

MISSISSAUGA / ST. GEORGE / SCARBOROUGH

University of Toronto

MAGAZINE



**CAN
ELECTRIC
VEHICLES
SAVE
THE
PLANET?**

Steering past the hype

Autumn 2023

PLUS: RECOVERING FROM ADDICTION - THE THEATRE OF TOMORROW - CHATGPT COMES TO CLASS -
WHAT PHOTOS REVEAL ABOUT WAR - TOOLS OF SCIENCE PAST - HOW ROBERTS GOT ITS LOOK

SPEEDING UP SCIENCE

DATE: SEPTEMBER 18

TIME: 1:48 P.M.

CAMPUS: ST. GEORGE

Science has brought us robots and artificial intelligence. Now, robots and AI are changing how we do science, making it faster, cheaper and more productive.

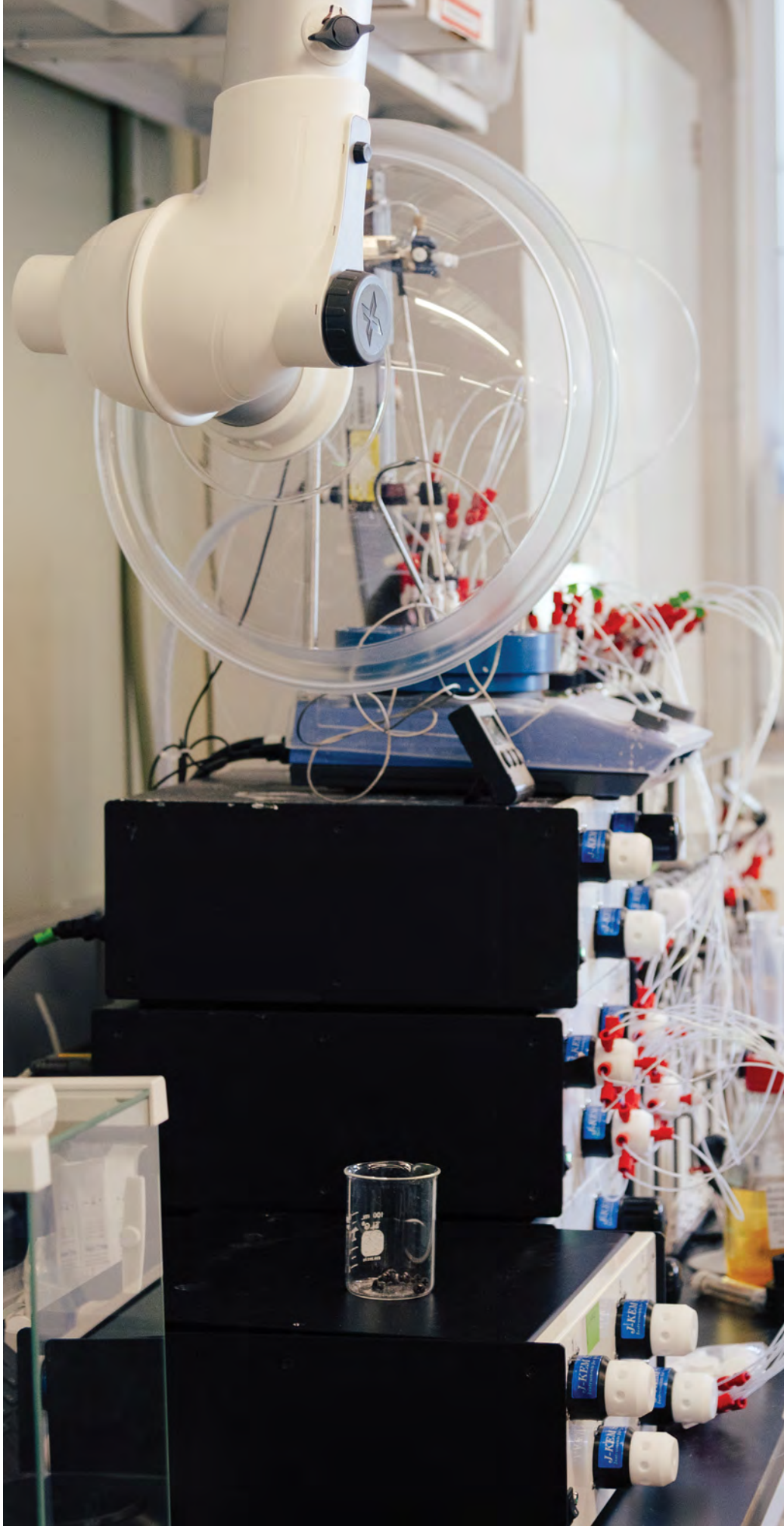
In this chemistry lab, robots do 90 per cent of the manual work. There is still a lab manager to oversee operations but almost all of the most tedious, repetitive tasks are handled by machines. AI, meanwhile, is helping scientists choose experiments to yield the greatest chance of success, allowing them to focus on bigger questions.

This “self-driving lab” belongs to U of T’s Acceleration Consortium, a two-year-old network of nearly 100 researchers around the world that is using AI and automation to radically shorten the time it takes to discover new materials. Earlier this year, the group received a \$200-million federal research grant – the largest ever to a university in Canada.

The consortium’s director, Alán Aspuru-Guzik (pictured), says the group already has proof their approach works. Scientists here took just two months to test the efficacy of more than 1,000 molecules for use in organic lasers, identifying two with state-of-the-art performance. (Other researchers have taken as long as five years to test 10 molecules.)

Organic lasers are cheaper to produce than conventional lasers, easier to modify and more environmentally friendly.

“We’re essentially supercharging the process of scientific discovery,” says Aspuru-Guzik. —**Scott Anderson**





PHOTOGRAPH BY POLINA TEIF



LIVING IN HARMONY

DATE: SEPTEMBER 1

TIME: 9:36 A.M.

CAMPUS: SCARBOROUGH

More than a few tears were shed between Reva Birla and her parents as they hugged each other goodbye. They had just finished moving the first-year student into her new residence room at U of T Scarborough.

“It was obviously a very emotional moment with my parents,” says Birla, who is studying co-op molecular biology and biotechnology. “At the same time, I’m also very excited to start university.”

Birla joined 746 other first-year students moving into Harmony Commons, U of T Scarborough’s new nine-storey student residence at the corner of Ellesmere Road and Military Trail. The residence features single- and double-occupancy rooms with high ceilings, giving each room a modern, open-concept feel. The building’s large dining hall located on the main floor has a variety of nutritious options and comfort foods. There are mixed-use spaces and lounges throughout the building, as well as a rooftop garden and terrace.

Harmony Commons also happens to be North America’s largest passive house building – an energy-efficient design standard that is among the most rigorous in the world. The residence’s energy-saving features include triple-glazed windows, walls with improved thermal performance and continuous insulation, among others. The result is that it consumes 40 to 60 per cent less energy than conventional buildings. —Don Campbell



PHOTOGRAPH BY NICK IWANYSHYIN

CLEAN MACHINE

DATE: AUGUST 23

TIME: 11:43 A.M.

CAMPUS: MISSISSAUGA

Gurtaj Bajwa, a building engineer, makes notes after checking pressure readings from the geothermal system at the Instructional Centre.

The system, which began operating in 2011, heats the centre in winter and cools it in summer – without the need for a boiler or chiller. All that’s required is a small amount of electricity, which enables U of T Mississauga to reduce its carbon emissions.

The system functions a bit like a battery, explains Kranti Sharma, senior manager, utilities services, and chief operating engineer. During the hotter months, the geothermal system strips excess heat from inside the building and stores it inside a network of pipes, deep underground. Then, in winter, the stored heat is taken out of the ground and pumped into the building to warm it.

U of T Mississauga’s new science building also features a geothermal system; it covers 90 per cent of the building’s energy load, drastically reducing the building’s carbon emissions.

U of T Mississauga is aiming to create a carbon neutral campus before mid-century. By 2030, UTM will design and construct new buildings to a minimum LEED gold standard under the Canadian Green Building Council guidelines.

—Patricia Lonergan



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ON THE COVER



Our cover illustration, by Tyco, captures the hope that electric vehicles offer the world a near-magical solution to climate change. But do they? On p. 18, he depicts a more sobering reality: EVs, despite all their promise, come with their own set of environmental challenges

Badri can't wait to code something you've never seen before.

“Autonomous aviation might be the future,” says Badri Widaatalla. “I’d love to be a part of that.”

And he just might. A scholarship, created by a gift from Wilma Winkelman’s will, helped Badri begin his studies in computer engineering.

Coding combines analytic skills and creativity—that’s why Badri loves it. And it’s this balance that will help him innovate. “I really want to bring something new to the world.”

Include a gift for U of T in your will and help students soar. Contact Michelle Osborne at michelle.osborne@utoronto.ca or 416-978-3811, or visit uoft.me/giftplanning



UNIVERSITY OF
TORONTO

DEFY
GRAVITY



This young man will be a change-maker and inspiration in whatever country he works.

ELIZABETH MCDONALD

MLS 1982, BOBCAYGEON, ONTARIO

Incredible Journey

We received more than a dozen comments from readers expressing support for Jaivet Ealom, whose story of escaping oppression in Myanmar, coming to Canada as a refugee and enrolling at U of T, appeared on our Spring 2023 cover.

This young man will be a change-maker and inspiration in whatever country he works. I hope that U of T will update us on his life and progress. What an amazing and wonderful story this is!

ELIZABETH MCDONALD, MLS 1982, BOBCAYGEON, ONTARIO

This is a remarkable story showing human resilience, strength and courage. I wish Jaivet Ealom peace, happiness and success with his future journeys. Thank you for sharing this story.

JOAN ELIZABETH CHEN, BA 1996 ST. MICHAEL'S, MARKHAM, ONTARIO

The Hidden Cost of International Travel

In his Spring 2023 column, President Meric Gertler wrote about U of T's global strategy and the value of face-to-face meetings with colleagues in other countries.

No doubt U of T and its partners benefited from President Meric Gertler's recent trips to India and Africa. But his column should have noted that jetting across the globe is problematic because it is a significant – and fast-growing – source of carbon. According to Transport Canada, from 2005 to 2019 greenhouse gas emissions from our airlines rose 74 per cent.

No one denies the value of meeting face-to-face. Everyone knows video conferencing can have a one-dimensional quality, making full expression and authentic engagement difficult. But given the climate crisis it may now be the only ethical way to connect with colleagues overseas.

What is the biggest challenge facing the Toronto area?



31%

Transit and getting around the city

29%

Affordable housing and homelessness

10%

Safety

9%

Cost of living

21%

Other

U of T students share the concerns of many others who live in the Toronto area: too much traffic, unreliable transit, high rents and homelessness. While students at U of T Mississauga and U of T Scarborough cited transit as their top concern, those downtown more often complained about the lack of affordable housing. Says Amanda Wang, a fourth-year student in peace, conflict and justice studies: "A lot of my friends are struggling to find a place. It's not that they have a low budget; in Toronto, it's just not enough." To help matters, U of T Scarborough opened a new residence in September, and U of T is changing its need-based financial aid program for students to reflect the high cost of living in Toronto.

This highly unscientific street poll of 100 U of T students was conducted across the three campuses in July 2023.

