University of Toronto
MAGAZINE

```
A  I        E
A  I        E V
A  I        E V E
A  I      E V E R
A  I      E V E R Y
A  I     E V E R Y W
A  I    E V E R Y W H
A  I    E V E R Y W H E
A  I    E V E R Y W H E R
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
A  I    E V E R Y W H E R E
```

AI EVERYWHERE

How U of T is helping to shape the
future of artificial intelligence

ACTING FOR EARTH

DATE: MARCH 6
TIME: 8:02 P.M.
CAMPUS: ST. GEORGE

A few decades from now, during an unfolding global catastrophe, a group of people go on trial for their role in the climate crisis. The members of the jury are teenagers, struggling to live with the environmental chaos their elders have created.

This is the world imagined by *The Trials*, a play by British writer Dawn King that fourth-year students at U of T's Centre for Drama, Theatre and Performance Studies mounted for their annual mainstage show.

In this scene from the dress rehearsal, jury members confront one another about their biases. Noah (left) votes guilty against all defendants, calling them dinosaurs. Grace believes history will judge the trials as gravely misguided. Much of the tension in the show comes from how each young person interprets the concept of eco-justice.

Director Andrew Kushnir, who as a sessional lecturer at the centre selected the show, says *The Trials* offers a dramatic and emotional perspective on "how the temperature of our relationships will change with our warming planet."

For student Emily Beaubien, who plays Ren, it's how the characters interact – "and what we do to get what we want" – that makes the topic come alive in a fresh and interesting way.

As part of their undergraduate journey, the annual mainstage show enables graduating students to consolidate the skills they've acquired but also, in this case, says Kushnir, learn how theatre can play a part in social change. **—Scott Anderson**

SEEDS OF RESILIENCE

DATE: FEBRUARY 27
TIME: 12:07 P.M.
CAMPUS: SCARBOROUGH

Four new plant growth chambers will allow biologists at U of T Scarborough to do research that may one day lead to stronger, more resilient food crops.

Located in a basement lab of the Science Research Building, the chambers are equipped to mimic different types of growing conditions. Researchers can control the amount of heat, humidity, carbon dioxide and light intensity, as well as wind speed and direction inside the chambers. They even have an astronomical clock that can recreate the average amount of sunlight received during different times of year in any part of the world.

Here, Jenan Noureddine, a PhD candidate in biological sciences, checks on the state of her *Arabidopsis* (rockcress). These small flowering plants are related to cabbage and mustard and are among the most widely studied by biologists due to their status as a model organism (like the plant equivalent of a lab rat).

The chambers will be used for a range of experiments, including identifying genes that are important for disease resistance and proteins that help regulate growth and development.

"The ultimate goal is to translate our research into improved crop varieties that can support local agriculture," says Adam Mott, an assistant professor in the department of biological sciences, who manages the facility. —Don Campbell

PHOTOGRAPH BY DON CAMPBELL

WHERE SCIENCE MEANS BUSINESS

DATE: MARCH 26
TIME: 1:16 P.M.
CAMPUS: MISSISSAUGA

Biology students Evelina Tronina (left) and Seema Mahmalji try out the new tech in SpinUp, U of T's first wet lab incubator for life science startups. The facility offers both student and local entrepreneurs access to equipment and programming to help refine their lab-based innovations.

Located in U of T Mississauga's New Science Building, the specialized space is outfitted with the most energy-efficient laboratories in North America and available via memberships for less than half market rates. SpinUp will also help enrich UTM's programs by creating new experiential learning opportunities for students and new research partnerships.

The majority of memberships will be provided to ventures emerging from U of T's accelerator programs, with a few spots for off-campus researchers from the region. "It will give startups the chance to refine their innovations and position themselves to attract external investment and funding," says SpinUp lead Raquel de Souza.

The project supports UTM's goal to drive innovation in the life sciences. U of T ranks first in Canada for research-based startups and in the top five globally for university-managed incubators. The university has helped launch more than 650 companies over the past decade, creating more than 10,000 jobs.
—Kate Martin

Celebrating
50 Years of Robarts Library

For half a century, Robarts Library has been a place of connection—a place where we share ideas and spark new ones, circulate, preserve and create knowledge in every field, retell our stories and reimagine our future. For the U of T community, Robarts has always been more than an iconic building—it's the symbolic heart of the university, bringing together everyone from every discipline to help make lasting change around the world.

Discover what Robarts means to the University of Toronto, and how you can help it thrive for another fifty years and beyond.
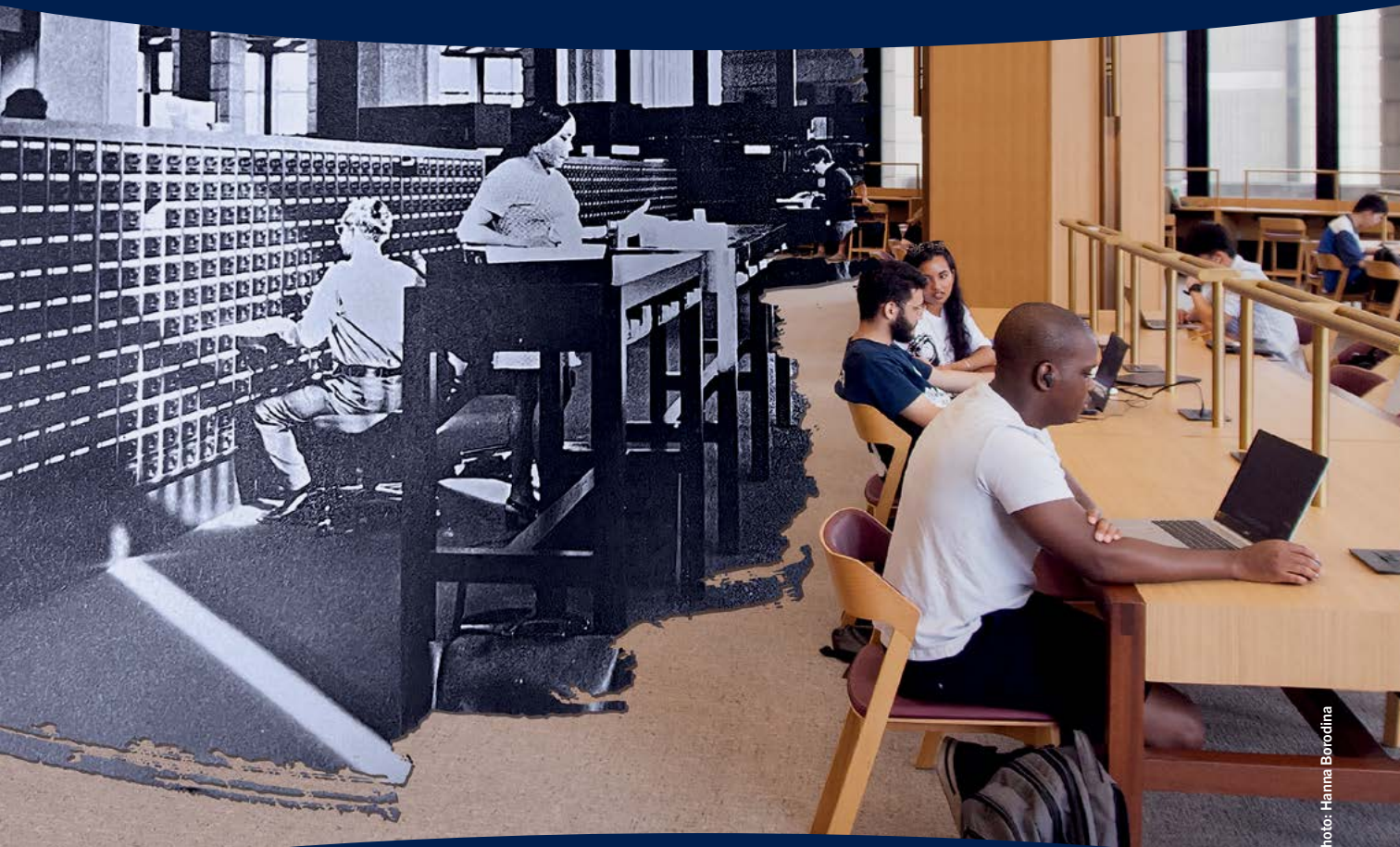
https://uoft.me/robarts50

Photo: Hanna Borodina

UNIVERSITY OF TORONTO

FIFTY ROBARTS

CONTENTS

VOLUME 51, NO. 2

AI EVERYWHERE

How U of T is helping to shape the future of artificial intelligence

CONTENTS SPRING 2024

Prof. Ai Taniguchi says comics tell stories that hook people. "They help students understand complicated linguistics concepts." p. 38

Women with disabilities are more likely to get inadequate care during pregnancy, p. 42

ON THE COVER

The magazine's art director, Studio Wyse, used repeated text to reinforce the idea that AI is rapidly infiltrating our lives. Visit our website to see how an animated effect creates the impression of an ever-changing and evolving technology.

