “A new field is being born – the field of accelerated science.”

One area where these new materials hold enormous potential is in developing next-generation electronics, including those that are biodegradable. Helen Tran, an assistant professor of chemistry who works with the consortium, sees applications for such devices in fields ranging from medical diagnostics to

environmental monitoring. She's especially interested in polymers – long chain-like organic molecules in which certain groups of atoms repeat. By manipulating the order and connections of atoms in these molecules, their properties can be finely controlled – making them softer or more stretchable as desired. Best of all, they can be designed to simply erode into harmless organic molecules when the time comes. “I see myself as a molecular architect,” says Tran. “We design these molecules one at a time.”

In that design process, Tran relies on what is already known about how molecular structure influences electronic properties, as well as her own intuition. But automation speeds everything up. AI helps her and her colleagues “make better-informed decisions about how to design the best molecule for a particular application.”

Tran foresees a myriad of uses for these materials. Think of someone



getting an electrocardiogram: A technician sticks an array of electrodes made of plastic and metal on the patient's chest; when it's over, the electrodes are tossed in the garbage. Instead, Tran envisions ultra-thin, electrically conducting stickers performing the same function wirelessly, and then degrading safely. “Instead of finding out, years from now, that these electronic stickers are a nuisance, what if we made them from sustainable materials from the beginning?”

For Jason Hatrick-Simpers, a professor of materials science and engineering, the consortium's work aligns with his own research interests, especially the use of automation and AI to design new alloys and oxides that perform better than those currently used in manufacturing. For example, every year in Canada, more than \$60 billion goes into mitigating the effects of the corrosion of metals. There is a human toll, too. Corroded steel reinforcements are thought to have played a role in the collapse of the Miami condominium tower last year that killed 98 people. For Hatrick-Simpers, the investment needed to make steel and other materials last longer is, in the long run, a bargain.

Developing those materials is a challenge – one that requires testing staggering numbers of chemical combinations. He compares his work to that of a cook. “I have this whole list of ingredients – meats, vegetables, spices – and then I have to decide the order in which I add them, how to mix them, whether to boil or fry them. We have the same sort of problem in materials science. There are all these elements we could use, and all these different ways we could bring them together.” Evaluating the seemingly infinite array of combinations is a time-consuming task for a human researcher, but child's play for an AI. And when humans and AIs work together, projects can be completed in a fraction of the time.

For Aspuru-Guzik, a key to the consortium's success is bringing together leading experts from around the world and letting the ideas flow. “If you have computer scientists and chemical engineers and materials scientists and chemists in the same consortium, super cool stuff is going to happen.” —Dan Falk



←
Prof. Alán
Aspuru-Guzik,
the director
of U of T's
Acceleration
Consortium

“A new field is being born – the field of accelerated science”

WHAT IF...

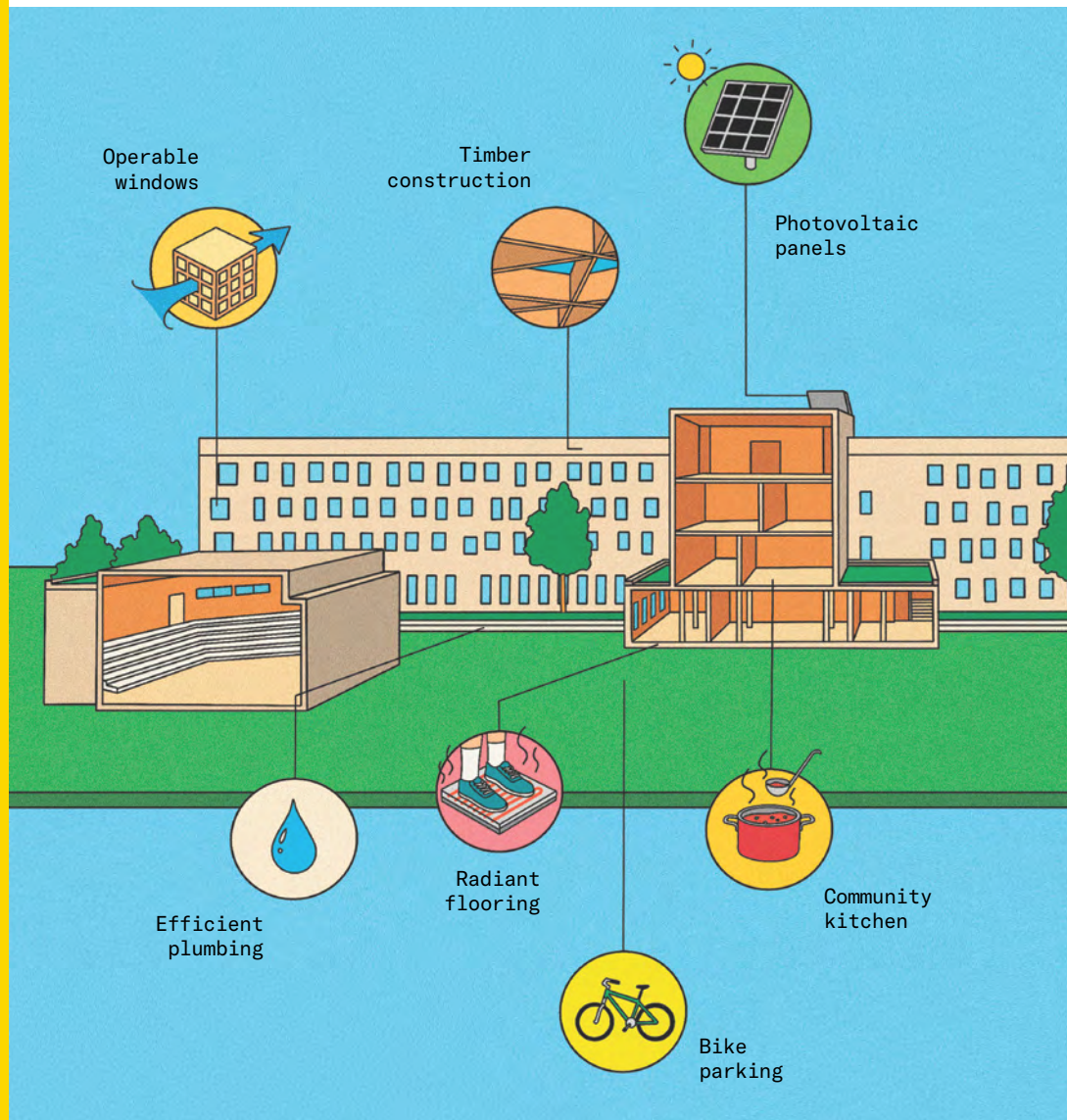
SPEAKING WITH
STUDENTS
BENEFITED THEM
— AND YOU?