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How President Gertler gets around matters because, as a community leader, he helps establish social norms. When he flies instead of using a video platform, he suggests that non-essential air travel is morally acceptable. I'm not sure this is the case anymore. But I admit it is a legitimate topic for discussion. That's the debate we needed to see in his article.

GIDEON FORMAN, BA 1987
VICTORIA, Toronto

Ron Saporta, U of T's vice-president, operations (acting), responds:

U of T is taking decisive action against climate change through education, research and operations. We also know we can have a bigger impact by working with universities around the world. As we forge the relationships necessary to address global challenges, we are conscious of our environmental impact.

This year, U of T became the first Canadian university to institute a mandatory, in-house carbon offsetting program – avoiding controversial third-party offsetting programs – for university-funded, business-related air travel. We are charging a fee for every kilometre flown and reinvesting that money into local projects that provide sustainability benefits.

Massey's Hidden Treasure

The Spring 2023 issue included a story about Massey College's Bibliography Room, where students create printed materials using 19th-century letterpresses. The story was expanded on the magazine's website.

The Bib Room is a treasure! Printing is an art and fundamental to culture. It is wonderful that these techniques have not been lost in our age.

The knowledge of creating the printed page will endure thanks to Massey College.

R.W. FISHER, TORONTO

Having written a dissertation on a 17th-century bishop who published some 250 books, I was glad to see print culture given such care in what is thought of as a digital era.

THOMAS WORCESTER,
REGIS COLLEGE,
UNIVERSITY OF TORONTO



Women in Science

In our Spring 2023 issue, Christina Guzzo, a professor of biological sciences at U of T Scarborough, spoke with us about her experiences with mentoring.

For female friends of mine who started in science decades ago, the problem was not just the shortage of female mentors in science. It was active opposition from their male colleagues. Being discriminated against was more than a “feeling;” it was reality. As in many other fields, it is crucial to change the minds of men. As an art historian, I still encounter younger female art historians dealing with gender discrimination – in a field where women hugely outnumber men.

ANNE THACKRAY, MA 1974, TORONTO

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U OF T SCARBOROUGH BIOLOGY LABS GET LATEST TECH

U of T Scarborough is investing \$10 million to transform 10 of its teaching labs in the department of biological sciences into modern, collaborative spaces for students.

Located in the campus's original Science Wing, the teaching labs are being outfitted with technology and equipment found in most industrial research labs, including plant growth chambers, aquatics tanks and an invertebrate tank. Students will

also have access to a qPCR – imaging equipment that allows sections of DNA to be measured in real time. Five of the labs will also meet high containment standards, allowing students to work with different types of bacteria and pathogens.

“These changes open up so much potential for our faculty and students to reimagine how they are able to teach and learn,” says Karolyn Keir, lab manager in the department of biological sciences.

U OF T MISSISSAUGA NEW INCUBATOR FOR LIFE SCIENCE ENTREPRENEURS

U of T Mississauga has created U of T's first wet lab incubator, SpinUp, filling a critical gap in life science entrepreneurship.

Housed in UTM's new science building, it will offer early-stage life science entrepreneurs affordable access to the equipment and programming they need to help bring their innovations to market.

“Entrepreneurs can use this facility for a fraction of the cost of comparable

spaces, gaining time and conserving capital to build their companies even before they have to seek major private investment,” says Kent Moore, UTM's vice-principal, research.

Most of the wet lab will be offered to ventures emerging from U of T's accelerator programs. SpinUp aims to keep entrepreneurs within the region and boost their chances of success. The space will also create new experiential learning opportunities and foster research partnerships between entrepreneurs and faculty.

U OF T PLACES 21ST IN WORLD RANKINGS

The University of Toronto has been ranked the top university in Canada, 21st globally and third among North American public universities in the latest *Times Higher Education World University Rankings*.

The closely watched international ranking evaluated more than 1,900 research-intensive universities across the globe based on their performance in teaching, research, knowledge transfer and international outlook.

U of T – which placed 10th among

public universities worldwide – was 15th overall in the research environment category, which reflects a university's reputation for research excellence among its peers.

“This latest ranking is a tremendous credit to our dynamic community of researchers, learners, teachers and innovators,” says U of T President Meric Gertler.

Overall, U of T continues to be one of the world's top-ranked public universities in the five most closely watched international rankings.



ACCELERATING PROGRESS

The great challenges of the 21st century are becoming increasingly urgent. From climate change and renewable energy to antibiotic resistance and drug discovery, we need solutions – and we need them now.

But ours is also a time of incredibly rapid change, in both technology and society. So we also need thoughtful, careful solutions that will truly serve human ends. And given the complexity of the challenges before us, we need to bring together knowledge and insights from across multiple disciplines in finding those solutions.

It's a tall order, but there is hope. And the University of Toronto community is helping to lead the way.

In 2021, we established the Acceleration Consortium as an institutional strategic initiative – a U of T-led global collaboration with partners in academia, industry and government. Based on the concept of “self-driving labs,” the consortium is harnessing the power of artificial intelligence, robotics and advanced

computing to turbocharge the discovery of new molecules and materials.

The consortium's goal is to achieve breakthroughs in everything from cancer treatments to low-carbon construction materials in a fraction of the time and at a fraction of the cost involved in traditional research and development. And to ensure that both the process and the results will be ethical and sustainable, the consortium includes top experts from the humanities, social sciences and professions, in addition to world leaders in science and technology.

This exciting initiative builds on a series of strategic decisions to leverage U of T's academic strengths and its distinctive capacity to address emerging, multidisciplinary challenges. The consortium's inaugural director, Professor Alán Aspuru-Guzik, is a pioneering scientist who was recruited to U of T from Harvard in 2018. He is the Canada 150 Research Chair in Theoretical and Quantum Chemistry, and holds a chair at the Vector Institute. The consortium's scientific leadership team includes Professor Michelle Murphy, Canada Research Chair in Science and Technology Studies and Environmental Data Justice, who brings an Indigenous and feminist perspective, and Professor Avi Goldfarb, the Rotman Chair in Artificial Intelligence and Health Care, whose work focuses on the digital economy.

Our foresight and strategy have been rewarded. Earlier this year we were delighted to learn that the Acceleration Consortium was awarded the largest research grant in Canadian history – \$200 million, from the federal government's Canada First Research Excellence Fund. Since then, we've been recruiting a group of highly skilled researchers to help realize the consortium's enormous potential.

This is a signature achievement for the University of Toronto – no other institution in the world is better positioned to take the lead on such an initiative. It's also a powerful new reason for hope, as we look ahead to our third century of learning, discovery and innovation.

MERIC GERTLER

Present-day Service of Remembrance
(photo by Laura Pedersen)

Dedication of the Soldiers' Tower, June 5, 1924
(City of Toronto Archives, *Globe and Mail*
fonds, Fonds 1266, Item 2806)



Standing together for 100 years.

In 1924, the university community honoured our fallen at Soldiers' Tower for the first time. So began a solemn tradition that lives on almost a century later.

On Friday, November 10, 2023, we will stand together in remembrance of the alumni, students, faculty and staff who died in the First and Second World Wars and other conflicts. We hope you will join us.

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



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CAN ELECTRIC VEHICLES SAVE THE PLANET?



Eliminating gas-powered cars and trucks may help avert a climate catastrophe. But they are only part of the solution

● BY KURT KLEINER

● ILLUSTRATION BY TYCO



↓

AS MORE ELECTRIC VEHICLES HUM PAST ON CITY STREETS, AND MORE CHARGING STATIONS APPEAR ON ROADS AND IN PARKING GARAGES,

IT'S EASY TO IMAGINE that we are winning the fight against climate change, one electric car at a time.

But electric vehicles by themselves are not a silver bullet to the problem of transportation pollution and climate change. And as we ramp up their use, they will create new problems that will have to be solved, warn U of T researchers who study transportation and climate.

“There is no future without electrification. But just electrification will not get us there,” says Marianne Hatzopoulou, a professor in U of T’s department of civil and mineral engineering. “We don’t want to fall into the trap of thinking that if we support electric vehicles, we’ve solved the problem.”

The transition to electric vehicles is already well on its way. Globally, electric cars made up 14 per cent of new sales in 2022, according to the International Energy Agency. In Canada, all-electric vehicles accounted for seven per cent of new car sales at the beginning of 2023.

At the UN Climate Change Conference in 2022, the Accelerating to Zero Coalition pledged to make all new cars and vans zero-emission by 2035 in leading markets, and by 2040 globally. Canada is currently considering regulations that would require automakers to ensure that 60 per cent of new passenger vehicles available for sale in 2030 are zero-emission, rising to 100 per cent by 2035.

Daniel Posen is an associate professor in U of T’s department of civil and mineral engineering, and the Canada Research Chair in system-scale environmental impacts of energy and transport technologies. He agrees electrification is vital. But relying solely on electric vehicles to reduce carbon emissions from transportation may not be enough, especially if we want to do it in time to stop a catastrophic two-degree rise in global temperatures.

To get an idea of the scale of the problem, Posen, along with Heather MacLean, a professor in U of T’s department of civil and mineral engineering, and post-doctoral researcher Alexandre Milovanoff, looked at how quickly the U.S. would need to electrify transport in order to meet emission goals that would keep warming to less than two degrees.

By 2050, the U.S. would need 90 per cent of all passenger vehicles on the road to be electric – 350 million vehicles. Right now, it has about a million. Considering how long cars last, that would probably mean by 2035 every new car sold would have to be electric.

If the U.S. could get that many EVs on the road that quickly, it would have to increase the electricity it generates by 1,700 terawatt-hours per year – or by about 40 per cent of its total production in 2021.

Posen says that there’s no similar analysis for Canada, but this country will likely face similar challenges in ramping up its electricity production. The problem is especially challenging because, to get the full benefit of EVs, the electricity that powers them – and how they’re manufactured – should be green. If not, you could end up with an EV that creates more greenhouse gases than an efficient gasoline-powered car.

For example, when you take emissions from manufacturing into account, an EV using electricity in a place like coal-dependent West Virginia will emit about six per cent more greenhouse gases over its entire lifetime than a gas-powered vehicle of the same size, according to Posen’s study.

“Solar and wind have gotten much cheaper than they used to be. These are not prohibitively expensive technologies anymore,” Posen says. “But there will be a challenge in terms of the technical resources, of building up the [green-energy] grid fast enough.”



CRITICAL MINERALS

Possibly one of the most difficult problems electric vehicles will create is the increased demand for critical minerals such as lithium, manganese and cobalt.

To meet the increased demand for green energy technologies,

“WE HAVE TO MOVE TO A PATH OF DECARBONIZATION, BUT WE HAVE TO CHOOSE THAT PATH VERY SOBERLY”

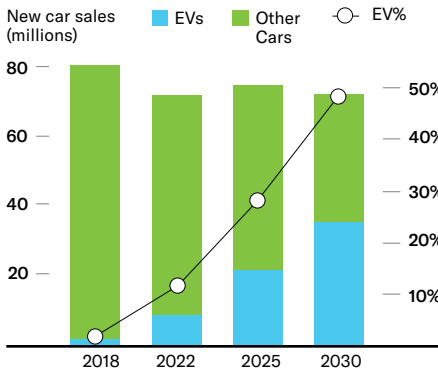


EVs BY THE NUMBERS

To meet the soaring demand for electric vehicles, worldwide production of lithium - a silvery metal used in battery manufacturing - will have to increase 500 per cent by 2050, according to the World Bank.