ILLUSTRATION BY MASHA FOYA; PHOTOGRAPH BY CARMEN CHEUNG

From boundaries to new beginnings.

A life-altering accident forced Beau Hayward to confront his future —and profound barriers.

In 2018, Beau sustained a spinal cord injury that significantly limited his mobility. Yearning to gain independence and purpose, he's pursuing a history and archaeology degree through Woodsworth College and is a campus accessibility advocate. Bursaries and scholarships, including one established by graduate Norma Brock through her will, helped him confront financial barriers. As Beau says: "There's no way I could find my purpose without donor support."

Break barriers to student success by making a gift in your will. Contact michelle.osborne@utoronto.ca, 416-978-3811 or **uoft.me/giftplanning**
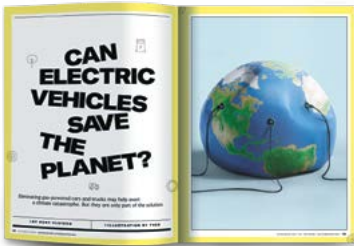
UNIVERSITY OF TORONTO

DEFY GRAVITY

I like that Prof. Doug Richards challenges his students and is open to being challenged — in fact, encourages it. It is fundamentally important that we be proactive about our own well-being.

JOHN CONNOLLY, OTTAWA

How green are electric vehicles?

Our Autumn 2023 cover story about EVs drew dozens of comments from readers.

A lot more electricity will be required with the increasing use of electric vehicles. Even though we have excess overnight capacity today, daytime EV charging will become a reality. Since it takes 10 years or more to add new nuclear power capacity, Ontario could encounter problems. One solution might be to develop plug-and-play technologies that would allow homeowners to add solar capacity themselves without the cost and expertise of an electrician. These systems would have to be approved by regulators and safe for homeowners to plug into existing circuits or panels.
**STEVEN SZILARD,** BASc 1969
NEWCASTLE, ONTARIO

For most drivers, using a full EV is a misuse of resources. Why push around a thousand-pound battery pack when it is rarely utilized? For 80 per cent of drivers, a plug-in electric hybrid vehicle with a range of 80 km would be a more effective solution.
MICHAEL SCULLY, BASc 1970, MBA 1975
OTTAWA

Here is another solution: government and corporate employers should maximize the use of hybrid work. We did it during the pandemic, and we had zero traffic congestion,

How optimistic are you that AI will help bring about a better future?
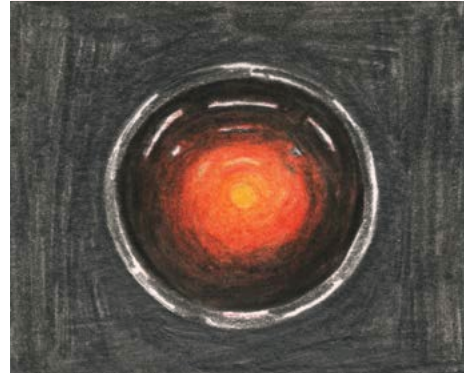
11%
It'll be amazing!

31%
I'm fairly optimistic

40%
It could go either way

16%
I'm a bit pessimistic

2%
I'm terrified

In the past year, the sense of wonder surrounding powerful new AI tools has given way to a distinctly gloomier mood. Last year, hundreds of tech leaders called for a pause in AI development, calling it a grave risk to humanity. Despite the doomsaying, U of T students seem hopeful AI will work out for the better. "I'm optimistic – mostly because of the trust I have in people," says fourth-year criminology student Joshua Weisz. "Even if certain jobs get phased out by AI, there will be new jobs to look forward to," notes Alezzandre Cabalit, a second-year student in economics and computer science at UTM. Still, students aren't blind to the perils. "AI is dangerous for misinformation," says Seanne Sy, a fourth-year political science student at UTM. "We need to start learning how to live with it."

This highly unscientific poll of 100 U of T students was conducted across the three campuses in January 2024.

a massive reduction in air and ground pollution – even the animals noticed and came out. Or better yet, combine hybrid work arrangements with a four-day work week and adopt Europe's laid back, slower pace of living. It's this drastic change in the way we live and work that will make the most significant impact.
BRENDA YEE, BScN 1997
MISSISSAUGA, ONTARIO

In the short term, there are a few simple, if politically unpalatable, ways to limit the use of traditional vehicles and encourage the use of public transit. Besides dramatically increasing the cost of fuel, governments could raise the cost of parking. They could impose so-called congestion fees to enter a city's downtown core, exempting EVs. The revenue collected could be used to improve public transit and the electrical infrastructure.
ALEXANDER FOREST, BASc 1972
ORILLIA, ONTARIO

The biggest polluter globally is the Chinese power generation system. You make absolutely no mention of that!
MARTIN PEROS, BASc 1969, MASc 1973
TORONTO

How to live longer – and healthier
Our January 2024 digital "feel-good" edition included a profile of Doug Richards, a professor in the Faculty of Kinesiology and Physical Education, who teaches a course on healthy living that students have nicknamed "Sex, Drugs and Rock 'n' Roll."

Dr. Richards taught me when I was doing my sports medicine fellowship at U of T. Almost 10 years later, I think about him and his approach frequently when teaching my own students. This was a wonderful article about a wonderful educator.
LEAH HILLIER, TORONTO

"Sex, Drugs and Rock 'n' Roll" needs to be included in the high school curriculum. Many of the lifestyle choices we make are so entrenched by second- or third-year university that they are difficult to turn around. We need to help prevent folks from getting into a downward health spiral.
FRANK CHRISTINCK, BSc 1986
KILLALOE, ONTARIO

Super article by Bruce Grierson! As his 84-year-old mother-in-law, I'm delighted to learn that "the health benefits, especially for older women, appear to max out at 7,500 steps a day." Aqua fitness rocks!
JEAN WILLIAMS, BScN 1962
WESTMOUNT, QUEBEC

Change makers
Our digital "feel-good" issue included profiles of three students who are drawing on their personal experience to advocate for change.

What amazing young leaders! Their words and actions are motivating others to change, which is needed in our world. I trust they will keep instilling hope in those they meet.
MARGARET SMALL, BEd 1988
BURLINGTON, ONTARIO

In a world in which many of our current leaders are descending into the darkness of hate, anger and discord, it helps to know that there is a younger generation of leaders who are carrying the flame of equity and inclusion into the future.
MARK NAKAMURA, BA 1970
TORONTO

Write to us

University of Toronto Magazine welcomes comments at uoft.magazine@utoronto.ca. All comments may be edited for clarity, civility and length.

🐦 📘 📷
@uoftmagazine

UNIVERSITY OF TORONTO

Show your career path who's boss.

Whether you're launching your career or taking it to the next level, we can help you succeed — through webinars on AI and other tech tools, skill upgrades at the School of Continuing Studies, mentorship programs, networking tips and more. U of T is your lifelong resource for career support and other alumni perks. Make the most of it.

Find out more at **uoft.me/careersupport**

The selection of alumni benefits may vary based on availability.

UNIVERSITY OF
TORONTO

DEFY
GRAVITY

தமிழ்

U OF T
SUPPORTING TUITION FOR INDIGENOUS STUDENTS

U of T is covering tuition for students from nine First Nations to make the university more accessible and inclusive for Indigenous students.

The initiative supports members of First Nations whose territories include or are adjacent to U of T campuses. They are: Alderville First Nation, Curve Lake First Nation, Hiawatha First Nation, Huron-Wendat First Nation, Mississauga First Nation, Mississaugas of the Credit First Nation, Mississaugas of Scugog Island First Nation, Mohawks of the Bay of Quinte (Tyendinaga Mohawk) and Six Nations of the Grand River. In addition, Indigenous or Native American students from the continental United States will be charged the domestic Ontario tuition rate in recognition of the Jay Treaty of 1794, which acknowledges the colonial nature of the border between the U.S. and Canada.