Film writer and director **Richie Mehta** (BA 2001 UTM) says he never refuses an invitation to speak to students at U of T Mississauga events.

“I wish I’d had someone to answer my questions when I was in my final year at U of T Mississauga. Was it possible to have a viable career in the arts in Canada? Is there a set path, or does everyone improvise their own way? Now, for today’s students, I try to provide some of the answers. On the flipside, the students also remind me of the youthful motivation that I once had. It helps me re-energize!”

WHAT IF ...
**NEW U OF T BUILDINGS
WERE BUILT TO
THE **HIGHEST STANDARDS**
OF **ACCESSIBILITY** AND
SUSTAINABILITY?**

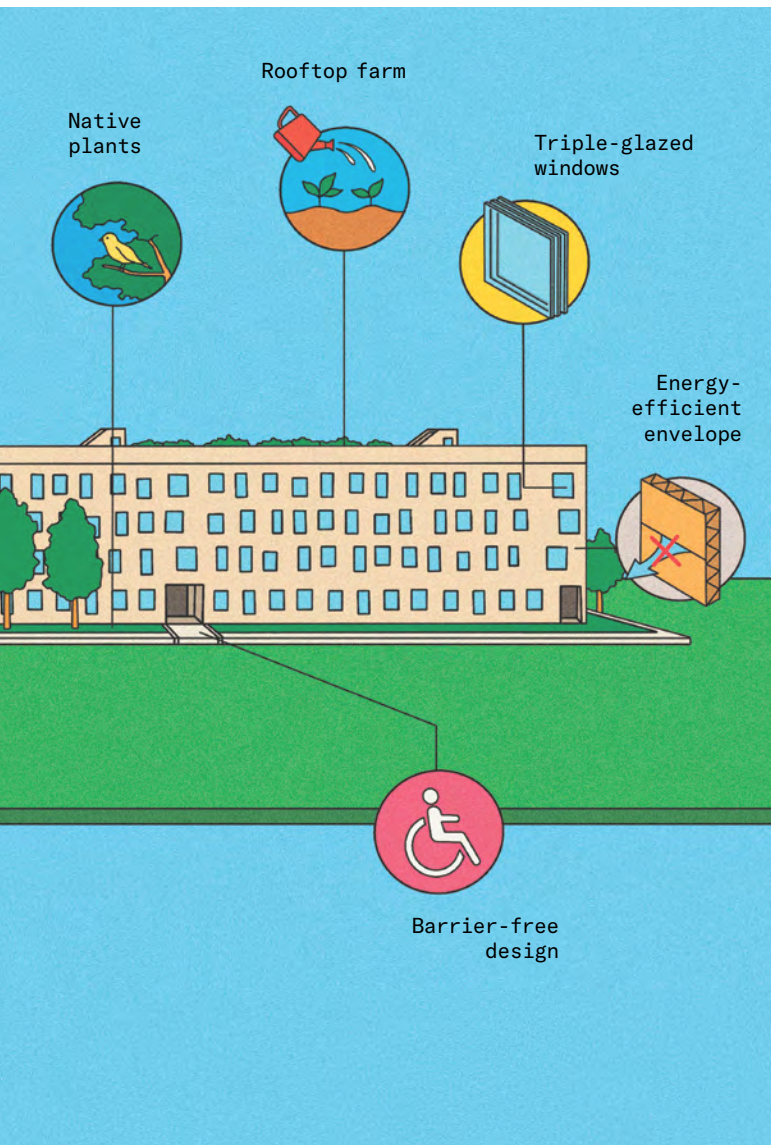


✓ **The Art of Living Sustainably**

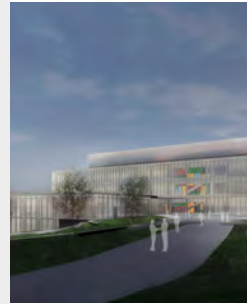
The Lawson Centre for Sustainability at Trinity College, a 350-bed residence and student hub supported by lead donors Brian and Joannah Lawson and many alumni, is part of a larger initiative to promote sustainability across the college.

The four-storey facility, scheduled for completion in fall 2024, will be designed to the highest environmental standards, with solar panels, a geothermal heating and cooling system and hybrid timber construction. It is expected to achieve zero carbon certification.

A rooftop agriculture operation will enable students to participate directly in the creation of their food – and conduct research on those practices. And a community kitchen will serve as both a gathering space and a hub for teaching and learning about sustainable food practices. The building will also include academic and event spaces, seminars and classrooms and a rooftop event and conference space.



PHOTOGRAPHS BY (RICHIE) SARANG GUPTA / HINDUSTAN TIMES, GETTY IMAGES; RENDERINGS BY (GREEN SCIENCE) KIERANTIMBERLAKE; (WOODSWORTH) KONGAITS ARCHITECTS; (INDIGENOUS) FORMLINE ARCHITECTURE AND LGA ARCHITECTURE PARTNERS; ILLUSTRATION BY CHOI HAERYUNG



› **Green Science**

U of T Mississauga's Science Building, now under construction and slated for completion in 2023, will set a new standard for green design. The building – which will be home to the Centre for Medicinal Chemistry, the forensic science program, wet labs and a computing data centre – will be one of the most energy-efficient biological and chemical laboratory facilities in North America.