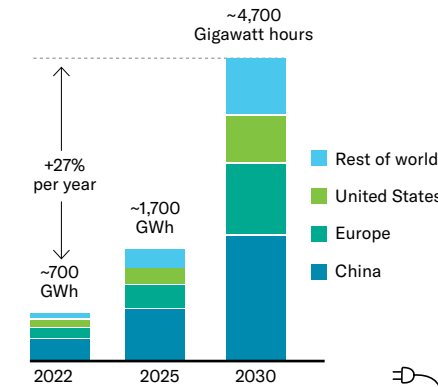
EV SALES ARE RISING QUICKLY

● By 2030, electric cars are expected to account for half of global new car sales



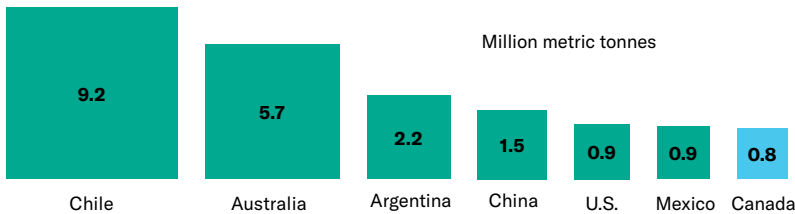
LITHIUM-ION BATTERY DEMAND, BY REGION

● As EV sales grow, the demand for batteries is expected to soar



TOP LITHIUM RESERVES, BY COUNTRY

● Much of the world's confirmed lithium reserves are in Latin America and Australia



including EVs and the renewable power needed to generate the electricity to build and operate them, production of lithium and cobalt will need to increase by 500 per cent by 2050, according to the World Bank - and that could pose problems. "Mining has a long history of creating significant environmental harms," says Teresa Kramarz, an assistant professor at U of T's School of the Environment and co-director of the Environmental Governance Lab. "How are these harms going to be mitigated? Furthermore, how are we going to ensure that the social perils of extractive industries are also avoided?" she asks.

Mining tends to displace people

and contaminate local environments. Many critical minerals are found in lower-income countries where, paradoxically, mineral wealth can create huge problems. For instance, in the Democratic Republic of Congo, cobalt mining has contaminated water supplies and cropland, led to a lack of transparency and accountability, and increased forced labour, Kramarz says.

In addition, all the materials that we put in solar panels and batteries will eventually need to be recycled and disposed of properly to avoid contaminating the environment. These include not only the critical minerals, but also heavy metals such as lead, tin and

cadmium. "We have to move to a path of decarbonization, but we have to choose that path very soberly, based on what kind of tradeoffs are associated with different options," says Kramarz.

One promising avenue, developed by Gisele Azimi, a professor of chemical engineering, involves changing the way that the lithium-ion batteries used in electric vehicles are recycled.

Azimi and her team at U of T Engineering's Laboratory for Strategic Materials, have proposed a new, more sustainable method to extract critical minerals such as lithium, cobalt, nickel and manganese from lithium-ion batteries that have reached the end of their useful lifespan. "These batteries are still very rich in elements of interest," says Azimi.

Not only can recycling provide these materials at a lower cost, but it also reduces the need to mine raw ore, which comes with all the problems noted by Kramarz. "We really believe in the benefits of this process," says Azimi.



THE AIR WE BREATHE

EVs also promise to reduce ground-level pollution - the kind that affects the air people breathe. Pollutants such as nitrogen oxide and fine particulate matter, which commonly come from cars, cause 15,300 premature deaths in Canada every year - 3,000 of those in the Greater Toronto and Hamilton Area alone, according to Health Canada. In one study, Hatzopoulou found that if all cars and SUVs in the region were electric, there would be 313 fewer deaths every year, with a total social benefit of \$2.4 billion.

On the other hand, electric vehicles still create some ground-level pollution in the form of airborne particulates. These come from the grinding of brake pads and rotors, and the wear of tires on roads, says Matthew Adams, an



associate professor in the department of geography, geomatics and environment at U of T Mississauga. “EVs are going to eliminate the end-of-tailpipe emissions. Yes, absolutely. But they’re not going to eliminate all emissions,” Adams says.

“It’s really important that people recognize, from a community health perspective, that electric vehicles aren’t going to save us from these particles being generated. How much reduction we will see is still unclear.” It is possible, for example, that the lower operating costs of EVs will encourage people to buy larger vehicles and to drive them more, resulting in even more particulate pollution.

Adams, along with U of T colleagues, is working on a study with the U.S.-based Health Effects Institute to understand EV particulate pollution better.

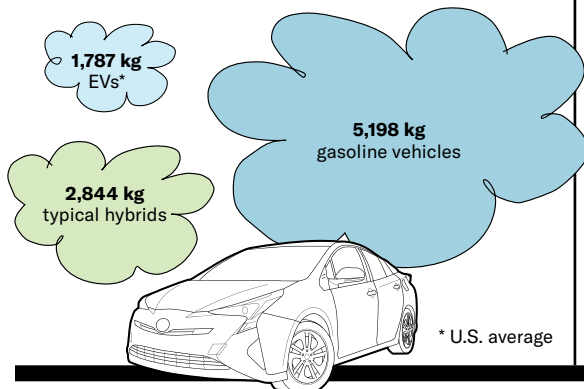


THE PROBLEM WITH TRUCKS

Converting delivery and long-haul trucks to zero-emission vehicles is an even more difficult problem. Although delivery trucks account for only 15 per cent of traffic by kilometre driven in the Toronto and Hamilton region, they contribute 50 to 70 per cent of the pollutants we breathe, Hatzopoulou says.

HOW MUCH CO₂ DIFFERENT KINDS OF CARS PRODUCE

● EVs cause fewer carbon dioxide emissions each year than gas vehicles, but not zero. It depends on how clean the electricity is that powers them



IF YOU WANT TO MAKE A LOW-EMISSIONS TRIP TODAY, YOU COULD SIMPLY TAKE THE BUS



Electrification will be especially challenging for long-haul commercial trucks, she says. Partly it’s the larger up-front cost of replacing a commercial fleet. Partly it’s the still-limited range of electric vehicles. And partly it’s the long charging times that could affect scheduling.

Instead of counting on electrification, we might have more immediate impact by redesigning how we deliver goods. “Do you have to have a delivery truck circulating in the neighbourhood?” Hatzopoulou asks.

Distribution centres and routes could be planned so that the “last mile” of deliveries could be made by bicycle, for example. People might also need to stop expecting same- or next-day delivery, which makes it harder for companies to consolidate deliveries. “My thinking is, ‘Yes, technology can get us somewhere.’ But we have to also rethink how we deliver goods in large metropolitan areas,” says Hatzopoulou.



A PATH FORWARD

So, what to do? Every researcher interviewed for this article agreed that electrification is necessary to reduce greenhouse gas emissions. But other steps could be easier, cheaper and just as effective. For example, if you want to make a low-emissions trip today, with a carbon footprint almost as good as the newest electric vehicle, you could simply take the bus.

If you drive a kilometre in an electric car in Ontario today, the emissions from the electricity generated to power that trip come to 15 grams. That’s a lot better

than the 250 grams if you drove a gas-powered car. On the other hand, you could do almost as well simply by catching the bus – emissions from public transportation average just under 20 grams per kilometre per person.

“So even your good old diesel bus running up and down Kipling Avenue is still competitive, because of ridership. You’re dividing these emissions from the vehicle by a lot more people,” Hatzopoulou says. A low-emissions bus would bring per-person emissions down even further.

Changing the design of our cities could decrease traffic-related emissions by 25 per cent, according to the Intergovernmental Panel on Climate Change. We could make cities denser, design mixed-use neighbourhoods that people can walk and bike in safely, impose downtown congestion charges, and – this is especially important – improve public transportation, says Steven Farber, an associate professor in the department of human geography at U of T Scarborough. He warns that simply moving to electric cars without making other changes risks “doubling down on a highly inefficient mobility system.”

“There’s still a fundamental problem,” he says. “Car-based mobility systems don’t scale well. In larger cities, they occupy too much space, and therefore they take away land that cities need in order to provide residents with a high quality of life.”

And electric cars don’t solve problems around safety, congestion, land use and travel times.

“Trying to move that many cars around through a city is just completely inefficient,” he says – electric or not. ■



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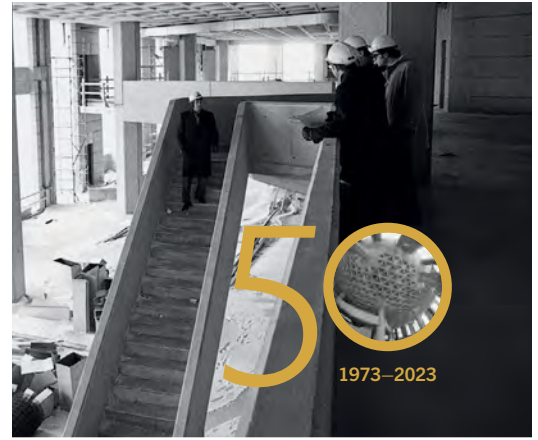
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Needed: two alumni

The College of Electors is seeking candidates who reflect the diversity of the university's alumni, will enrich the U of T community with their perspectives, experiences and connections, and actively participate in the governance of the university.

The *Call for Applications* for two of three alumni governor seats on the Governing Council—the senior body that oversees the University's academic, business and student affairs—will open at noon on Thursday, November 16, 2023.

Each seat is for a three-year term beginning July 1, 2024 (the two incumbents are eligible to stand for re-election).

The deadline is December 14, 2023. Additional information is available at:

governingcouncil.utoronto.ca/needed-two-alumni



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light.

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cles.

David Rokeby,
director of U of T's
BMO Lab for Creative
Research in the Arts,
Performance, Emerging
Technologies and AI



THE

THEATRE

OF

■ TOMORROW

A U of T lab is working with actors, writers and directors on how they could harness AI and other emerging technologies to generate new ideas and – just maybe – reinvent theatre

By Glenn Sumi

Photographs by Kate Dockeray

IN A DARK BASEMENT ROOM IN THE

northwest corner of University College, I'm catching a glimpse of the future of live theatre and performance. Or at least a possible future.

There is no stage of any kind here, and no audience seating. Nevertheless, for the past four years, some of the country's most talented theatre artists, including writers, actors and directors, have walked into this space (and its predecessor, a few blocks south at the Koffler Centre) to act, speak and move – and test how they could use artificial intelligence and other technologies to push theatre in new directions.

Welcome to the BMO Lab for Creative Research in the Arts, Performance, Emerging Technologies and AI.

"This used to be the University College kitchen," explains the lab's genial director, David Rokeby, as he fiddles with computer cables and switches. Yet what Rokeby, his research students and international artists have been cooking up at the lab – which is part of U of T's Centre for Drama, Theatre and Performance Studies – is anything but traditional theatre fare.