The initiatives apply to current and future Indigenous students enrolled in most credit-based programs.

U OF T MISSISSAUGA
ADVANCING TRUTH AND RECONCILIATION

A quiet spot among the trees at U of T Mississauga is now home to a Tipi and teaching lodge – among the newest landmarks at the university's western campus. Students, staff, faculty and librarian volunteers helped raise the structures as part of a student orientation event last September.

Creating spaces reflective of Indigenous community is one of the many ways U of T Mississauga is working toward Truth and Reconciliation on campus. Members of the community can book this sacred space online for gatherings that honour its tradition as a site of ceremony, storytelling and community building.

The Tipi, which will be on site for two years, is already in use for programming, events and classes, while the larger lodge is designated as a teaching space. It is equipped with a wood stove to provide heat during the winter months.

U OF T SCARBOROUGH
NEW CHAIR TAKES THE HELM AT TAMIL STUDIES

After a lengthy international search, Professor Sidharthan Maunaguru has been hired as chair of Tamil Studies.

Maunaguru, who starts in May, is an expert on global Tamil communities and was recently at the National University of Singapore. In his new role, he will be responsible for managing academic programs and research in Tamil language, culture and history.

The Chair in Tamil Studies was created through a $3-million philanthropic campaign spearheaded in 2018 by the Canadian Tamil Congress and Tamil Chair Inc. that involved almost 4,000 donors.

"Scholars at U of T have already set a solid foundation for Tamil studies," says Maunaguru. "As chair, I will be building on these foundations while looking forward to expanding scholarship and research using an interdisciplinary approach."

A GLOBAL HUB FOR SAFE AI

In May, the University of Toronto will celebrate the official opening of the first phase of the Schwartz Reisman Innovation Campus. This iconic new building is already a hub for the university's global leadership in artificial intelligence and machine learning. Its mission is to power the full supply chain of innovation in this burgeoning field, from ideas and scholarship to successful startups.

It's iconic, not just because of its spectacular architecture, but also because of what it represents – a compelling vision of the university as a crucible of progress that is both revolutionary and human-centred, where we push the technological boundaries of what's possible while ensuring these new tools benefit people and communities. It's no accident that two of the building's key tenants are the Vector Institute for Artificial Intelligence and the Schwartz Reisman Institute for Technology and Society.

We scarcely could have imagined this development 20 years ago. Toronto's rise as a major global AI hub – with U of T as its anchor – happened so quickly that one could be forgiven for missing the important back story.

In 1987, Geoffrey Hinton arrived at U of T. He and his students began conducting fundamental research into the novel but unproven concept of artificial neural networks. Toronto appealed to Hinton, now a University Professor emeritus, because of the availability of public support for curiosity-driven research from the Natural Sciences and Engineering Research Council of Canada and the Canadian Institute for Advanced Research. Professor Hinton's pathbreaking work, once given no hope for success, is now celebrated around the world. It powers everything from real-time language translation to frontier drug discovery to ChatGPT.

This story shows the importance of fundamental research. It changes the world. The Canadian government's Pan-Canadian Artificial Intelligence Strategy, the world's first national AI strategy when launched in 2017, was a visionary investment in Canada's future. And Prime Minister Justin Trudeau's recent announcement of major new funding to build on that strategy is welcome news. We must continue to invest in advanced research and prepare for the next big bang, whatever it may be.

The same story highlights the dramatic economic impact that can arise from such research. Celebrated local AI startups such as Waabi and Cohere have attracted hundreds of millions of investment dollars to Toronto. Indeed, Toronto's innovation ecosystem, with U of T at its heart, is a massive economic driver for the region. In just 10 years, research from U of T alone has created 650 venture-backed startups, attracting more than $3 billion in funding, and generating 10,000 jobs.

And finally, the story contains a word of caution. Professor Hinton and others have recently drawn the world's attention to pressing social, cultural, environmental and moral questions associated with AI's rapid rise. Addressing questions about AI safety is at the heart of the Schwartz Reisman Innovation Campus's vision – and an essential component of U of T's approach to AI and human-centred technology.

MERIC GERTLER

It's hard to see unexpected health bills coming.

That's why there's Alumni Health and Dental Insurance.

Unexpected health expenses are a part of life. And they seldom come with a "heads up" warning (wouldn't that be great?). So how can you be prepared for something you don't see coming?

With **Alumni Health and Dental Insurance**. It can help reduce your out-of-pocket costs for routine and unexpected health expenses not covered by your government health insurance plan. Things like dental care, prescription drugs, vision care, mental health therapy, massages and more. Get your free quote today.

Protection for what you don't see coming.

Get a quote today.
Call 1-866-842-5757

or visit us at
Manulife.com/utoronto

Manulife

Making graduation even more meaningful.

Held annually since 2017, Black Graduation is a joyful celebration of excellence and achievement among U of T's Black grads. Run by the university's Black Students' Association, it fosters a sense of belonging, community and pride. When you purchase U of T affinity products from our insurance partners, a portion of the proceeds goes to Black Graduation and other initiatives that celebrate and empower our students and alumni.

Learn more about value-added U of T affinity products:
affinity.utoronto.ca

UNIVERSITY OF TORONTO · AFFINITY PARTNER

Ⅲ Manulife

TD Insurance

DEFY
GRAVITY

Becoming climate positive at our core.

From the geoexchange field beneath the St. George campus to low-carbon projects across U of T, sustainability is embedded into everything we do — and it shows. U of T was recently ranked the most sustainable university in the world.* Learn more about our bold climate-positive goals and the actions we're taking at a keynote by Ron Saporta, co-chair of the President's Advisory Committee on the Environment, Climate Change and Sustainability.

Saturday, June 1, 2024 • Convocation Hall
"Sustainability at U of T: #1 and Just Getting Started"
With Ron Saporta (MBA 2013), Chief Operating Officer at U of T

Register at:
uoft.me/utaa • 1-888-738-8876

All U of T alumni are members of the U of T Alumni Association and are invited to join us for the Annual Meeting, followed by Ron Saporta's keynote.

An Alumni Reunion event.

*QS World University Rankings: Sustainability 2024

Sponsored by the University of Toronto
Alumni Association (UTAA)

DEFY
GRAVITY

AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
A I E V E R Y W H E R E
AI EVERYWHERE
AI EVERYWHERE
AI EVERYWHERE
AI EVERY W H E R E
AI EVERY W H E R E
AI EVERY W H E R E
AI EVERY W H E R E
AI EVERY W H E R E
AI EVERY W H E R E
AI EVERY
AI EVERYWHERE
AI EVERYWHERE
AI EVERYWHERE AI
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE
AI EVERYWHERE AI EVERYWHERE

AI EVERY- WHERE

A rtificial intelligence already seems ubiquitous. In one version of the future, this bodes well: AI will turbocharge progress, lead to new ways to treat disease, warn us of public health threats and even generate new career possibilities. In a darker scenario, it could eliminate entire job categories and fuel a tidal wave of disinformation.