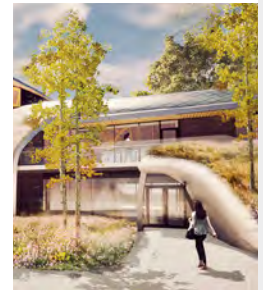
For most of its heating and cooling, the Science Building will use a geoexchange system and rooftop photovoltaics. Interior features include LED lighting throughout, automatic sash closing for fume hoods and real-time air-quality monitoring systems.



› **Woodsworth Adds On**

Woodsworth College will soon see its first construction in more than three decades.

A new six-storey academic building, scheduled to open in 2025, will transform three existing structures into one cohesive complex. The building's design includes plenty of open areas for studying as well as classrooms and event space. The facility will be home to the Centre for Criminology and Sociolegal Studies and will include offices for the college and the Centre for Industrial Relations and Human Resources.



› **Indigenous Inspiration**

A traditional winter wigwam has inspired the design for Indigenous House, which is expected to begin construction soon at U of T Scarborough. A key element of the structure will be a large circular gathering room that will open onto an observation deck overlooking a garden with plants of cultural significance for local Indigenous communities. Heat sensors will replace smoke detectors to permit smudging throughout the structure. The building will provide academic and social spaces for people in the eastern Toronto region to gather and learn about Indigenous history, culture and ways of knowing.

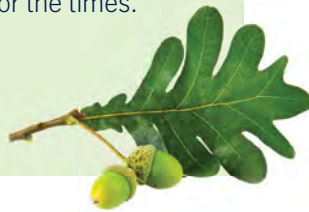
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Join Dr. Roberta Bondar Wednesday, May 25, 2022

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Canada’s first neurologist in space has never stopped exploring. Since her historic spaceflight in 1992, Roberta Bondar (PhD 1974) has been uncovering the truth about our connection to Earth. Get a glimpse at our planet through her unique lens. Find out how the natural world informs our mental health and creative expression at this keynote talk for the times.

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All U of T alumni are members of the U of T Alumni Association and invited to join us for the Annual General Meeting, which immediately follows Roberta Bondar’s presentation.



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DEFY
GRAVITY

Expanding the Pool of Entrepreneurs

A U of T initiative aims to support the creation of Black-owned businesses in the university community



Melisa Ellis understands what it is like to work in spaces where no one looks like her.

While employed with a Canadian bank, a supervisor once told her that she didn't seem to be the right fit for corporate. "He said this to me on my very first day of training," Ellis (BA 2015 UTSC) recalls.

Reflecting on her experiences as a Black woman working in tech, she imagines an industry where Black professionals are no longer underrepresented.

In 2020, Ellis founded Nobellum, a social and technology enterprise that aims to create opportunities for Black youth and professionals to work – and start their own companies – in science- and tech-related fields.

Recently, Ellis announced that Nobellum will play a key role in the Black Founders Network – a new U of T-funded initiative to support Black-identifying faculty, students and alumni who have started (or want to start) their own business. The network offers

entrepreneurs resources and grants as well as guidance and mentorship from established Black business owners.

Over the past year, Efosa Obano (BBA 2018 UTSC), manager of the Black Founders Network, consulted with community members, including Ellis, to identify barriers facing Black entrepreneurs – and to devise new ways to provide meaningful support. Now, Nobellum is collaborating with the network and two campus-linked accelerators at U of T Scarborough (the Bridge and the Hub) to launch the Nobellum Innovator Program for Black Entrepreneurs.

As part of the program, Nobellum has pledged \$80,000 toward an accelerator fund (to be matched by U of T) that will help winners of a pitch competition transform their ideas into business plans. Ellis hopes these efforts in conjunction with UTSC and the Black Founders Network will lead to the launch of at least 100 new Black-owned businesses by 2025.

Obano says there is demand for entrepreneurship programs created by and for the Black

community. While pursuing his business degree at U of T Scarborough, Obano helped create the African Impact Initiative, a non-profit organization dedicated to supporting young African entrepreneurs.

Like many of the members of the Black Founders Network, Obano navigated the business world with luck and a bit of boot-strapped improvisation. He says having guidance from someone with more expertise would have helped him avoid many of the pitfalls he encountered, such as speaking to investors who then declined to support him because he lacked the right connections.

Black entrepreneurs have historically faced more difficulties raising funds compared to their white counterparts. A study last year by Abacus Data found that three out of four Black entrepreneurs felt their race made it harder for them to achieve success.

And according to a recent report by the Canadian Black Chamber of Commerce, seven in 10 Black businesses were ineligible for the Canadian Emergency Business Account (which provided interest-

“IT TOOK ME 10 YEARS TO GET WHERE I AM. IT SHOULDN’T TAKE ANOTHER BLACK ENTREPRENEUR THAT LONG”

free loans of up to \$60,000 during the pandemic to small businesses and non-profits) because they didn’t meet minimum requirements for payroll size. According to Obano, this problem speaks to the funding barriers that exist and the need for more support.

Isaac Olowolafe (BA 2007 UTM), the founder of Dream Maker Ventures and a member of the network, says he had to build relationships on his own because he had no connections in real estate development. “It’s the reason this network is so important – to give Black entrepreneurs greater exposure, help them make connections and explain industry practices. It took me 10 years to get where I am. It shouldn’t take another Black entrepreneur that long.”