I sit in on a session in July with Nick Flynn, an American poet who is visiting the lab for a few days to experiment with a voice-to-image system that uses artificial intelligence to create visual representations of what a performer is saying. As he reads a poem from his upcoming collection, images flash onto a makeshift screen along one wall: birds fly by, corpses pile up, a forest burns. When Flynn says, "A blue mass of cold," a blue stone appears, hanging in the sky, like something out of a Magritte painting. To influence the type of image the computer produces, he can provide the system, before he starts reading, with prompts, such as "landscape," "black and white" or "in the style of Hieronymus Bosch."

Flynn, who thrives on collaboration, is excited by the possibilities of what he sees. When his book is published later in the year, he hopes to incorporate the technology into his public readings, adding an immersive layer to his performances.

Later, as he gets ready to return home, Flynn tells Rokeby it's a shame that his book is finished. Because of this experiment, he says, he can "feel the poems rewriting themselves."

"Nick saw the system go off on tangents from the words he used, showing him new possibilities," says Rokeby. "But [the system] also pointed things out the way a proofreader might, asking him to clarify a point or make things more concrete. It made me think about the potential creative roles of these technologies in real life."

Real life. Real space. These are terms Rokeby returns to during our conversations. As an installation and interactive artist, Rokeby has been working adjacent to new technologies since the early 1980s. He's interested in how they affect living, breathing actors and vice versa – not in flashiness for its own sake (he mentions the Royal Shakespeare Company's Intel-funded production of *The Tempest*, complete with 27 projectors, as a spectacle that didn't add anything to the play). So, he's



For his play, *No Save Points* (right), writer and actor Sébastien Heins (above) worked with lab director David Rokeby on using motion-capture to create an animated 10-year-old version of himself

choosy about the kind of technology the lab will work with. Video has been around for too long. "It's not a place for the lab to invest its time," he says. Virtual reality doesn't interest him so much, either: he finds it alienating for audience members to have to put on a clunky headset.

Although he enjoyed parts of Canadian playwright Jordan Tannahill's 2021 show *Draw Me Close*, which combined virtual reality with a live performance by a single actor for one audience member at a time, he says the technology is still unproven – and may not gain widespread appeal. "The fact that VR did not take off massively during the COVID pandemic was fascinating to me," he says. "Some people are 100 per cent in, but others aren't going there."

But he is intrigued by working with artists who want to pose questions about the role these technologies should play in society. And he wants to give U of T students from a variety of fields a chance to work creatively with these kinds of tools, which they will likely use at some point during their career.

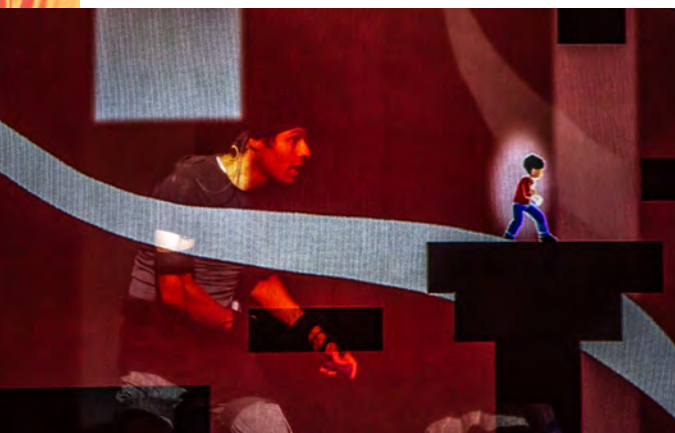
During the early days of the pandemic, the lab and Canadian Stage created a paid eight-month residency to bring in artists to experiment with the technologies. The program launched with Sébastien Heins and Ryan Cunningham, both writers and actors. It quickly expanded to include writer and director Rick Miller and Stratford star Maev Beaty. "Nobody was

working [because live theatres were closed], and so this was an amazing opportunity for all of us,” says Rokeby.

Heins worked closely with Rokeby on his autobiographical play, *No Save Points*, figuring out how to use the latest motion-capture technology, which tracks human movement to animate a digital character, to tell a story about his mother’s Huntington’s Disease, a debilitating neurological condition.

Heins was in his early 20s when he found out about his mother’s illness and was confronted with the possibility that he had inherited it as well. The play, which enjoyed sold-out shows in Toronto in June, illustrated his attempts to escape from his real-life worries by retreating into a fantasy world through his Game Boy. “I found myself wanting to escape from the truth of her diagnosis – and so the Game Boy became a symbol of taking back control,” Heins said in a U of T News interview just before the play’s debut.

The lab helped Heins use motion-capture to create an animated, 10-year-old version of himself that would appear on a screen onstage. When certain audience members pressed buttons on a control pad they’d been given, they sent signals to sensors planted on Heins that would tell him whether to



move left or right, jump or duck. His movements triggered his on-screen avatar, who was trying to escape danger, to do the same.

Using this technique, Heins effectively brought several “video games” in the show to life. The metaphor illustrated Heins’s anxiety about his mother’s – and his own – health. And it captured his feeling of helplessness. “The use of technologies as a metaphor here is really key because it shifts it from being, ‘OK, here’s a cool thing you can do,’ to ‘Here is a way this character is working through things,’” Rokeby told U of T News.

“I was really specific about what I thought we needed the tech for,” says Heins. “I needed to test a prototype of a 3D-looking avatar that moved on the screen. If the motion-capture character looked a little weird, David tweaked it. And he also gave philosophical mentorship as well, talking about what to do if and when the tech went wrong.”

One day, as Heins was working on *No Save Points*, he had finished up what he was doing and took off the motion-capture suit. A stick-figure avatar of himself connected to the sensors

in the suit was still up on a screen. And suddenly Heins saw his avatar’s head flop over and its arm begin to move erratically – much like his mother’s limbs would move with her disease. That haunting image – a poignant mix of theatre and technology – made it into the final moments of *No Save Points*. “That’s the sort of thing you don’t get through discussion and theorizing,” says Heins. “It’s pure discovery.”

The lab, which is supported with a \$5-million gift from BMO Financial Group, is also experimenting with a large language AI tool that works like ChatGPT, the popular chatbot released late last year. Rokeby has fed the system the complete works of Shakespeare and can now get the computer to generate lines of text that resemble the Bard’s. This in itself may not seem especially useful. But what if a contemporary playwright fed the system their own collected works? Could the AI help generate ideas for future projects? Or assist them in writing?

Rokeby tried something like this with Rick Miller, who was interested in seeing what the system could come up with. He wasn’t especially impressed with the output, but he saw its potential. “You wouldn’t say [the result] was a play, but it was a kind of live performance,” Miller observed. “It made me wonder, ‘Am I expendable?’”

The text generator also offers a “chat mode,” which allows for a real-time, improvised dialogue between the performer and the system. Such an AI could act, effectively, as a rehearsal partner, challenging actors to respond authentically and creatively, and encouraging them to experiment with different emotional nuances.

FOR THE NEXT SEVERAL MONTHS, Rokeby will focus on preparing for the lab’s move into a new space in UC’s Laidlaw Wing. There, it will occupy one of three state-of-the-art studios equipped with full lighting grids and sound systems. (The other two studios will belong to the Centre for Drama, Theatre and Performance Studies.) Set to open in 2024, the new facility will be used for teaching, experimenting and workshopping new productions.

Rokeby’s goal is to outfit the lab in such a way that artists – both students and visitors – can follow their instincts and intuition. Do they want to use the voice-to-text-to-image tech for a scene? It’s available. Do they want an interactive light and sound system that responds to gestures you make while wearing a motion-capture suit? It’s also there. Do they want to use a large-language-model AI system to help generate ideas for characters or plot for a play they’re writing? That’s there, too.

“We want to be able to shift the space quickly and fluidly, and show them what’s possible,” he says. “It’s one thing to make cool, interactive experiences. But the process of making these things should themselves be interactive and responsive – you should be able to use the toolset at the speed of creative inspiration. That’s not just useful and efficient; it actually changes what’s possible, because you can feel your way through the possibilities.” ■



NEW PATHS TO RECOVERY

EVERY YEAR, THOUSANDS OF CANADIANS SEEK HELP FOR ADDICTION. WHICH TREATMENTS WORK BEST?

JOHN HAD BEEN FEELING TIRED FOR MONTHS.

He didn't have any energy or motivation, and he couldn't keep up with his usual work and family obligations. What seemed to help was a few drinks in the evening. His wife thought he had a problem. So did his doctor, who gave it a fancy label: "alcohol use disorder." They thought he needed treatment.

Actually, "John" doesn't exist – he is part of a vignette that U of T researchers are using to assess people's views toward addiction. After reading the vignette, people are asked a series of questions to tease out their beliefs. Is addiction a moral failing? Is it a consequence of trauma? A genetic predisposition? A disease?

Samantha Rundle, a recent PhD graduate from U of T's department of psychology, is interested in the relationship between addiction and stigma. She is also interested in how stigma might act as a barrier to treatment for people like John and whether changing the way we talk about addiction can reduce it.

Rundle gave questionnaires to people after they read a vignette similar to the one above. Sometimes John was Jane, sometimes John/Jane had an addiction not to alcohol, but to opioids or gambling. Sometimes John/Jane had no addiction at all, but had diabetes. Rundle asked people to say whether statements such as "once someone has an addiction,

by
ALISON MOTLUK
illustrations by
GRACIA LAM

they will always have an addiction” or “individuals with addiction lack moral standards” were true. In addition to 755 responses from the general public, she also got them from 109 people who had addictions, to measure self-stigma.

She found that in the survey of the public, people were more likely to align with what she calls the “psychological” model of addiction, which attributes addiction to past traumatic experiences, maladaptive coping mechanisms and other psychological deficiencies. People who view addiction through this model, she found, were less likely to stigmatize people with addictions. Those who view addiction through a “moral” model, which attributes addiction to weakness in character and bad choices, were more likely to stigmatize, she found.

“My main goal was to identify which models are related to less stigma,” says Rundle. “Maybe the way in which we talk about addictions and the way in which we learn about them and the way that they’re portrayed in the media need to be modified in order to have these people be OK to reach out to treatment programs.” In short, why not create messaging around addiction that reduces stigma, so that more people who need treatment will be willing to get it?

There is evidence that treatment can help a person overcome addiction. Some people defy stigma and seek that treatment out. But much is still unknown about exactly how different treatments work and what their effects in the brain really are. U of T researchers are examining those questions, pushing forward our understanding of how addiction works, one piece of the puzzle at a time.

ACCORDING TO STATISTICS CANADA, about one in five Canadians will experience an addiction at some time in their life. Data from other sources suggest about three per cent of Canadians will use illegal drugs such as cocaine, ecstasy or heroin in any given year. Canadians using prescription medications such as opioid pain relievers, psychoactive drugs and stimulants also sometimes report problematic use. But alcohol, nicotine and cannabis remain Canada’s most-used problem drugs.

Addiction is a burden on the Canadian economy. According to the Centre for Addiction and Mental Health (CAMH), substance abuse disorders cost about \$40 billion annually in additional health care and criminal justice expenses, and lost productivity. The personal cost – in misery, illness and death – is harder to put a number on.