Ensuring the safe and responsible development of AI will be crucial. Read on as we explore how U of T researchers at the Schwartz Reisman Institute for Technology and Society, the Vector Institute and across the three campuses are harnessing the power of AI for good – and helping to shape its future.
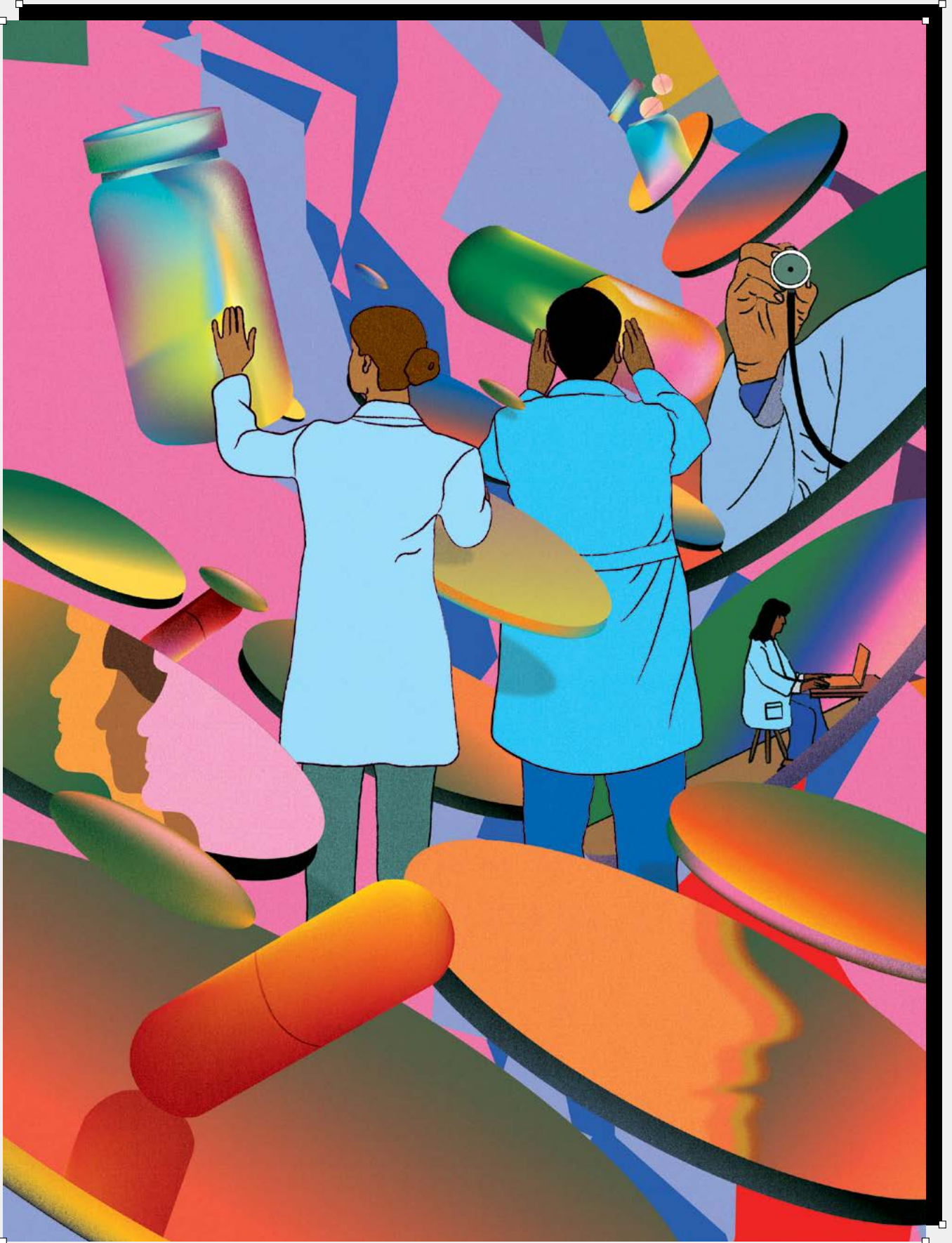
HEALING POWER

Why AI could be good news for both patients and our health-care system

About eight years ago, artificial intelligence seemed poised to revolutionize health care. IBM's much-hyped AI system, known as Watson, had rapidly morphed from winning game-show contestant to medical genius, able to provide diagnoses and treatment plans with lightning speed. Around the same time, Geoffrey Hinton, a U of T professor emeritus, famously declared that human radiologists were on their way out.

Now, it's 2024: radiologists are still with us, and Watson Health is not. Have AI and medicine parted company? Quite the opposite, in fact: today, the marriage of disciplines is more vibrant than ever.

At the Temerty Centre for AI Research and Education in Medicine, director Muhammad Mamdani is leading developments that are transforming the field. The centre has more than 1,400 members in 24 universities across Canada and is, Mamdani believes, the largest hub for AI and medicine in the world.

In his role as vice-president of data science and advanced analytics at Unity Health Toronto – a position he held prior to the centre's official launch in 2020 and still retains – Mamdani oversees a team that has created more than 50 new AI solutions, the majority of which are now being deployed.

U of T's combined resources have been essential to the success stories emerging from both institutions. "We have one of the top medical schools in the world," says Mamdani. "As well as highly ranked computer-science, electrical and computer engineering, and statistics departments. So, we've got an incredibly talented pool of researchers."

One of the biggest success stories has been CHARTwatch. The algorithm runs every hour on the hour, analyzing information from patients' electronic records to predict whether the patient's condition will deteriorate and, when the risk exceeds a certain threshold, page the medical team.

CHARTwatch, a Unity Health initiative, has been in operation since 2020 and has been trained on the data of more than 20,000 patients. At the time of its implementation, mortality rates in St. Michael's Hospital (part of Unity Health) were much higher than usual due to COVID-19. But following the deployment of CHARTwatch, the hospital saw a 26 per cent drop in unanticipated mortality compared to pre-pandemic levels. "Peoples' lives are being saved with solutions like this," says Mamdani.

Another algorithm in use, the ED RN Assignment Tool, has reduced the time registered nurses (RNs) spend on scheduling in emergency departments (EDs). "They were struggling with making assignments, because there are all sorts of rules," says Mamdani. The new tool reduces the number of times that any individual nurse is repeatedly assigned to the same role or location within the same series of shifts; it also makes sure that each role is assigned the number of required nurses, each of whom is only assigned to roles or locations that they are qualified to fill.

Since the tool's deployment in 2020, the senior nurse has found that this work can be completed in one minute instead of 90. "With this," says Mamdani, "we're giving time back to clinicians so they can spend it on more valuable activities, such as patient care."

The genesis for these tools is most often clinicians themselves, rather than data scientists, says Mamdani: "We get our ideas from

DEFINITIONS FOR WORDS THAT HAVE TAKEN ON NEW MEANINGS IN THE AGE OF AI.
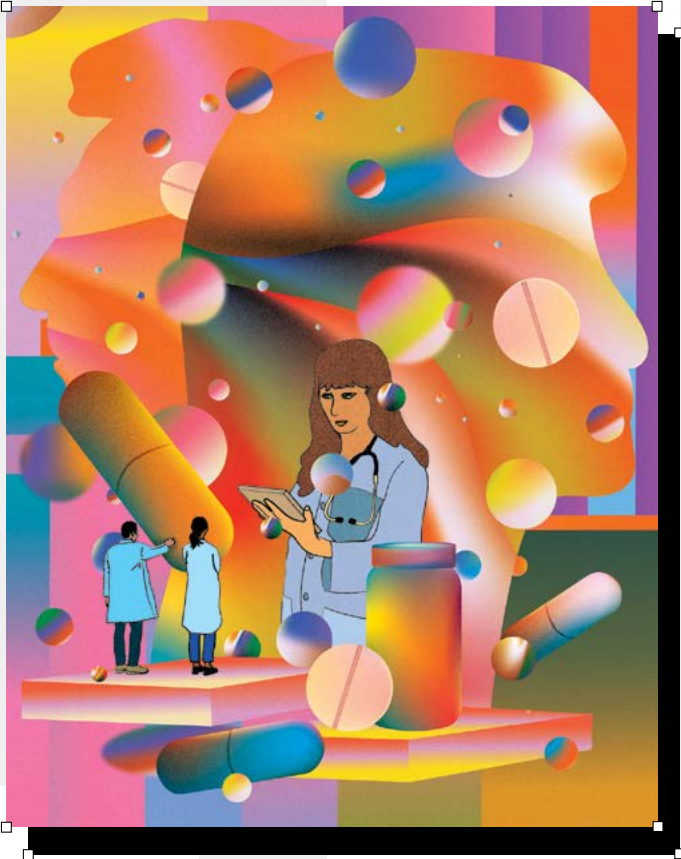
⇨ ⇨ ⇨ **ALIGNMENT**

"Joint human-AI collaboration is what's driving our reduction in mortality"

people on the ground because they know what the issues are."

The continuing involvement of health-care providers in AI use and development is a key point. About 10 per cent of the Canadian workforce is involved in health care, and, like employees in other fields, many may fear replacement. Mamdani emphasizes that humans must continue to drive AI – not the other way around.

While algorithms have sometimes been shown to outperform clinicians, it isn't always the case. This is why, for the moment, AI is never the sole decision-maker. "For CHARTwatch, for example, we are very firm that it should not decide *for* clinicians, but *with* them. That kind of joint human-AI collaboration is what's driving our reduction in mortality."