The Black Founders Network is structured to help entrepreneurs at three stages of business development. The first stage offers grants of up to \$5,000 and pairs aspiring entrepreneurs with co-founders based on values, passions and business interests. At the second stage, grants of up to \$25,000 are available to develop businesses with viable products or services. The final stage is for companies to expand, with the goal of surviving long-term. At this stage, entrepreneurs can access up to \$200,000 and request specific expertise from network members, who now number more than 1,500.

During her third year, Faizah Balogun (BA 2021 UTM) launched Envly, an app that allows people to

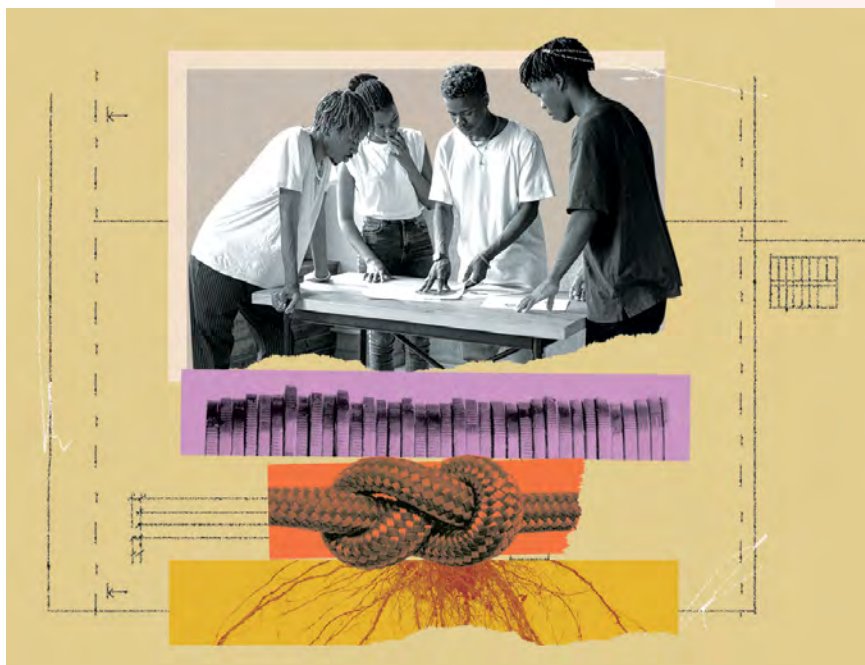


ILLUSTRATION BY YAZMIN BUTCHER; SPOT ILLUSTRATION BY DAVID SPARSHOTT

buy and sell sustainable products. She says many of her company's growing pains could have been avoided with guidance from a more established entrepreneur. Her company qualifies to apply for a second-stage grant from the network, which she says would enable her to do more rigorous user testing and market research.

Balogun says a network of Black entrepreneurs may encourage new business owners like her not to lose hope when they hit a rocky patch. "Starting a business can be an isolating experience," she says. "It's a lot of work, a lot of risk and a lot of stress. Being able to connect with established entrepreneurs can diminish that sense of isolation so that 'making it' doesn't feel so out of reach."

Obano says the murder of George Floyd in May 2020 and the social movement that followed made the world more receptive to a conversation about race, historical injustices and the need for change, although, he adds, "myself and many others were pointing out the challenges faced by our community prior to 2020."

Looking ahead, he hopes the Black community will rally around the network to help instill a sense of self-belief in the next generation of founders. "The business world has often missed out on the differences in perspectives that come from supporting Black entrepreneurs," he says. "While this reflects the world we live in, without them, we'd all continue to miss out on so much untapped potential."

Ellis felt that missed potential herself as a student, noting that, had the Black Founders Network existed at the time, it would have enhanced her own university experience. "I would have lived in that office," she says. "I think of the network as a bridge for Black people who see U of T as a place they don't belong. Now there's a space that is just for them."

—Noel Ransome



Doing Improv Can Boost Your Confidence

Social work research suggests three ways the activity boosts self-esteem

Improv comedy is fun to watch — and difficult to do. But simply trying it could have valuable therapeutic effects for marginalized women, according to new research by Stephanie Begun, an assistant professor at the Factor-Inwentash Faculty of Social Work. Begun teamed up with Daphney Joseph, a performer from The Second City comedy-theatre troupe in Toronto, to run online improv classes with racialized young women last year. They also held an in-person workshop with women experiencing homelessness. Based on interviews with the participants following these events, Begun found that doing improv boosted their self-esteem in three ways. —Megan Easton

Improv relies on the “Yes, and...” philosophy, which means always agreeing with and adding to someone's idea. This creates an environment where people feel safe to take risks. “I didn't think I would be very good at this, but I surprised myself,” said one participant. Said another: “I think improv is extra-good for young women, as we struggle with self-esteem.”

Improv is also an equalizer, Begun says. “No one has an advantage — no matter your education or place in the world. The women said that seeing me jump in and join the activities meant a lot because improv was clearly just as new and unknown to me as it was for them.”

The participants said the workshops created **new social connections** and provided a much-needed injection of fun and humour in their lives. “It got me right out of my head and out of all my anxiety and all my worries,” said one participant. Begun notes: “It seems that these experiences lead to meaningful realizations in nearly anyone who gives improv a try.”

Students Dig for Answers to a Local Mystery

Each summer, about two dozen U of T Mississauga students take part in an archeological field project on campus, digging into local history to help solve the mystery of a house lost to time.

Since 2013, the project has given upper-year anthropology students hands-on experience with compasses and trowels as they look for material remains of a family that once owned the property that makes up the north end of campus.

In the 1800s, the Schreiber estate boasted three large houses: Lislehurst, Iverholme and Mount Woodham. Lislehurst currently serves as the principal's residence. The initial idea behind the field school, taught by U of T Mississauga anthropology professor Michael Brand, was to find the locations of the other two houses.

Iverholme burned down in 1913, leaving behind a stone foundation that was quickly identified. The fate of Mount Woodham – and its location on the property – remain a mystery. About nine years ago, Brand and his students uncovered a stone foundation, but it wasn't big enough to belong to Mount Woodham. Brand suspects it's the remnants of a barn.