Konstantine Zakzanis, a professor in the department of psychology at U of T Scarborough, and Tyler Brown, a master’s student in psychological clinical sciences, are

interested in whether the cognitive abilities that are compromised during addiction – things like memory, concentration, decision making, planning and problem-solving – can be restored by treatment and abstinence. Most research addressing this question only looks at a snapshot in time. But Brown (under supervision from Zakzanis), has just launched a longitudinal study, to examine that question over an extended period. He has partnered with a private inpatient treatment facility, the Canadian Centre for Addictions; together they aim to follow at least 85 patients for several months. Testing and interviews when a person first arrives at the centre will establish their baseline.

Brown is interested not only in standard measures of cognition, but also the person’s mood, personality characteristics and ability to navigate daily life – things like personal care, shopping, cooking, housekeeping, banking, relationships and vocational activities. He knows that most people with substance use disorders are struggling with more than one substance, and he has embraced that in the study design.

The centre’s programs run for 30, 45, 60, 90 or 120 days, and they involve counselling, social support and activities such as yoga, art therapy and group walks. On day 30, all of the study participants, who have given informed consent, will be retested. The same will happen on day 90, even if the people have left the facility, either because their program ended or because they didn’t finish it. After that, a check-in will occur three months post-treatment.

Brown says he and Zakzanis want to know what happens to people in the real world. “Are they able to get back to work?”



Are they able to get back to living independently? Are they able to get back to school, because their cognition is now good enough? That's important," says Brown, "not just for the individual, but for their caregivers, their families, their employers." Some, they know, will run into trouble again and come back into treatment. He wants to continue following them as well. What led to the relapse? What did they end up using?

Research Zakzanis has done in the past suggests that how much and how long a person has used drugs is a decent predictor of how well they will recover in terms of cognition. But he speculates that so are traits like resiliency and conscientiousness. "We're going to be measuring those things along the way," he says.

His view is that when cognition – specifically, the brain's executive functioning – improves, so does a person's ability to operate day to day. He likens executive functioning to the conductor of a choir. "You have all these other parts of your brain doing things – processing information, consolidating new memories, perceiving the world around you – meaning they're all adding music," he says. "But at the end of the day, it only sounds like music when the conductor can put it all together."

If treatment coupled with abstinence can be shown to improve overall cognition, and therefore control over behaviours needed to overcome addiction, that will be a promising finding – indicating there's hope for long-term meaningful cognitive recovery.

IF TREATMENT can restore cognitive function, then there is almost certainly more than one way to make that happen. If brain-based mechanisms are underlying the disorder, says Victor Tang, an addiction psychiatrist and clinician scientist at CAMH and an assistant professor in U of T's department of psychiatry, then therapy, medication and brain stimulation could each be successful in bringing about modifications. "It's just different entry points into changing the brain," he says.

When people do cognitive behavioural therapy and other forms of talk therapy, they are developing coping mechanisms and personal strategies to figure out how to avoid drug use, he says. The idea is that such therapy changes the way the brain works; it changes cognition itself. But such changes are underpinned by changes in brain circuitry. And as a neuroscientist, Tang is experimenting with techniques to treat the brain more directly.

Tang is using electrical or magnetic pulses that stimulate the brain rather than psychological therapy. But in many ways they share the same goal – altering brain function. One technique, called repetitive transcranial magnetic stimulation, involves creating an electromagnetic field in a coil, placing the coil next to the part of the brain you want to influence – in this case, the prefrontal cortex – then using it to activate the brain and hopefully cause changes in how the brain functions.

Two years ago, scientists in the U.S. and Israel showed that stimulating this region of the brain in this way was effective at helping people quit smoking. The U.S. Food and Drug Administration approved the device for smoking cessation treatment in 2021, and Health Canada did the same in 2022. The smoking study was proof of concept that repetitive transcranial magnetic stimulation could be effective in treating addiction, says Tang.

WHY NOT CREATE MESSAGING AROUND ADDICTION THAT REDUCES STIGMA, SO THAT MORE PEOPLE WHO NEED TREATMENT WILL BE WILLING TO GET IT?

But he is mindful that, as he puts it, "a lot of addictions travel with mental illness." So, Tang will be investigating the treatment's effectiveness against nicotine addiction in people with various mental health conditions. In these studies, participants will come to

CAMH for treatments over a period of three or four weeks. Each session of repetitive transcranial magnetic stimulation will be paired with a reminder or "activation" of their cognitive coping skills. Since both the brain stimulation and the reminders are trying to do the same thing – alter the way the brain works – Tang believes the therapy will reinforce the changes introduced by the stimulation.

Each session of repetitive transcranial magnetic stimulation will be paired with a reminder or "activation" of their cognitive coping skills. Since both the brain stimulation and the reminders are trying to do the same thing – alter the way the brain works – Tang believes the therapy will reinforce the changes introduced by the stimulation.

ANOTHER STUDY (which Tang is not leading but is working on) will look at addiction alongside depression. Previous research has shown that another kind of non-invasive brain stimulation, known as theta burst stimulation, is effective at treating depression. One of its advantages is that it is much quicker than repetitive transcranial magnetic stimulation – just three minutes compared to about 40 minutes – with equally good outcomes. Tang and his colleagues want to know if theta burst stimulation could be effective at treating patients who have both depression and alcohol use disorder.

Because the researchers know that cognition is affected by both these conditions, they will examine whether a four-week trial of theta burst stimulation can improve scores on tests of cognition. It works the other way too: cognition affects both addiction and depression. So, they also want to know if depression scores improve and craving symptoms decline.

But even if these brain stimulation treatments work in the short term, Tang admits, it is not yet clear if the positive effects will last without some sort of maintenance therapy – another question he would like to explore. ■

Back where it all began.

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Education Is Evolving in the Age of AI

As ChatGPT disrupts conventional teaching and learning, U of T is helping instructors and students to adapt and innovate



As a student in a third-year computer science course at U of T Mississauga earlier this year, Valeria Ramirez-Osorio was able to turn for academic help to a new, approved “member” of the teaching team: an AI chatbot. QuickTA was on hand 24-7 to answer Ramirez-Osorio’s questions about topics such as relational algebra, computer programming languages and system design. It was able to summarize complex definitions, explain concepts and generate computer code. Trained on the course curriculum and based on the AI language model of ChatGPT, it was able to respond to her queries in a conversational way. Ramirez-Osorio says QuickTA was invaluable in helping her complete assignments and prepare for tests – most of the time. “It was very impressive. It was well formatted and easy to understand. Me and my friends, we used it a lot for studying,” she says. But it did have limitations: “The only time it let me down is when I asked it something too specific.”

The introduction of QuickTA was sparked by the emergence last November of ChatGPT, the wildly popular chatbot that can process, understand and generate written language in a way that seems similar to humans. ChatGPT can answer questions, compose essays

and stories, summarize long texts, translate from one language to another, generate computer code – all with results that are frequently (but not always) accurate and relevant.

Attracting 100 million users in its first two months, the free web-based tool has been shaking up diverse domains such as marketing, media, and customer service. In higher education, the technology has sparked deep reflection about teaching methods, evaluation formats and academic integrity. Some institutions have restricted or outright banned it.

“The significance of this technology is potentially quite large,” says Susan McCahan, U of T’s vice-provost of academic programs and of innovations in undergraduate education. “I think we are just starting to scratch the surface of what it means.”

Charged with guiding human-AI interaction at U of T, McCahan says she spent most of her winter break last year studying the ChatGPT phenomenon and its implications for teaching, learning and other key functions at the institution. Together with several colleagues, she determined that new policies on AI were unnecessary, but that guidance for faculty and students was needed.

By the end of January, they had developed a list of FAQs on the use of ChatGPT and generative AI in the classroom, making U of T one of the first Canadian universities to do so. The document, which is revised regularly to keep pace with changing technology, covers topics such as whether instructors can use AI in their teaching (yes, with caution: the university discourages the use of public tools it hasn’t vetted for privacy and security); whether students can use it to complete assessments (no, unless specified otherwise by their instructor); and the tool’s reliability (on occasion, it produces content that is inaccurate or biased).

“One of the important things for instructors is to have a conver-

sation with students about their expectations on how ChatGPT and generative AI can – or should not – be used in class,” McCahan says. She suggests instructors could help students understand their role when working with AI systems as the “human in the loop” – a term that refers to the primacy of human judgment in guiding the safe and responsible use of AI, and knowing when and how to override the technology when it fails.

As part of her research into the technology, McCahan convened a meeting on ChatGPT with her counterparts at 14 other research universities in Canada, and established an advisory group at U of T on teaching and learning.

ChatGPT’s meteoric rise also prompted McCahan’s office to extend funding for projects exploring how generative AI could be used in teaching. QuickTA was one such project, with Michael Liut, an assistant professor of computer science, piloting the intelligent digital tutor he co-developed to determine if it could provide timely and high-quality academic support to his students. (The tool gives accurate responses

about 90 per cent of the time). Once it’s optimized, he says, it could be especially useful in his first-year Introduction to Computer Science course, which can attract 1,000 students – a number that taxes the capacities of his 54-person teaching team.

“What I was focusing on was the mass scale. With a big class, we can’t give enough personalized help,” says Liut, whose invention recently won an AI Tools for Adult Learning competition in the U.S. “I realized that we could use this generative AI to give students personalized, unique support when they need it.”

It’s not just written communication that is being reshaped by generative AI. Several similar tools now make it possible to create new image, audio and video content. In another U of T-supported project, Zhen Yang, a graduate student at the John H. Daniels Faculty of Architecture, Landscape, and Design, is creating a guide for first-year students that focuses on the differences between traditional and AI image research methods and helps them use AI ethically. He

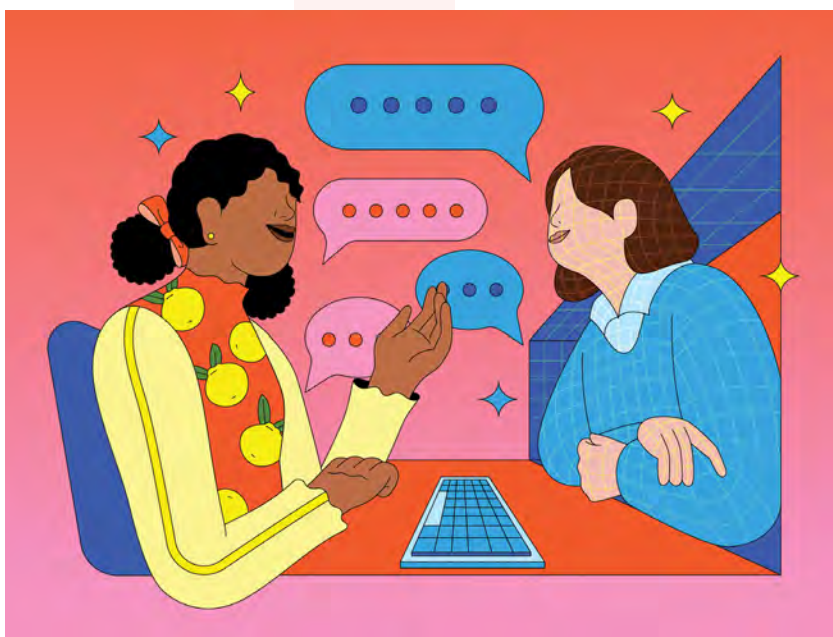


ILLUSTRATION BY JIAQI WANG; SPOT ILLUSTRATION BY DAVID SPARSHOTT

says the materials will highlight issues around obtaining permissions when using AI tools.