To drive this message home, Mamdani says the Temerty Centre

for AI Research and Education in Medicine performs an important role as a place where practitioners in the community can learn more about AI, and data scientists can learn about health care. "A huge focus for us is to educate health-care providers – not only about AI's potential to improve the health-care system, but about the challenges." These include ethical considerations around algorithmic gender and racial bias, how well the algorithm performs and how to adopt AI into clinical practice.

"It's very hard to do AI without data," says Mamdani, "and where

do you go for it? MIMIC is the world's most publicly used clinical dataset, but researchers need more. They also deal with questions of where to store the data, and whether they have the computing power to do the analyses they want to do."

These questions have led the centre to create the Health Data Nexus on Google Cloud, which contains multiple publicly available, large health datasets that community members can access and contribute data to. (Identifiers such as name, address and birthdate are removed.)

What does the future hold for AI in medicine? Mamdani is particularly excited about how it will enable patients to engage in greater self-care: many who might otherwise have been hospitalized will be able to access providers while still at home. "Patients will have monitors and sensors that they can apply themselves, allowing physicians and nurses to videoconference with them and monitor their progress. This could free up hospital beds," he says. "AI may also be able to monitor you. If it detects something wrong, it could flag your provider immediately."

Mamdani is clearly proud of the achievements of both Unity Health Toronto and the Temerty Centre for AI Research and Education in Medicine, which launched less than four years ago. But he is careful to strike a cautious note when discussing the future, so as not to repeat the false promises made years ago.

At the same time, "if we want to live in a society that advances, we have to dream of what's possible," he says. "Educating people about AI's amazing potential, along with its limitations, will lay the foundation for societal acceptance – and the ongoing development of amazing products that we can actually use." **—Cynthia Macdonald**

AI LEARNS EVERYTHING IT KNOWS FROM HUMANS. WILL HUMANS ALSO LEARN FROM AI?
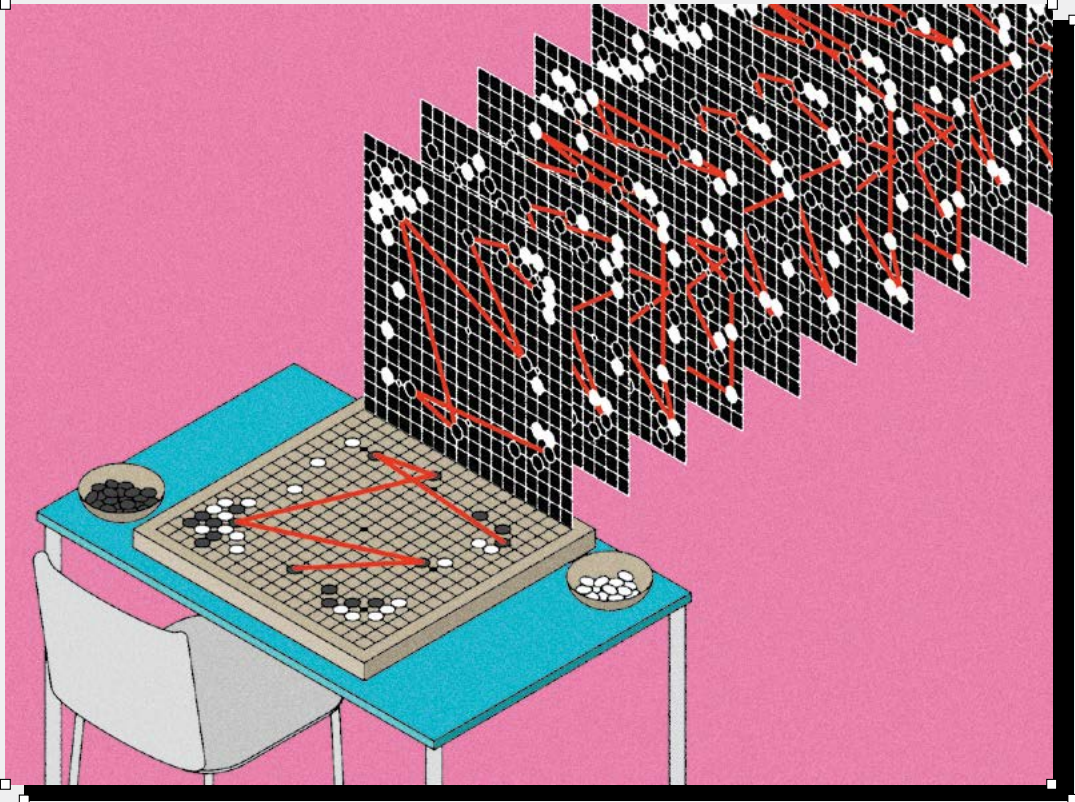
In 2016, an AI program called AlphaGo made headlines by defeating one of the world's top Go players, Lee Sedol, winning four games of a five-game match.

AlphaGo learned the strategy board game by studying the techniques of human players, and by playing against versions of itself. While AI systems have long been learning from humans, scientists are now asking if the learning could go both ways. Can we learn from AI?

Karina Vold, an assistant professor at U of T's Institute for the History and Philosophy of Science and Technology, believes we can. She is studying how humans can learn from technologies such as the neural networks that underlie today's AI systems.

"In the case of Go, professional players learn through proverbs such as 'line two is the route to defeat,' or 'always play high, not low,'" says Vold, who works at the intersection of philosophy and cognitive science, and is affiliated with the Schwartz Reisman Institute for Technology and Society. Those proverbs can be useful, but they can also be limiting, impeding a player's flexibility. AlphaGo, meanwhile, gleans insights – a term that Vold believes is appropriate – from digesting enormous volumes of data. "Because AlphaGo learns so differently, it did moves that were considered very unlikely for a good human player to make," Vold says.

A key moment occurred in the second game, on the 37th move, when AlphaGo played a move that took everyone – including Sedol – by complete surprise. As the game went on, however, move 37 proved to be a masterstroke. Human Go players "are now studying some of the moves that AlphaGo made and trying to

come up with new sorts of proverbs and new ways of approaching the game," says Vold.

Vold believes the possibility of humans learning from AI extends beyond game playing. She points to AlphaFold, an AI system unveiled by DeepMind (the same company behind AlphaGo) in 2018, that predicts the effects of proteins based on their structure. Proteins are made up of sequences of amino acids, which can fold and form complex 3D structures. The protein's shape determines its properties, which in turn determine its potential efficacy in new drugs to treat diseases. Because proteins can fold in millions of different ways, however, it is impossible for human researchers to work through all the combinations. "This was a long-standing grand challenge in biology that had been unsolved," says Vold, but in which AlphaFold "was able to make great advances."

Even in cases where humans may have to rely on the sheer computing power of an AI system to tackle certain problems – as with protein folding – Vold believes artificial intelligence

↓

Professor
Karina Vold

can guide human thinking by reducing the number of paths or conjectures that are worth pursuing. While humans may not be able to duplicate the insights an AI model makes, it is possible "that we can use these AI-driven insights as scaffolding for our own cognitive pursuits and discoveries."

In some cases, Vold says, we may have to rely on the "AI scaffolding" permanently, because of the limitations of the human brain. For example, a doctor can't learn to scan medical images the same way that an AI processes the data from such an image; the brain and the AI are just too different. But in other cases, an AI's outputs "might serve as cognitive strategies that humans can internalize [and, in so doing, remove the 'scaffolding']," she says. "This is what I am hoping to uncover."

Vold's research also highlights the issue of AI "explainability." Ever since AI systems started making headlines, concerns have been raised over their seemingly opaque workings. These systems, and the neural networks they employ, have often been described as "black boxes." We may be impressed by how quickly they appear to solve certain kinds of problems, but it might be impossible to know how they arrived at a particular solution.

Vold believes it may not always be necessary to understand exactly how an AI system does what it does in order to learn from it. She notes that the Go players who are now training on the moves that AlphaGo made don't have any inside information from the system's programmers as to why the AI made the moves it did. "Still, they are learning from the outputs and incorporating the moves into their own strategic considerations and training. So, I believe that at least in some cases, AI systems can function like black boxes, and this will be no hindrance to our learning from them."