The field school extends beyond the search for the house to learning about the Schreibers' lives and how they integrated themselves into the community, as well as their influence on the cultural landscape. For Yunfei Lin, a fourth-year anthropology student who took the field school in 2020 and 2021, this additional research involved excavating the barn wall and digging into a midden heap (a domestic dump site) that contains residential artifacts such as medicine bottles and toy soldiers. "Hearing the professor talk about excavation and soil stratigraphy is one thing, but experiencing it is totally different," says Lin. She credits the field course for landing her an archeological position after she graduates this spring.

Brand, meanwhile, plans to open additional excavation sites around the campus to keep the field school going for future students – and to find more clues to where Mount Woodham once stood. "It is a constant mystery," he says. —Patricia Lonergan



PHOTOGRAPHS BY NICK IWAN YSHYN



UNEARTHING HISTORY IN THE FOREST

For nearly a decade, UTM students have searched for artifacts that might reveal an archeological secret

1. Students sift for artifacts using mesh screens, carefully noting the location of each discovery



2. Each artifact is meticulously cleaned and assessed

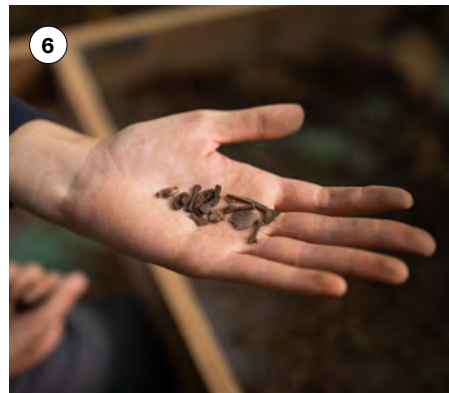
3. The dig team excavates in one-metre-square units, allowing them to accurately record the location and depth of each item

4. Glass and pottery shards are common finds

5. The colour of each distinctive soil layer is compared against a colour chart

6. Small animal bones are frequently uncovered

7. UTM anthropology professor Michael Brand, who runs the field course, plans to open up other excavation sites around campus to keep it going for future third- and fourth-year students



Where Kindness Rules

For professor Fiona Rawle, compassionate teaching is the bedrock for student success

One day not long ago during virtual office hours, Fiona Rawle found herself meeting the mother, father, grandfather and neighbour of one of the 900 students in her first-year biology class at U of T Mississauga. “We’d finished discussing the assignment, so I suggested a conversation,” says Rawle. “Instead, the student asked if they could introduce me to their family. It was unexpected and wonderful and reminded me how a sense of community enriches any course.”

Rawle, the associate dean, undergraduate education, at UTM, is a proponent of a “pedagogy of kindness” – a teaching approach rooted in care, mutual respect and inclusion that research has shown enhances students’ learning and well-being. When instruction moved online, she was determined to build relationships with her students in new ways and make them feel like more than another name on the screen. It wasn’t easy, and some days it felt like an overwhelming task. But she says positive feedback from students and

small, gratifying moments like this impromptu chat proved her efforts weren’t in vain.

Rawle has a long-standing interest in improving science education, both through individual teaching strategies and university-wide efforts. Right now, she’s focused on how to move forward after a difficult and disruptive couple of years. “I’m reflecting a lot on the pandemic’s impact on teaching and learning, and what we should leave behind and what we should take with us.”

While the pandemic may be easing, she says the need to make kindness central in teaching is just as urgent – not solely because of the documented increase in mental health concerns among students, but because students learn better when they feel connected to their instructors. “Thinking back on the professors that have had a huge impact on me and my academic career, I don’t remember single acts of kindness,” says Rawle, who is a professor in the department of biology and director of the Robert Gillespie Academic Skills Centre. “I remember when



UTM biology
professor
Fiona Rawle
←

there was a foundation of care, when professors showed me that they prioritized our student-instructor relationship and listened to my ideas and opinions.”

It’s not enough for faculty to pledge they’ll uphold grand concepts like compassion and kindness, she says. “They need to consider what these look like in practice.” In Rawle’s classes, students often get to select essay topics and vote on due dates from an approved range. “I’m not making things easier. I’m offering choice and flexibility to ease student stress, promote wellness and expand avenues for learning.” Rawle has received dozens of emails from students expressing their gratitude for these practices, and students’ formal evaluations of her teaching routinely mention how much her classes have improved their mental health and attitudes toward learning.

Demonstrating genuine curiosity about students’ lives – inside and outside the classroom – and creating opportunities for student feedback are also key to a pedagogy of kindness, says Rawle. Whether in-person or online, she asks students to submit their favourite songs, makes and shares a class playlist and features one song at the end of each class. Another tradition is the question of the day, which could be about students’ thoughts on recent lectures and assignments (“What is your muddiest point from the last week”) or about their state of mind (“What gives you hope?”). The next class, she presents their answers – and hers. “The exercise often highlights how much we all have in common.”

One of the commonalities Rawle wants students to recognize is that everyone fails at one time or

“We’re all works
in progress,”
says Rawle
→

another, though individuals define failure differently. For some, it means literally failing an assignment or exam; for others, it means getting anything less than an A. She underlines how failure is integral to the scientific process – sparking experimental refinements, new questions and innovative solutions. It’s a useful bridge to one of her central research and teaching interests: how to reshape students’ perception of failure so they can see it as productive, not shameful.


In collaboration with other UTM faculty, Rawle is exploring ways to show students the merits of failure in both science and everyday life. They’ve shown that certain instructional methods, such as awarding marks when students show how they solved a problem, even if they don’t arrive at the correct answer, and requiring students to reflect on their failures in journals, can boost students’ resilience and improve their study habits. Teaching students to bounce back from failure is especially critical in first year, when they may be falling short for the first time in their academic lives, she says. A recent survey of first-year biology students found that societal and family pressures to succeed were the largest contributors to students’ fear of failure.