U of T Scarborough, meanwhile, is using AI to help arts and science co-op students prepare for the workforce. In 2022, the co-op department introduced an application called InStage, which lets students engage with human-like avatars to practise job interviews. The application is tailored to the curriculum of two co-op courses, so the avatars are able to ask appropriate questions and provide meaningful feedback. The app also tracks metrics such as the students' eye contact, the length and speed of their responses, and the number of times they say "um." The initiative is now being expanded to two groups that face barriers to employment: international students and students with disabilities.

Cynthia Jairam-Persaud, assistant director of student services at U of T Scarborough, says the tool is not meant to replace interactions between students and co-op staff. "We looked at it as a way of enabling students to practise repeatedly and get immediate feedback," she says. "It also gives co-ordinators something tangible to coach students on."

McCahan says while U of T continues to find its footing in the still-evolving AI technology landscape, there is now growing enthusiasm among community members to explore its potential for innovating in education.

"After coming through the pandemic and having to change everything they did in all kinds of ways, I think our faculty were thinking, 'Oh my goodness, we have to change all kinds of things again,'" McCahan says. But the mood appears to have calmed: "Many of us have lived through the advent of personal computers, the internet and Wikipedia. Now it's more like, 'Here we go again.'"

—Sharon Aschaiek



Improving Your Shuteye

Sleep is crucial. It supports cognitive function, physical health and emotional well-being. Yet the Canadian Sleep Society estimates that at any given time 40 per cent of Canadians are suffering from symptoms of insomnia. David Samson, the director of the Sleep and Human Evolution Lab at U of T Mississauga, has tips for those of us who need to up our zzz's. —Kate Martin

Adopt a consistent sleep schedule

Maintaining regular sleep-wake cycles helps synchronize our internal clock with the external environment, promoting better sleep quality and overall well-being. Shift work or travel across time zones can negatively affect circadian rhythms.

Create a good sleep environment

Keep the bedroom cool, dark and quiet. Avoid fluorescent and LED lights, and don't use electronics such as TVs or smartphones two to three hours before bedtime. The blue light emitted by these devices mimics daylight, which triggers alertness and suppresses melatonin production — a hormone crucial for sleep.

Manage stress

Stress can disrupt sleep patterns, leading to insomnia or fragmented sleep. Sedentary behaviour can do this, too. Mindfulness meditation or deep breathing exercises can calm the mind and prepare it for better sleep.

Avoid alcohol and caffeine

The stimulating effects of caffeine can inhibit the ability to fall asleep and should be avoided at least four hours before bedtime. Alcohol, although a sedative, is known to suppress rapid eye movement sleep (crucial to memory retention and emotional regulation). It can also trigger sleep apnea, which constricts breathing.

Unseen Stories

The American perspective dominates our understanding of the Vietnam War. In her new book, Professor Thy Phu offers a glimpse from the other side

When Thy Phu was a young Vietnamese-born newcomer to Toronto in the 1980s, she liked to watch kids' shows on CBC. Without the luxury of today's on-demand programming, she would often sit through the adult shows that came on in between, including a frequently aired documentary on the Vietnam War. Witnessing the shocking battleground footage over and over again, Phu was confused by how little this depiction looked like the Vietnam from her hazy childhood memories and family stories. "I knew," she writes in her recent book *Warring Visions: Photography and Vietnam*, "as do so many Vietnamese, whether in Vietnam or overseas, that there was more to see."

Warring Visions (2022) is the first scholarly book to explore works by Vietnamese photographers – both professional and amateur – during the war, filling a gap in the otherwise huge visual record generated by the Western press. "Growing up, the onslaught of images of destruction and carnage, and of poor, desperate refugees, seemed to cancel out or negate the images that I felt

were part of my world," says Phu, a professor in the department of arts, culture, and media at U of T Scarborough. The dominant photos and film footage framed Vietnam not as a country, but as a war, which didn't reconcile with her memories of home as a place of swaying palm trees, family and ordinary life – shadowed as it was by the conflict that ended in 1975, not long before her birth.

This disparity sparked countless questions in Phu, though she didn't address them until she was well established in her academic career. Her first aspiration was to be a creative writer, which led her to literary studies. Yet she always felt drawn to the visual side of things, even focusing her doctoral dissertation on literary representations of photography. "I can't really describe why I turned to photography," she says. "I'm definitely not that great a photographer."

After completing a postdoctoral fellowship at U of T, Phu taught courses on visual studies, cultural theory and Asian North American culture at Western University in London, Ontario, for more than a decade before joining U of T Scarborough in 2020. Her research



PHOTOGRAPHS BY MAY TRUONG



Thy Phu is a professor of arts, culture and media at UTSC

←

has examined the intersections between media studies, diaspora and migration, among other subjects. For a long time, however, she avoided delving into any topics related to Vietnam, the war and her personal story.

“I thought I was too close to those things, and that academic writing had to be objective,” she says. “Eventually, it became clear to me that I’d been internalizing a judgment that’s often launched at more socially and politically engaged work about what counts as serious scholarship. There was this sense that it would be self-indulgent, that I’d be labelled as a person who does ‘me-search’ instead of research.” Phu eventually rejected the idea that research with any personal connection is less legitimate. “Being critically engaged with material that’s close to you is actually one of the hardest things to do,” she says. “It demands a lot of methodological rigour.”

Phu’s decision to write *War-riving Visions* can be partly traced to one photo that captivated her from childhood. It was a wedding picture of her mother’s friend, and Phu would return to it again and again to scrutinize the bride’s beauty, her sparkling tiara and the shining Ford waiting to whisk her away. It was years until Phu noticed the sandbags in the background of the photo, taken near Saigon in 1968 after the start of the Tet Offensive – a series of coordinated attacks by North Vietnamese forces against South Vietnam. “It’s a family photo that’s also a war photo,” she says. “I had seen the photo so many times, but I’d never seen it fully. That lesson – that our picture of the war must

expand to include the dailiness of life in the midst of war – was one of the inspirations for the book.”

The Vietnam War is often called the first “living room war,” meaning that Western broadcast and print images brought the latest developments to the world in near real-time. The extensive coverage, mostly by Americans, also produced several iconic images that became ingrained in the public imagination, such as the burning monk and the naked girl (who we now know is Kim Phúc) running from a napalm attack. Phu absorbed those photos too. “They stuck with me as I grew up,” she says. “But I kept thinking, should these be the only photos that come to mind when we think of the war? In many ways, I guess, the book is a plea to look elsewhere, to look beyond the iconic images to see the Vietnamese people who have been left out of the prevailing visual history.”

In effect, *Warring Visions* pushes against the boundaries of traditional notions of war photography. “I want this book to challenge readers to finally see Vietnamese people as more than just the monolithic imagery of the war,” she says. “Some of the images are ordinary. They’re ones that you could skip over. But there’s a beauty in people wanting to take these photos in the midst of their daily survival.” Phu also challenges her students at U of T Scarborough to reflect on these issues. “I teach students to



“THERE’S A BEAUTY IN
PEOPLE WANTING TO TAKE
THESE PHOTOS IN THE MIDST
OF THEIR DAILY SURVIVAL”

think critically about how images inform the ways that they see war,” she says.

Warring Visions has two main parts: the first focuses on North Vietnamese photography during the war; the second on photography from the former South Vietnam and the Vietnamese diaspora. Each side, says Phu, used photos to communicate its ideological position and try to garner support

domestically and internationally: these are the “warring visions” of the book’s title.

Phu drew on multiple sources for the wealth of images in the book, most of which have never been seen in the West before. She includes a broad variety of photographic types and styles, ranging from photojournalism and propaganda to studio portraits and family photos. Her research took years, mostly because of the obstacles she encountered in finding images from South Vietnam and the South Vietnamese diaspora.

After Saigon fell in 1975, the new Socialist Republic of Vietnam attempted to erase the visual evidence of the defeated South Vietnamese republic. “How do you look for the images created by people who have been written out

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of history?” says Phu. Confronting scant official archival images, she remembered the insight she’d gained from the wedding/war photo and began searching for South Vietnamese family photos.

Phu spent a couple of years digging through antique stores in Ho Chi Minh City, formerly Saigon, where shopkeepers sell vintage personal photos individually and in bulk. Many South Vietnamese families, she says, were eager to rid themselves of visual evidence of their wartime allegiance when they fled the country after the war, so they sold, discarded or destroyed their photos. “The challenge was for me to tell the story of loss around these photos while protecting the photographers’ and subjects’ desire to be lost,” she says, noting that she used pseudonyms and omitted identifying information for some photographers.

The countless personal photos she uncovered are rich sources of information about how Vietnamese people lived through the war, what they chose to document through photography and what they left behind as refugees.

Phu also included images from her own family. There’s a snapshot her mother kept of Phu and her brother at a refugee camp, for example, that Phu admits to finding unnerving because the “two urchins in rags” could be mistaken for mere victims. The photo emerged out of “my mother’s desire to have a record of our survival,” she writes.

Phu says she hopes other scholars will pick up where she’s left off in attempting to illuminate the wartime visual record created by Vietnamese people. “It’s a story that’s incomplete, but I’ve hopefully opened the door a tiny bit so that others may come through. Most of all, I hope that the book widens the picture of the subjects of war to more than just suffering victims whose stories need to be told for them.” —**Megan Easton**



How Robarts Library Got Its Distinctive Look

A huge, concrete triangle wasn’t an obvious design, but there were reasons for it

Architect Danforth Toan’s first set of design concepts, delivered in 1965, included a “city of towers” set on a broad podium, with one tower dedicated to each subject area. However, U of T’s president at the time, Claude Bissell, wanted something different from Toronto’s typical rectangular box. He requested a look that would come to be a symbol of the university and honour Canada’s upcoming centennial.

The architect suggested a triangular form, noting that it was the only shape that would provide a window for every carrel in the book stacks (a dubious claim, in retrospect). And so, a triangle it was.

The building would be immense: at 100 metres, each of its sides

would be the length of a Canadian football field. Contrary to popular belief, the turret at the top of the Fisher Library — originally conceived as a bell tower — was not meant to resemble the head of a peacock or turkey; it’s merely decorative. And contrary to another urban myth, the library is *not* sinking, despite its enormous structural weight and that of the four million volumes inside.

When it opened in 1973, at a cost of almost \$42 million (about \$280 million today), Robarts — named for former Ontario premier John P. Robarts — was the largest academic library building in the world. The structure dwarfed everything around it and drew its share of neighbours’ complaints.

It is still known as “Fort Book.”

But, over time, appreciation for Robarts has grown. Gary McCluskie, a principal at Diamond Schmitt, the Toronto architectural firm that designed the five-storey, glass addition that opened in 2022, has called Robarts “very well designed,” with a “rugged, expressive character.”

Indeed, now 50 years old, Robarts may finally be the right “fit” for a city that has grown up around it. And for the St. George campus, the rough-hewn giant at its core remains as important as ever — a stalwart, outsized presence in the academic life of students and faculty alike.