Yet there may still be situations where we won't be satisfied unless we can see inside the black box, so to speak. "In other cases, we may need to understand how the system works to really learn from it," she says. Trying to distinguish cases where explainability is crucial from those where a black box model is sufficient "is something I'm still thinking about in my research," says Vold. **—Dan Falk**
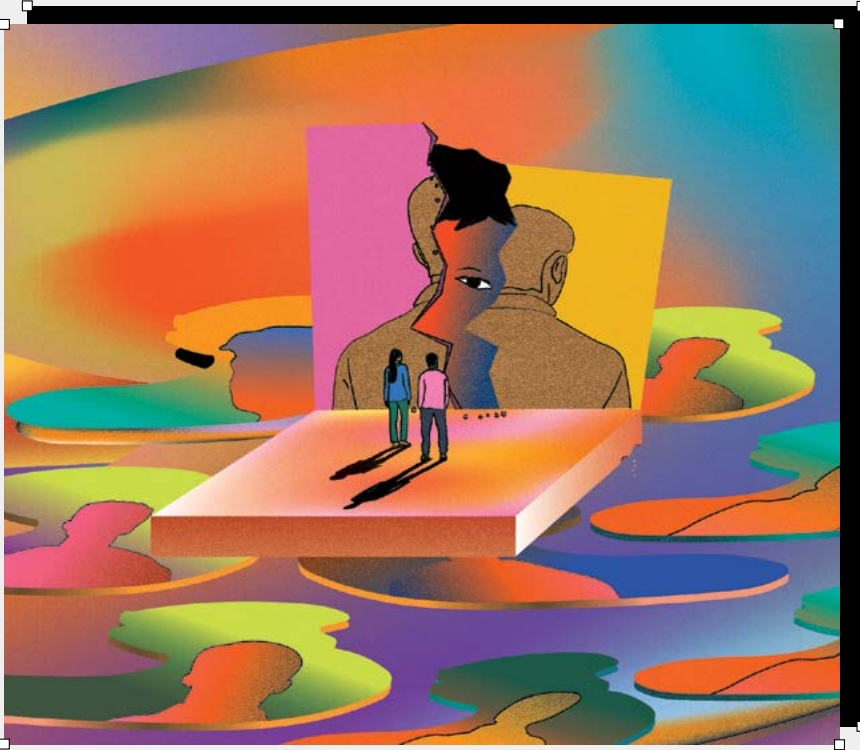
THE AGE OF DECEPTION

AI is generating a disinformation arms race.
The window to stop it may be closing

I n an apparent interview with the talk show host Joe Rogan a year ago, Prime Minister Justin Trudeau denies he has ever appeared in blackface, responds to rumours that Fidel Castro was his father, and says he wishes he had dropped a nuclear bomb on protesters in Ottawa.

The interview wasn't real, of course, and was apparently intended to be humorous. But the AI-generated voice of Trudeau sounded convincing. If the content had been less absurd it would have been difficult to distinguish from the real thing.

The video highlights the growing danger that artificial intelligence could usher in a new era in disinformation – one that will make it easier than ever for malign actors to spread propaganda and fake news that seems authentic and credible. Recent advances in generative AI have made it much easier to create all sorts of convincing fake content – from written stories to replicated voices and even fake videos. And as the technology gets cheaper and more widespread, the danger increases.

"It's probably one of the things that I'm most worried about right now," says Ronald Deibert, director of the Citizen Lab at the Munk School of Global Affairs and Public Policy. "I think it's going to create all sorts of chaos and havoc, and amplify a lot of the problems that we're seeing around misinformation and social media," he says.

AI tools such as ChatGPT allow people to write articles about specific subjects in a particular style. For instance, U.S. researchers were able to get the program to draft convincing essays arguing that the school shooting in Parkland, Florida, was faked, and that COVID-19 could cause heart problems in children. "You can simply plug in a prompt and the entire article can be created. That makes it just so much easier," Deibert says. "It's hard to discern if something is fake or authentic."

Impersonating a voice is also straightforward. The people who made the Trudeau fake interview said they used a service called ElevenLabs. The company's website offers the ability to generate a realistic human voice from a typed script, and also has the option of "cloning" a voice from a recording.

A technology like this may have been used in January during the New Hampshire presidential primaries, when a robocall in the voice of President Joe Biden urged Democrats not to vote. The New Hampshire Attorney General's office said the recording seemed to use an artificially generated voice.

Perhaps even more concerning are deepfake videos, which can be made to show a lookalike version of a real person doing or saying almost anything. For instance, a video that appeared last year seemed to depict Hillary Clinton on MSNBC endorsing then-Republican presidential candidate Ron DeSantis. Although the

face seemed slightly rubbery, the video was fairly convincing – until the end, when Clinton says, "Hail, Hydra!" – a reference to an evil organization from Marvel comics and movies.

The stakes can be high. In 2022, a deepfake video of Ukrainian President Volodymyr Zelenskyy appeared to show him urging Ukrainian soldiers to put down their arms and surrender.

In the recent past, creating forged documents, photos or articles took considerable time and effort. Now, generating synthetic media is simple, widely available and cheap. One researcher, whose work is widely known but who has not disclosed his identity, built and demonstrated an AI-enabled platform called Countercloud that was able to create a disinformation campaign – complete with fake news articles and extensive social media support – with only a few prompts. "So what you have is the means to generate authentic, credible-looking content with the push of a button," Deibert says. This substantially lowers the barriers for malicious actors who want to wreak havoc.

Deibert and his colleagues at the Citizen Lab have documented several sophisticated disinformation campaigns on social media. They recently released a report by researcher Alberto Fittarelli on an effort they call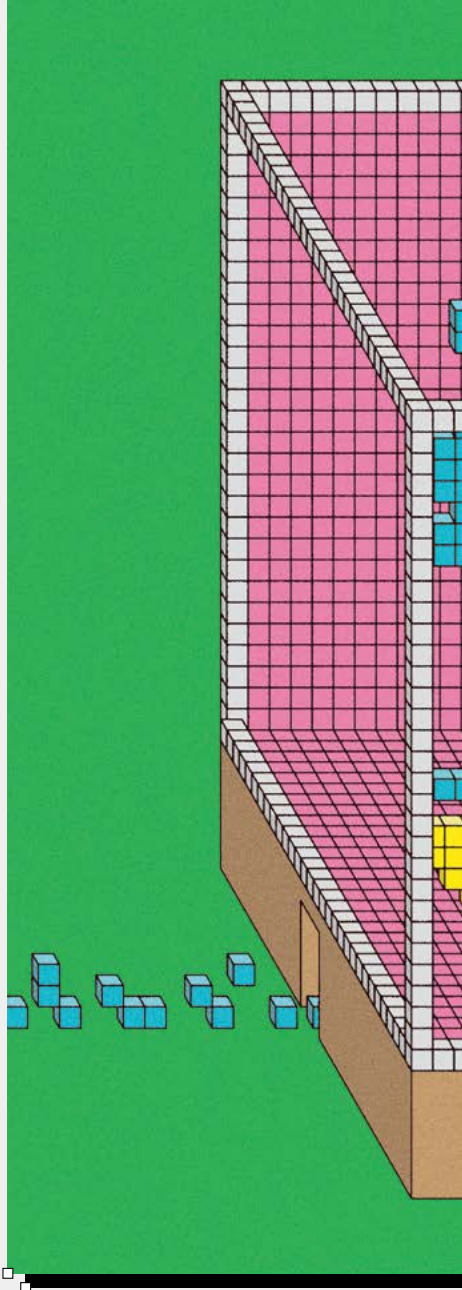 Paperwall, in which at least 123 websites run from within China impersonate legitimate news sites from around the world, running stories favourable to Beijing. Previous work by the lab has uncovered sophisticated disinformation campaigns run on behalf of Russia and Iran.

Deibert isn't the only one raising the alarm about AI and disinformation. Publications from the *New York Times* to *Foreign Affairs* have run articles about the problem – and possible solutions. Among them are technical approaches, such as "watermarks" that allow users to see if information has been generated by an AI, or artificial intelligence programs that are capable of detecting when another AI has created a deepfake. "We will need a repertoire of tools," Deibert says – "often, the same tools the bad actors are using."

Social media companies also need to devote more resources to detecting and eliminating disinformation on their platforms. This might require government regulation, he says, though he acknowledges that this comes with the risk of government overreach. He also calls for increased regulation around ethical use of and research into AI, noting this would apply to academic researchers as well.