On the bright side, Rawle says, “students also told us that more classroom discussion and open communication about experiences of failure would reduce its stigma.” This is where the open dialogue inherent in a strong instructor-student connection comes in. “As professors, we should model learning through struggle and be honest and vulnerable with our students.” For her, this means revealing a disastrous mark she

received in organic chemistry. Sometimes she even brings in her test for proof.

Yet Rawle is not a fan of what she calls “wellness theatre,” where faculty might send emails to students urging them to practice self-care. “Though they may be well-intentioned, we have to move beyond words to provide meaningful structural support for student wellness in our classrooms and across the university,” she says. Rather than being an add-on, “a pedagogy of kindness should be the cornerstone of course design and teaching practice.”

Rawle often uses social media to spread the word about how she and other instructors at U of T and



“AS PROFESSORS, WE SHOULD MODEL LEARNING THROUGH STRUGGLE AND BE HONEST AND VULNERABLE WITH OUR STUDENTS”

elsewhere are adopting a pedagogy of kindness. In the fall of 2020, for example, she posted a letter on Twitter that she’d sent to her students at the start of term. It laid out her commitment to support students during an uncertain, stressful time while still challenging them to push boundaries in their learning.

“I got a lot of great feedback on that letter, and other professors started writing their own,” she says, noting that she wrote start-of-term letters to students even pre-pandemic to set the tone for the class. “Over the past couple of years, I’ve noticed more and more faculty members doing so many impactful things to forge connections with students.”

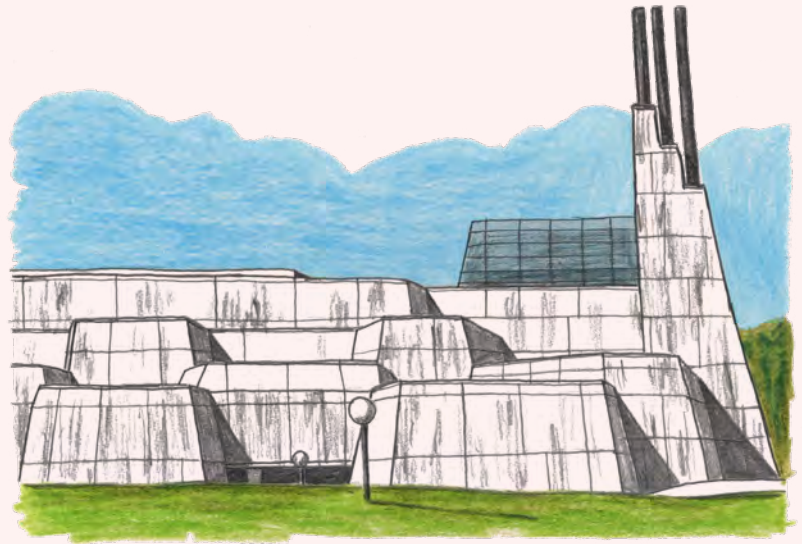
For Rawle, creating a teaching and learning environment that’s welcoming and equitable for everyone is closely related to showing kindness in the classroom. She speaks openly about how gender bias in fields such as math, science and engineering has personally affected her over the

years. She recalls that when she was a young professor, she felt it was important to be called ‘Dr’ to reinforce her expertise, while some of her male colleagues would insist that students call them by their first names. A related struggle that persists today for Rawle and her female colleagues, she says, is the use of academic titles for men but not for women in academic presentations, media interviews and similar situations. She still relies on mentors and a small support network of female professors to bolster her morale at times. Through her research and advocacy, she’s investigating strategies to overcome gender and racial bias and other barriers to inclusion at the university. One way, she says, is to use research from diverse scholars in course material.

Last year, Rawle became the acting co-chair of the Toronto Initiative for Diversity and Excellence, a group of U of T faculty members from across all disciplines aiming to advance equity and diversity at the university. They provide resources and free educational sessions on unconscious bias, among other subjects, to interested instructors. “Everyone has biases,” she says, “and it’s vital to learn about them so we can mitigate their negative effects on students and faculty.”

If instructors can acknowledge their biases, failures and everyday struggles, says Rawle, they’ll help build a university culture that’s more conducive to student well-being and, in turn, student learning. “It’s so important to emphasize that we’re all works in progress, and the professor standing with you – not in front of you – will make mistakes and get it wrong and learn new things. It’s about valuing the process of learning together instead of only looking at the outcomes. Relationships give my job meaning, and they do the same for students’ learning.”

—Megan Easton



Concrete Magic

U of T Scarborough’s Andrews Building has become a Canadian landmark

The architect John Andrews was teaching at U of T in the 1960s when he was asked to oversee the design of a new campus on land the university had just purchased in Scarborough. Completed in 1966, the Science and Humanities Wing (U of T Scarborough’s first building) didn’t impress everyone, but its sprawling concrete form attracted worldwide attention, evoking comparisons to an Aztec pyramid or Babylonian ziggurat. Critics have hailed it as an exemplar of Brutalist construction – though Andrews, who died in March, had objected to the description. “It isn’t brutal. Scarborough College is a very human building,” he said. Now, it’s an architectural icon. —**Scott Anderson**

Tour stop

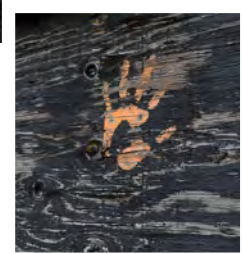
In his *Campus Guide to the University of Toronto: An Architectural Walking Tour*, Larry Richards, former dean of the Daniels Faculty of Architecture, Landscape, and Design, called the Andrews Building (as it is known) “one of Canada’s most important modern buildings” and “an astonishing essay in form, space and light.” It is regularly included in Doors Open Toronto.