—**Scott Anderson**

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Chelsea (not her real name) asked us not to reveal her identity, explaining: “As an Indigenous woman, I know the pain of silence and trauma. We have learned to keep quiet to protect ourselves and loved ones. But silence erodes our identity, culture, dignity and hope. It prevents us from healing and seeking justice. That is why it is important to speak up.”



Missing or Murdered — and Dismissed

UTM researchers examine the barriers family and friends face — often from police — when searching for Indigenous women and girls

Chelsea had kept in touch with her childhood best friend, Rachele, throughout the years. It hadn't been easy. Rachele (not her real name) struggled with addictions and had been living out of her vehicle, jumping from one small remote northern community to another.

One day, Chelsea read on Rachele's Facebook page that she had suffered an overdose. Worried, she tried contacting her friend — an Inuit carver by trade. There

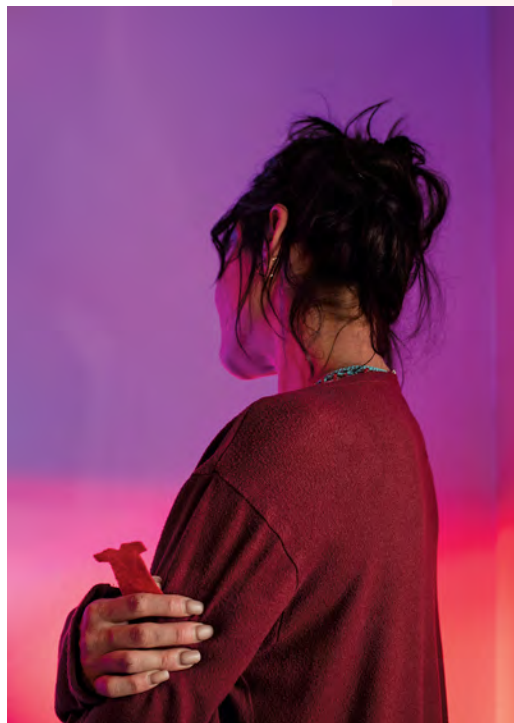
was no response. Deep down, she knew something was wrong. She filed a police report.

Chelsea waited. She cried. But she didn't hear back from police. She made another call. The investigator, who she says was the only person to show her empathy, was off work. She was told another would be in contact. Chelsea called women's shelters, treatment centres, warming stations, food kitchens – anywhere she thought Rachele might turn up. It was a difficult time for Chelsea, who is also Indigenous. Investigating her friend's disappearance took a toll on her mental health. Unbeknownst to her, Rachele had already been pronounced dead in a hotel room in the downtown eastside of Vancouver.

Chelsea's interactions with police are far from uncommon when Indigenous women and girls are reported missing. It is experiences like hers that were captured by U of T Mississauga PhD candidate Andrea Román Alfaro, whose recent research shows the systemic nature of how police deal with missing Indigenous women and girls.

She and her co-author, sociology professor Jerry Flores, launched a study, drawing on 48 in-depth interviews with Indigenous people in Canadian cities to identify patterns in police behaviour after a disappearance is reported. They also gathered information from the 219 testimonies found within the *Canadian National Inquiry into Missing and Murdered Indigenous Women and Girls* report that outlines the need for safety and security from predators, but also from the police.

What they discovered was that police employed similar storylines and framing of events to make sense of, dismiss and justify violence against Indigenous peoples, particularly Indigenous women. Given these findings, Román Alfaro and Flores argue that these actions and inactions are an expression of conscious



POLICE USE THE EXCUSE THAT THE WOMEN DON'T WANT TO BE FOUND

and unconscious bias at a most basic level towards Indigenous women and girls.

"Research has shown that the police frequently rationalize [these] cases by arguing that Indigenous women's experiences of violence are a result of their risky life choices. Police describe Indigenous women (particularly those who live in urban areas) as 'prostitutes,' 'drug addicts,' and 'drunks,'" explains Román Alfaro in a journal article published earlier this year.

The assumption made by the police, explains Román Alfaro, is that the women will turn up eventually, or police use the excuse that the women don't want to be found. The study debunks a myth that it's just a few bad apples in the police force, she says.

Families and friends, like Chelsea, often must pick up the pieces when police dismiss violence

INDIGENOUS WOMEN AND GIRLS ARE:

12

times as likely to be murdered or missing as other women in Canada

24

per cent of all female homicide victims

3

times as likely to be sexually assaulted as non-Indigenous women

against Indigenous women. The dispatcher asked Chelsea why she was calling and not the family, implying that she, a friend, didn't matter or didn't have the right to call. That made Chelsea feel angry, wondering what did it matter? "She's Indigenous," Chelsea recalls telling the dispatcher, "Do you know how much more likely it is for her to go missing? Do you know how serious this is? We can't just *not* look for her."

When the investigators returned, they told Chelsea that her friend had been discovered dead. Chelsea soon realized the wrong parents had informed the officers that their daughter had died. She told the officers of their mistake, and couldn't help but wonder if police would have handled the case differently if Rachele had been a white woman.

Román Alfaro's hope is that her study's recommendations are taken up by both researchers and decision-makers. "The Canadian police are not a haven for Indigenous women, girls, and 2SLGBTQIA people. On the contrary, they continue to perpetuate violence against them," Román Alfaro and Flores conclude. They believe that investing in alternatives to what they call settler policing, security and criminal justice is fundamental for reconciliation. Abolishing settler policing, they say, is the main way to address centuries of colonial violence.

If the police aren't going to do the work of searching for missing and murdered Indigenous women and girls, then an independent, Indigenous-led investigative unit tasked solely for that purpose should be funded to do the work, they say. "The police in Canada, particularly the RCMP, were created in order to control Indigenous peoples. The institutions cannot be reformed or changed when they have been created to do what they're doing."

—Katlià (Catherine) Lafferty

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Ode to Ingenuity

U of T's collection of scientific artifacts shows how researchers pursued discovery – and sometimes made history

Deep underground, in the sub-basement at McLennan Physical Laboratories on the St. George campus, sits a kind of buried treasure: one of Canada's largest collections of historical scientific instruments.

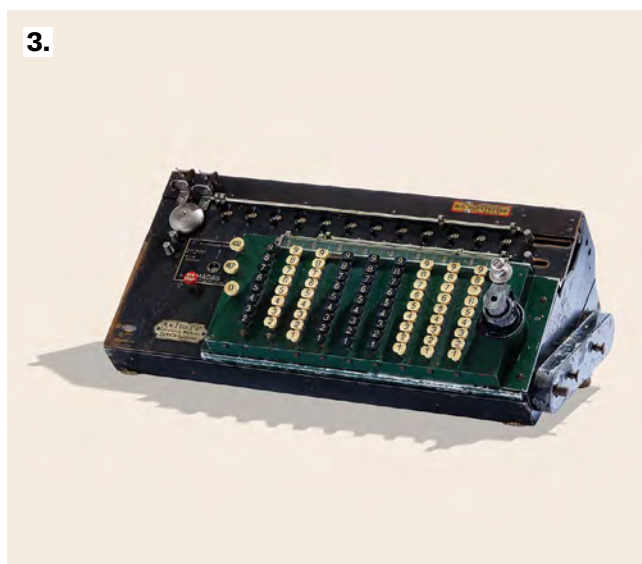
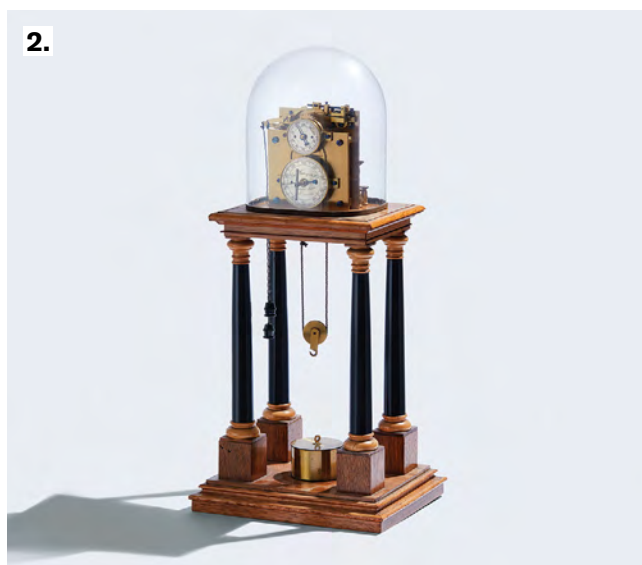
Carefully catalogued and arranged on shelves, some 2,000 artifacts, collected over four decades and covering a wide range of disciplines, reveal insights about how science has been pursued at U of T over the past century and a half: the projects undertaken – the successes and failures – and scientific trends of the day.

These artifacts – along with thousands more that remain uncatalogued in departments across the university – also tell a larger story about U of T's role in science and innovation, says assistant curator Victoria Fisher. Some items, such as a camera lens constructed specially to photograph a 1922 solar eclipse that helped prove Einstein's Theory of General Relativity, connect U of T with "important developments in the history of science in Canada and the world."

Many are intriguing just to look at (see right).

The materials, which are available online with photographs and details about their purpose and history, provide insights that go far beyond what one can glean from academic articles, says curator Erich Weidenhammer. "An artifact will tell you, not only its particular intellectual and cultural context, but about the materials, design aesthetics and technology of the historical moment from which it emerged," he observes. "Even mundane objects carry a wealth of information. A single piece of apparatus can serve as a record of an entire research program that would otherwise be forgotten."

With such a large collection, the curators and their host department, the Institute for the History and Philosophy of Science and Technology, are fundraising for a more suitable space on the St. George campus. In the meantime, they remain on the lookout for objects of interest – especially ones that reveal something previously unknown about research at U of T. "We love that kind of thing," says Fisher. —**Scott Anderson**



4.



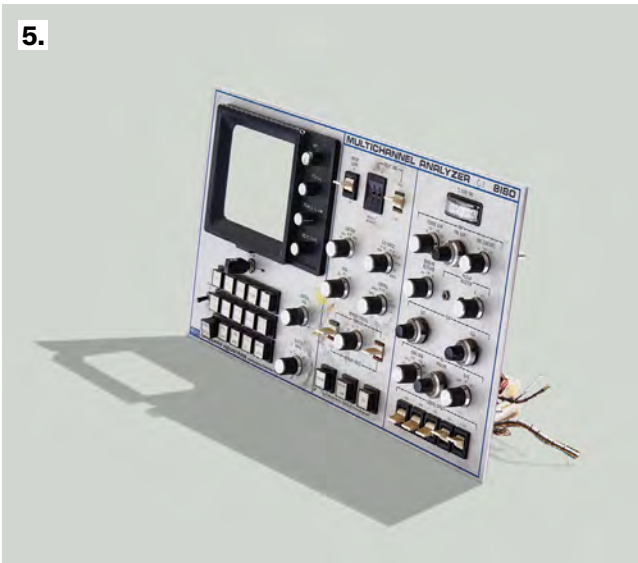
1. Koenig Analyzer, 1880s

This acoustical device creates a visible display of the individual frequencies that make up complex sounds. James Loudon, a professor of math and physics, acquired the instrument for U of T to promote the university as a place of serious scientific teaching and research. The analyzer uses a series of resonators linked to gas flames. When the frequency of a resonator is sounded, it stimulates a column of air, causing its nearby flame to "dance." A rotating mirror extends the flames' reflection into a streak of light.