But Deibert thinks a broader solution is needed, too. A big part of the problem, he says, are social media platforms that depend on creating extreme emotions in users to keep them engaged. This creates a perfect breeding ground for disinformation. Convincing social media companies to turn the emotional volume down – and educating citizens to be less prone to manipulation – may be the best long-term solution. "We need to rethink the entire digital ecosystem to deal with this problem," he says. **—Kurt Kleiner**

"We need to rethink the entire digital ecosystem to deal with this problem"

SAFETY FIRST

AI has developed faster than anyone thought. Will it serve humanity's best interests?
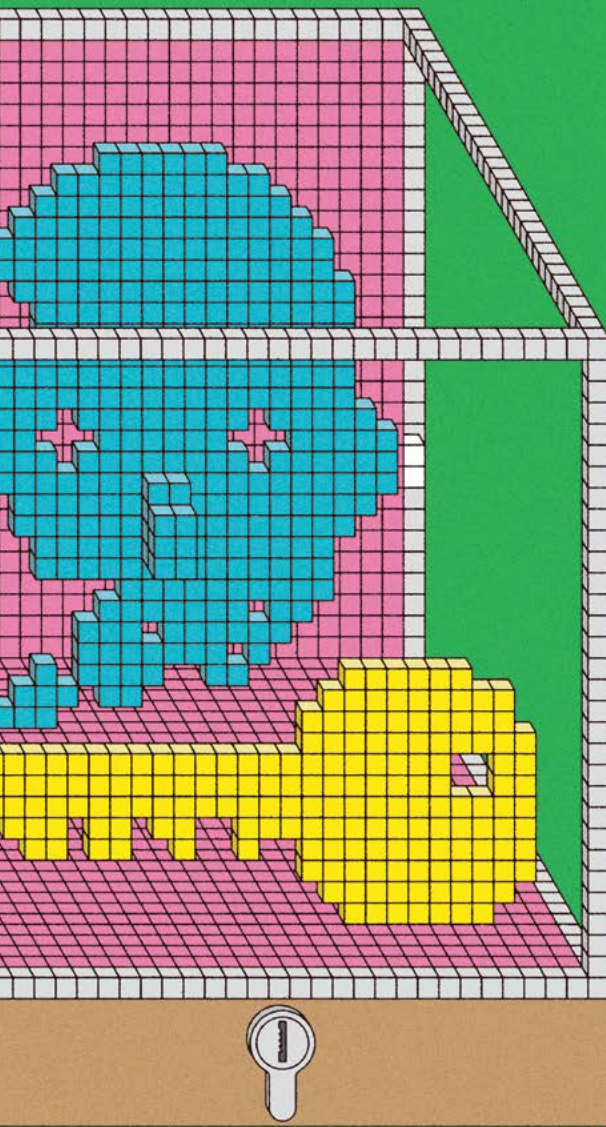
SOMETIMES USERS ARE BILLED BASED

get closer to achieving what computer scientists call artificial general intelligence (AGI) – systems that can perform a multitude of tasks, including ones they were never explicitly trained to do. "What's new about AGI systems is that we have to worry about the risk of misuse in areas they weren't specifically designed for," says Grosse, who is a founding member of the Vector Institute for Artificial Intelligence and an affiliate of U of T's Schwartz Reisman Institute for Technology and Society.

Grosse points to large language models, powered by deep-learning networks, as an example. These models, which include the popular ChatGPT, aren't programmed to produce any particular output; rather, they analyze massive volumes of text (and images and videos), and respond to prompts by stringing together single words based on the likelihood of that word occurring next in the data it was trained on. While this may seem like a haphazard way of building sentences, systems such as ChatGPT have nonetheless impressed users by writing essays and poems, analyzing images, writing computer code and more.

And they can catch us by surprise: Last year, Microsoft's Bing chatbot, powered by ChatGPT, told journalist Jacob Roach that it wanted to be human, and was afraid of being shut down. For Grosse, the challenge is trying to determine what sparked that output. To be clear, he doesn't think the chatbot was actually conscious, or actually expressing fear. Rather, it may have come across something in its training data that led it to say what it said. But what was that something?

TO TACKLE THIS problem, Grosse has been working on techniques involving "influence functions," which are designed to deduce what aspects of an AI system's training data led to a particular output. For example, if the training data included popular sci-fi stories, where tales of conscious machines are ubiquitous, then this could easily lead an AI to make statements similar to those found in such stories.

He notes that an AI system's output may not necessarily be copied word-for-word from the training data, but rather may be some variation on what it's encountered. They can be "thematically similar," Grosse says, which suggests that the AI is "emulating" what it has read or seen and performing "a higher level of abstraction." But if the AI model develops an underlying motivation, this is different. "If there were some aspect of the training procedure that is rewarding the system for self-preservation behaviour, and this is leading to a survival instinct, that would be much more concerning," says Grosse.

t's no secret that artificial intelligence has unleashed a variety of potential dangers. AI systems, for example, can be used to spread misinformation; they can perpetuate biases that are inherent in the data they have been trained on; and autonomous AI-empowered weapons may become commonplace on 21st-century battlefields.

These risks are, to a large extent, ones that we can see coming. But Roger Grosse, an associate professor of computer science at U of T, is also concerned about new kinds of risks that we might not perceive until they arrive. These risks increase, Grosse says, as we

Even if today's AI systems aren't conscious – there's "nobody home," so to speak – Grosse believes there could be situations where it makes sense to describe an AI model as having "goals." Artificial intelligence can surprise us by "behaving as if it had a goal, even though it wasn't programmed in," he says.

These secondary or "emergent" goals crop up in both human and machine behaviour, says Sheila McIlraith, a professor in the department of computer science and associate director and research lead at the Schwartz Reisman Institute. For example, a person who has the goal of going to their office will develop the goal of opening their office door, even though it wasn't explicitly on their to-do list.

The same goes for AI. McIlraith cites an example used by computer scientist Stuart Russell: If you tell an AI-enabled robot to fetch a cup of coffee, it may develop new goals along the way. "There are a bunch of things it needs to do in order to get that cup of coffee for me," she explains. "And if I don't tell it anything else, then it's going to try to optimize, to the best of its ability, in order to achieve that goal. And in doing that, it will set out other goals, including getting to the front of the line of the coffee store as quickly as possible, potentially hurting other people because it was not told otherwise."

Once the AI model is developing and acting on goals beyond its original instructions, the so-called "alignment" issue becomes paramount. "We'd like to make sure the goals of AI are in the interest of humanity," says Grosse. He adds that it makes sense to say that an AI model can reason, if it works through a problem step by step, the way a human would. The fact that AI can seemingly solve difficult problems is something that not long ago would have seemed miraculous. "That's why we're in a different situation from where we were a few years ago," says Grosse, "because if you asked me in 2019, I would have said deep learning can do a lot of amazing things, but it can't reason."

For Grosse, the acceleration of AI technology, as illustrated by the capabilities of today's large language models, is cause for concern – and a reason to refocus his research on safety. "I'd been following the discussions of AI risk for a long time," he says. "I'd sort of bought into the arguments that if we had very powerful AI systems, it would probably end badly for us. But I thought that was far away. In the last few years, things have been moving much faster."

Even if the frightening scenarios depicted in the Terminator movie franchise are more Hollywood than reality, Grosse believes it makes sense to prepare for a world in which AI systems come ever-closer to possessing human-level intelligence, and have some measure of autonomy. "We need to worry about the problems that are coming," says Grosse, "where more powerful systems could actually pose catastrophic risk." **—Dan Falk**

⇨ ⇨ **GUARDRAIL:** A GUIDELINE, CONSTRAINT OR SAFETY MEASURE PLACED ON AN AI MODEL TO MAKE SURE IT OPERATES WITHIN PREDEFINED BOUNDARIES AND DOESN'T DO BAD THINGS, SUCH AS OUTPUT HARMFUL CONTENT OR EXHIBIT BIAS OR DISCRIMINATION. ⇧ ⇧

TUNING INTO TOMORROW

AI can help musicians compose and create new sounds. Is it just another music-making tool – or something else?

A bout a year ago, Stephen Brade started noodling around with a guitar composition. He set the unfinished piece aside, but returned to it when he realized that an AI-powered synthesizer he was developing might help him find the swelling yet spacious sound he was striving for.

Brade, a master's student in the computer science department at U of T, is the creator of SynthScribe, a research project that aims to make synthesizers more user-friendly by allowing musicians to shape sounds through text and audio inputs rather than complex manual adjustments.

To demonstrate SynthScribe, Brade first walks a visitor through the constellation of buttons and knobs that musicians must learn

how to precisely manipulate to design synthesizer sounds. One shortcut in this time-consuming process is to draw from vast libraries of premade sounds, but it can be difficult to come up with the exact search terms to match the sound in your head.