Play of light

Daniel Scott Tysdal (MA 2008), who teaches creative writing at UTSC, set one of his short stories in the edifice. “I find the Andrews Building endlessly fascinating to wander and explore,” he says, adding that the skylights do all sorts of “magical and menacing things” with light. “One step down the hallway moves you into a soothing ray, while another may enact a Dr. Caligari-esque estrangement.”

Scene-stealer

The Andrews Building appears on lists of Brutalist landmarks in Canada and has frequently served as a setting for film and TV productions. It played the role of a post-Apocalyptic prison in *Resident Evil*, a top-secret government lab in *The Shape of Water*, and a Martian embassy in *The Expanse*. It also appears in the music video for The Weeknd’s “Secrets.”



Bruce Stonefish (left) says he is motivated by a sense of personal duty to help preserve the Munsee dialect spoken by his people: "I want to honour the language."



A Lifeline for an Endangered Language

U of T linguists have partnered with an Indigenous community member to bring the Munsee dialect back from the brink of extinction

The Delaware Nation, a community of about 550 in southwestern Ontario, is one of the oldest settlements in the region. But most members of the long-standing community are no longer able to converse in the language of their ancestors. Today, there is just one person who can fluently speak the Munsee dialect of the Lunaapeew language – Dianne Snake, and she is in her 80s.

The dialect, which is part of the Algonquin family, is one of dozens of endangered Indigenous languages in Canada.

Bruce Stonefish, a member of the Delaware Nation, fears that losing the language would permanently close a window onto how his

ancestors lived and their worldview. "Our language was conceived in the way that we smell, taste, see, feel, hear, and in the way we experience creation," he says. The Munsee word for "dog," for example, is *mwáakaneew*, which roughly translates to "one who is always ready." As Stonefish explains, "this conveys our relationship with the dog and how, at our side, they've helped us stay alert."

Stonefish recalls picking up a few Munsee words and phrases at an early age, though his parents didn't speak it, and learning more in his early 20s as part of a cultural program taught by Snake. Throughout his life, he says, he has felt motivated by a sense of personal duty to help preserve the dialect. Now, he is working

with Juvénal Ndayiragije (Ndah-ye-RAH-gwee-jay), an associate professor of linguistics at U of T Scarborough and the chair of the department of language studies, to do just that.

Ndayiragije and his research team have developed an online tool they think could help save Munsee and other critically endangered languages in Canada and around the world. The tool, which they are testing with Ojibwe (also an Algonquin language), contains 378 English sentences that were meticulously constructed to capture most of a language's grammatical elements.

The researchers enlisted primary speakers of Ojibwe to translate the 378 sentences and then read them aloud in Ojibwe. Then they saved the audio recordings to a database. Having almost completed the data collection for Ojibwe, the researchers recruited a Delaware tribal council member from Oklahoma who speaks Unami, a dialect closely related to Munsee, to translate the sentences into Unami and then read them aloud. Eventually, by creating a language database of the two dialects, as well as Ojibwe, the researchers will be able to conduct a comparative analysis. "It may end up being similar to comparing



The goal: to stop a language from disappearing →

MUNSEE WORDS AND PHRASES



Book
pámbiil



Attend school
shkóoluw



My hand
náxk



Maybe it's going to rain
*Píht éet
katá-sóokúlaan*



It is hot
kshúteew



I have many children
nzuluskóonzhe



two dialects of German with English," Ndayiragije says.

Meanwhile, the research team is using the knowledge they've collected to develop online teaching and learning tools that will enable people to learn Ojibwe from scratch. Once they have proof that the concept works, they'll expand to Munsee and other languages. Under the guidance of Jed Meltzer, a psychology professor who specializes in language processing, and Safieh Moghaddam, an assistant professor of linguistics at U of T Scarborough, the online tools are designed to use "spaced repetition." Users start with simple words and grammatical concepts, repeating them often at first and then less frequently as they progress through the lessons.

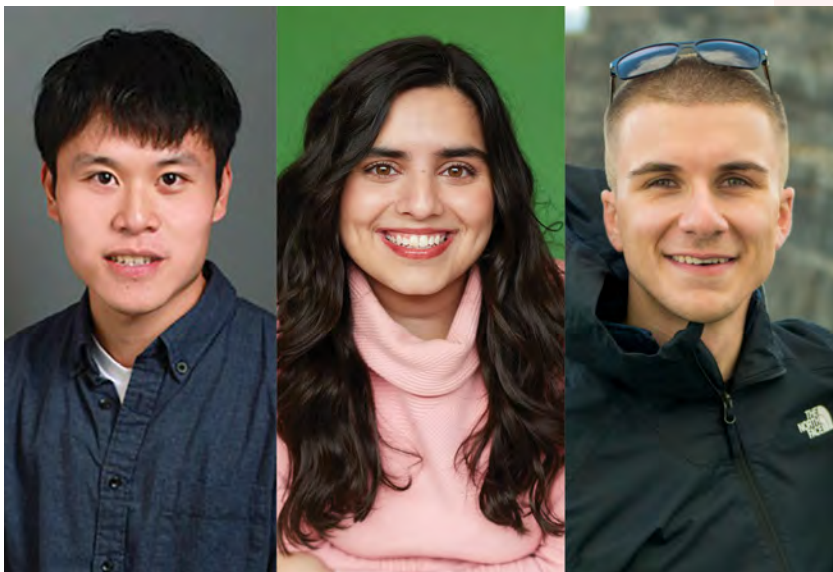
Meltzer, who is also a senior neurorehabilitation scientist at Baycrest Health Sciences, compares the program to digital flashcards. "If you know a word well, you'll remove it from your deck of flashcards and focus on the ones you're struggling with," he says. "The program does that as well, and through memorization, helps you build up the skill over time."