4. Watanabe Arthroscope, 1960s

Developed in Japan, the arthroscope was the first instrument enabling physicians to view the interior of a joint during surgery. Its development made minimally invasive surgery possible for many knee operations, which significantly decreased recovery times. U of T alum Dr. Robert Jackson (MD 1956), who is credited with helping to introduce arthroscopic surgery to North America, used the Type 21 arthroscope shown here while studying in Japan under Dr. Masaki Watanabe.

5.



2. Hipp Chronoscope, 1892

This high-precision timer, capable of measuring thousandths of a second, was used in U of T's psychological laboratory to measure human reaction times – one of several dimensions of the human sensorium that psychologists at the time were measuring to gain insight into human cognition. A simple experiment would have had a subject react to a noise by pressing a key. The chronoscope would then record the interval between the sound and the key press.

5. Multichannel Analyzer Faceplate, 1970s

This console was part of an instrument connected with a SLOWPOKE nuclear research reactor at U of T that enabled scientists to determine the chemical composition of a substance. A material placed inside the reactor would be bombarded with neutrons to transform some of its atoms into radioactive isotopes. The instrument to which this faceplate was attached then measured the radioactive decay of these isotopes to identify the sample's chemical makeup at a level of parts per million.

6.



3. MADAS VII T Mechanical Calculator, 1940s

Calvin Gottlieb, who would go on to become a key figure in Canadian computing, likely used this calculating device during his doctoral studies related to the development of proximity fusing, a critical technology developed by the Allies during the Second World War. Gottlieb's work included a radio method to measure how much a shell turns sideways during flight – an important consideration in targeting.

6. Traffic Data Recorder, 1979

Frank Ahlin, a graduate student in U of T's department of civil engineering, built this traffic recorder for a Transport Canada study about the effect of speed-limit enforcement on drivers' behaviour. The first of its kind, the device used sensors to record a vehicle's speed and stored the data on magnetic audio tape that could be transferred to a computer. It could also control a film camera to capture license plates.

PHOTOGRAPHS BY KALLEE MANDEL

U of T is looking for a new Chancellor



Dr. Rose M. Patten

will complete her final term as U of T's Chancellor on June 30, 2024.

The Chancellor Search Committee of the College of Electors invites nominations for Chancellor for a three-year term, commencing July 1, 2024.

What Does the Chancellor Do?

The Chancellor is an advocate for the university and plays an essential role in advancing U of T's interests within the local, provincial, national and international arenas. The ideal candidate will demonstrate excellence in their chosen field and in service to the community and exhibit a strong public profile and well-developed relationship-building skills.

The Chancellor is elected by the College of Electors for a volunteer three-year term and may serve a maximum of two consecutive terms. The Chancellor is required under the *University of Toronto Act, 1971* to be a Canadian citizen.

More information about the role and the nomination form will be available as of November 16, 2023, at: uoft.me/Chancellor-Search-Fall-2023

Nominations and requests for further information may be submitted in confidence to:

Mr. Anwar Kazimi
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College of Electors, University of Toronto
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416-978-8427
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The Sam Ibrahim Building will open on Military Trail in 2024



Scarborough Strong

A \$25-million gift will establish a new centre for entrepreneurship at U of T Scarborough

As a student at U of T Scarborough in the early 2000s, Sam Ibrahim remembers being inspired by the banners featuring alumni he saw lining Ellesmere Road and Military Trail. Passing under them while riding his bike to class, he imagined what it would be like one day to achieve something equally significant.

Now a successful entrepreneur, Ibrahim is hoping a \$25-million gift to support entrepreneurship and innovation will inspire the next generation of Scarborough youth. “Entrepreneurs can do well, supporting themselves and their families, but they can also uplift their communities,” says Ibrahim, who is CEO of the Arrow Group of Companies, which provides

strategic consulting and talent solutions to many industries.

“Scarborough is home to so many young people with great ideas. As a Scarborough entrepreneur myself, I want to make sure that the next generation can start their ventures and scale them up right here.”

Three New Awards

The Sam Ibrahim Centre for Inclusive Excellence in Entrepreneurship, Innovation and Leadership will offer the type of access to resources, connections to industry leaders and learning opportunities that can help students develop their business ideas and start-ups. The centre will leverage the university’s existing business incubator and accelerator community while also expanding

programming to include more work-integrated learning and mentorship opportunities.

The gift also supports the construction of the Sam Ibrahim Building on Military Trail. Set to open in 2024, it will house the Sam Ibrahim Centre, student services offices and spaces for the department of computer and mathematical sciences.

As part of the centre’s commitment to equity and inclusion, student entrepreneurs who face financial barriers will also be eligible for three new awards established by Ibrahim. “A core mission of the centre is to ensure its innovators embody leadership values that promote Sam’s and U of T’s commitments to inclusive and equitable communities,” says Wisdom Tettey, the principal of U of T Scarborough, and a U of T vice-president.

“We Have Incredible Talent”

Ibrahim is proud of his Scarborough roots. His company’s headquarters are located in Scarborough, and he is the co-owner of the Scarborough Shooting Stars of the Canadian Elite Basketball League (the team plays their home games at the Toronto Pan Am Sports Centre, located at UTSC).

He views the investment in entrepreneurship education as one that can benefit the entire community through economic growth – by encouraging young entrepreneurs to develop their start-ups in Scarborough.

“We have incredible talent and extraordinary potential for innovation and entrepreneurship,” says Ibrahim. “We are also resilient, inclusive and we understand diversity. All we need is the same level of access as other places in Canada.” —Staff

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Healing with Humour

Cody Caetano has written a painfully honest – and sometimes hilarious – memoir of growing up in a wayward family



Each of us processes our life's joys and sorrows, loves and losses in distinct ways. Cody Caetano (BA 2017 UTM, MA 2019) wrote a memoir. In *Half-Bads in White Regalia*, the 28-year-old Toronto resident recounts growing up with his siblings and often without his parents – a mother who learned she was Anishinaabe and a Sixties Scoop survivor, and a Portuguese father who came to Canada in the 1960s. Published in 2022, Caetano's debut book became a bestseller and critical success, earning two Indigenous Voices Awards.

What compelled you to put your life story into words?

It felt pretty intuitive and instinctual. I was naturally inclined to write as a way of being productive and creative – and to compartmentalize and organize my memories. The writing of the book was also tied up with learning how to write and my education as a writer at U of T. Also, thanks to the tools we have today, telling one's story has never been simpler. Because of the internet, it can be easier for people to pursue their art and share it with the world.

As you mined your childhood memories, what was your process for fleshing out your experiences and crafting them into a narrative?

I was incredibly fortunate to have a family who understood what I was seeking to do and were supportive. I was able to interview them, and had access to journals by family members. In the first stage, I started writing in the present tense and the first-person, writing down my memory. Then, as time passed and I sat longer with these stories, I was able to turn them into scenes in the book.

As a U of T student, you served as editor-in-chief of *Echolocation*, the university's literary magazine, and as co-editor of *Mindwaves*, UTM's creative non-fiction journal. How did your writing education shape you?

Those six years were really life-changing and I owe a lot to the U of T community. The creative writing master's program was my dream program. It made me feel like my memoir could be a real book – or at least a real manuscript. When I graduated, I had such an intuitive understanding of writing.

What was it like to have the late author Lee Maracle as an advisor?

Lee was a singular person. She set me up to think about myself as a writer and storyteller and what that would mean long term. She helped me pick the title for the book. Working with her was incredibly formative.

Toronto hangout?

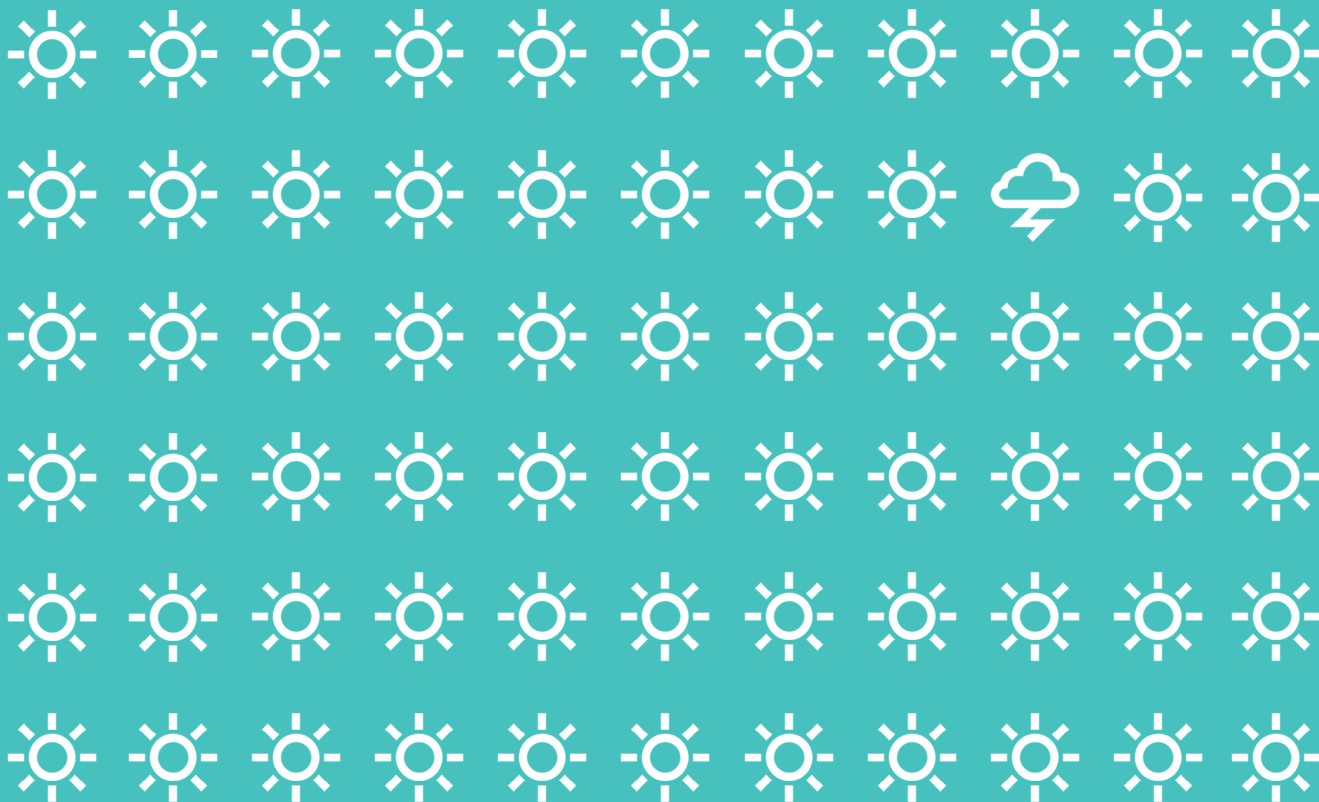
Rooms Coffee

How do you relax?

Yoga

What's next for you professionally?
I'm working on a novel – a revenge story involving two best friends.
—Sharon Aschaiek

PHOTOGRAPH BY ALEX JACOBS-BLUM



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