The researchers are still verifying the accuracy of the program they built for Ojibwe learners, but Ndayiragije feels confident that,

with Stonefish's assistance as an advanced speaker of the Munsee language, the online tools will prove useful to help revitalize it as well. The team is also developing course materials to help train language teachers. "The goal is to empower community members to take the lead on revitalizing their own languages," he says.

For his part, Stonefish, who has helped create a dictionary of Munsee words, has his doubts about relying solely on technology to revitalize a language. He believes supplementing online tools with cultural teachings is important, especially for a language such as Munsee that is largely based on oral traditions. Indigenous Elders and Knowledge Keepers who speak the language and understand the traditional translations are an essential part of the process, he says.

Yet Stonefish remains hopeful that the tools being developed at U of T Scarborough will work well in tandem with the Elders' cultural teachings. "I am excited for the technology and think it's a really good start," he says. "But I want to honour the language by recognizing the spiritual connection within it." —**Nickita Longman**



Will Kwan, Haleema Khan and Danny McInnis



Canada's Next Innovation Leaders

The Schulich Leader Scholarships support talented science undergrads who are interested in entrepreneurship

Established a decade ago, the Schulich Leader Scholarships have enabled hundreds of Canada's top students to earn a university degree in the sciences and math – with their tuition fully covered.

Recipients say the scholarship allows them to take risks and pursue opportunities they might not have otherwise considered. “Because the award alleviated the financial burden of paying for school, it let me try different things,” says Schulich Leader Danny McInnis (BASC 2020). “That has been instrumental in my learning.”

Founded by businessman and philanthropist Seymour Schulich, the scholarships are awarded annually to as many as 100 university students across Canada who are interested in becoming

entrepreneurs; last year, 10 University of Toronto students received them. Science and math students receive \$80,000 over four years; engineering students receive \$100,000. All recipients gain lifetime membership in the Schulich Leaders Network.

The entrepreneurial coder

Will Kwan (BSc 2016 Trinity) was one of U of T's first Schulich Leaders. A computer science student, he created a video game in the summer before fourth year. Knowing that the Schulich Leader Scholarship would cover his tuition, Kwan says he was able to channel his time and energy into his game, *Frantic Architect*, which hundreds of thousands of people eventually downloaded from the Apple app store.

Since then, Kwan, now a machine-learning engineer at

Approximate number of Canadian students considered for Schulich Leader Scholarships every year: **1,500**

Total number of Schulich Leader Scholarships awarded in Canada since their 2012 launch: **570**

Number of the scholarships awarded to U of T students since 2012: **46**

Google, has established three tech startups. “The important thing about entrepreneurship is to try lots of stuff,” he says. “That’s why having a scholarship really helps. If you’re not too worried about making money in the short-term, you can try riskier things.”

Supporting women in science

The Schulich Leader Scholarship gave Haleema Khan (BSc 2020 Victoria) the opportunity to conduct research with some of the university's top scholars in neuroscience and psychology. Now pursuing a master's degree in biomedical engineering at McGill University, she is developing a new type of highly accurate, rapid DNA test for bacteria and viruses that could expand access to high-quality testing in remote and low-resource communities.

But perhaps just as importantly, the Schulich Leader Scholarship elevated Khan's sense of her own capabilities: “It transformed how I valued myself.” Now, she hopes to extend that support to others. As vice-president, communication, of the Society of Women Engineers at McGill, she advocates for women and other underrepresented groups in the sciences.

David Goodman, the executive director of the Schulich Leader Scholarships, says McInnis, Kwan and Khan, as well as the hundreds of other members of the Schulich Leaders Network, will help generate the technology innovations that Canada needs to compete globally. “Good leadership matters,” he says.

Khan agrees: “I can't wait to see what we accomplish in the next 10 years.” —Janet Rowe

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Writing in a Tumultuous Time

Téa Mutonji finds creative possibility in the freedom of her youth



Born in Congo-Kinshasa, Téa Mutonji (BA 2020 UTSC) immigrated with her family to Canada when she was nine, eventually settling in Scarborough's Kingston-Galloway neighbourhood. She began writing poetry, plays and stories as a teenager. In 2019, she released her debut book of short stories, *Shut Up You're Pretty*, which was shortlisted for the Atwood Gibson Writers' Trust Fiction Prize. Here, she talks about her new novel set in Oshawa, Ontario, and the peril of early success.

Why did you choose Scarborough as the setting for your first book?

I'm sort of obsessed with childhood. It was the time in my life that I felt the freest. Whenever I think of my childhood in Scarborough, I think of running around open fields, clothes hanging on a line and a bunch of kids making up games in the middle of the street.

The idea of feeling "free" has been a hot topic lately. What effect has the pandemic had on you?

For several months, I couldn't write. The news was too much for me. People have become so divided by their political views. I haven't lost friends, but I've had a lot of uncomfortable conversations about politics, personal preferences and boundaries that were all a reaction to something we were witnessing in the news. I've had friends who have lost friends because of standing on opposite sides of the discussion on Black Lives Matter.

Has your writing changed since the publication of your first book?

I care about public perception now, and I didn't before. That freaks me out and makes me angry – that I might not be as bold or honest with my work as I was before.

What are you working on now?

I'm writing a novel that's set in Oshawa, Durham Region and the Toronto area. I love the idea of small towns and the closeness and intimacy that comes with that. As a teenager in Durham in the early 2000s, I literally had nothing to do. So that meant a lot of house parties, a lot of sitting in peoples' driveways. My book deals with codependency and intense friendships. There's this secretness to living there that I was attracted to. But Durham is a very simple place. When you leave, the possibilities suddenly become endless. —Andrea Yu

←

Book recommendation?

I'm currently reading *Bad Cree* by Jessica Johns

An author you admire?

Tia Williams

Favourite spot at UTSC?

I wrote *Shut Up You're Pretty* in the Bladen Wing. It's a special place for me

PHOTOGRAPH BY BRENT GOODEN



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