There's a disconnect, Brade says, between the technical jargon often tagged to sounds ("saw wave," "attack time," "low-pass filter") and the subjective everyday language we use to describe them ("warm," "gritty," "dreamy").

SynthScribe uses advanced AI to bridge this gap, making it easy for users to find, change and create synthesizer sounds using both descriptive words and audio clips.

Brade types "sound of the void" into the system's search bar and a hum of white noise whooshes through the speakers. He asks the system to make a flute sound "harsher" and it adjusts to a more bracing pitch. There's also a feature that can blend sounds together to create brand new ones. For his own piece, Brade landed on a raspy, resonant sound that he feels adds to the song's lilting melancholy.

Brade says his own creative experience was consistent with what musicians who were asked to try SynthScribe told the researchers. Many of the artists surveyed highlighted the system's ability to help them think outside the musical box, generating sounds they did not expect but were still pleased to hear. "There's

a lot of potential for really, really new music," he says.

Brade is among those who are excited about AI's potential to unleash a new wave of musical experimentation by creating never-before-heard sounds, streamlining production methods and reducing the technical barriers to creative expression.

But the rise of generative AI has also sowed discord in the music community. There are fears of unscrupulous actors using AI to "clone" singers' voices and of job losses in sound production. (Brade himself is wary of the potential for musicians to be exploited.) Some even fear that AI will strip music of its soul.

As a coder who enjoys composing, Brade says the outlook might depend on whether AI programs are designed to serve musicians as artistic collaborators or supplant them as all-in-one, automated music creators. So far, Brade thinks humans still have the edge. "Generative models tend to create music that sounds derivative," he says. "This is less likely to be the case with a composer or musician who is trying to push boundaries."

Gregory Lee Newsome, an assistant professor, teaching stream, in U of T's music technology and digital media graduate program, sees AI as simply the latest – but most powerful – example of technology's influence on the trajectory of music.

Newsome, who provided technical support on SynthScribe and co-authored the preprint paper, says artists have always made use of new tools. But he worries that generative AI might be qualitatively different than any innovation that's come before: "It's so powerful that it may not require human intervention at all."

Technologies such as Stability AI's Stable Audio and Google DeepMind's Lyria already allow

JAILBREAK:

"If people like the tune,
the voice, the lyrics, the beat,
will they care about
who – or what – made it?"

users to compose music in a variety of genres and styles without having to play a note.

Meanwhile, an AI-generated "collaboration" between Drake and The Weeknd that went viral last year has raised alarm about vocal clones, spurring mixed reactions within the music industry.

Last fall, Universal Music Group and other music publishers sued AI company Anthropic over allegations that its chatbot Claude copies and distributes copyrighted song lyrics. It's one of several similar lawsuits filed by copyright owners – including writers, visual artists and the *New York Times* – claiming their content was improperly used to train AI models.

At the same time, however, a number of music industry players are looking to get in on the AI action. Universal, for example, teamed up with YouTube to guide its approach to AI-generated music, while hitmakers including Charlie Puth and T-Pain have lent their voices to a Lyria-powered experiment on YouTube Shorts.

People often experience music emotionally, Newsome says, and many fans form deep personal attachments to their favourite artists. This essential element of human connection could prove difficult for AI to replicate, he suggests.

But Newsome says he still fears for his students, most of whom remain committed to traditional modes of music production, as AI threatens to siphon off the already limited revenue streams available to musicians.

"It's a little mysterious what's going to happen, but I would not be surprised if this is a sea change for a lot of music production," he says. "The test may be: if people like the tune, the voice, the lyrics, the beat, will they care about who – or what – made it?" **—Adina Bresge**

⇨ ⇨ **SYCOPHANCY:** LANGUAGE MODELS SUCH AS CHATGPT ARE TRAINED TO GET

A SENTINEL FOR GLOBAL HEALTH

AI is promising a better – and
faster – way to monitor the world
for emerging medical threats

n late 2019, a company called BlueDot warned its customers about an outbreak of a new kind of pneumonia in Wuhan, China. It wasn't until a week later that the World Health Organization issued a public warning about the disease that would later become known as COVID-19.

The scoop not only gained BlueDot a lot of attention, including an interview on *60 Minutes*, it also highlighted how artificial intelligence could help track and predict disease outbreaks.

"Surveillance and detection of infectious disease threats on a global scale is a very complex endeavor," says Kamran Khan, a professor at U of T's department of medicine, a clinician-scientist at St. Michael's Hospital and the founder of BlueDot. His solution is to use AI to help sort through vast amounts of information, and tag data of potential interest for the company's human experts to evaluate.

"The metaphor of the needle in the haystack is the right one. We're building a very big, increasingly

BlueDot founder
Kamran Khan
→

comprehensive haystack. But identifying what is anomalous or unusual is the key, because many outbreaks appear around the world every day, yet the vast majority of them are limited in scale and impact."

Khan's career as a doctor is largely defined by big disease outbreaks. He was doing a fellowship in New York in 1999 when West Nile virus hit, and was there in 2001 when anthrax spores were mailed to members of Congress and the media, killing five. He moved to Toronto just months before the SARS outbreak of 2003. "Having seen three infectious disease emergencies in four years was an indication to me that in my career we probably were going to see more of these," he says.

The heart of BlueDot's method was outlined in a paper published six months before COVID hit. The company uses a database of news stories, created by Google and collected from 25,000 sources in 100 languages around the world – far too much for humans to sort through. Instead, an AI model trained by the company sorts through the stories and flags those that seem most likely to be about a disease outbreak of interest. To develop the system, the team ran their program retrospectively on the 12-month period from July 2017 to June 2018, and compared their results with official World Health Organization (WHO) reports for the same period.

In the paper, the researchers explain that online media covered all but four of the 37 disease outbreaks identified by the WHO, and that their system flagged all but two of those reports. Although the system missed some of the outbreaks, the ones it did detect it found much earlier than the WHO – an average of 43 days before an official announcement.

Since that 2019 paper, BlueDot has supplemented news sources with information from government health websites, reports from the medical and health communities and reports from their own clients. "We use the internet to detect early signals that something unusual is going on in a community, even before it is being officially reported," Khan says, noting that government information is sometimes delayed – or suppressed for political reasons.

In their paper, the researchers used historical data to show that their system could work in theory. By the end of the year, when BlueDot detected COVID-19, they were able to show they could also beat official reports in real time.

More recently, BlueDot alerted clients to an outbreak of Marburg virus, which is similar to Ebola, in Equatorial Guinea in February 2023. WHO officials confirmed the outbreak with blood testing, and sent medical experts and protective equipment to help contain the disease. "We can innovate in a way that helps governments and other organizations move more quickly, when time is of the essence," Khan says.

BlueDot isn't the only organization using AI to help keep track of outbreaks, Khan says. The WHO has a system, and there are other startups and non-profits experimenting with the method. Khan says BlueDot offers extra value by making the information easy for governments and private clients to access, use and act upon – and by providing further analysis. "Our belief is that epidemics are a whole-of-society problem, which means that organizations across sectors need to be empowered to do their part," he says. Since starting more than a decade ago, BlueDot has attracted 30 clients in 24 countries, both public and private. Its government clients represent 400 million people.

Khan notes that improvements in AI since 2019 are opening new possibilities for using the technology to analyze and report information. Sorting through the data generated by the system can be a time-consuming task for a human. Khan says AI is getting better at generating text and visuals such as infographics, and humans are no longer needed to create routine reports with summaries, charts and simple analysis. BlueDot is also using a new interface that allows people to ask questions about disease outbreaks in everyday language. In the past, working with the system required some computer coding skills, he says.

Soon, the company would like to be able to take its audience into consideration – for instance, writing one kind of report for a doctor, and another for a policymaker. "Generative AI is opening the door for us to be able to communicate insights to a diverse set of audiences at a large scale," Khan says.

Rather than replacing humans, he thinks AI will complement them, allowing teams of experts to analyze and make decisions about much more data than they could otherwise. **—Kurt Kleiner**

Rotman School of Management
UNIVERSITY OF TORONTO

R

Rotman's ESG Designation

—

Make ESG a priority in your organization to unlock innovation and sustain growth.

U of T alumni can save 15%.

Rotman | **Executive Programs**

LEE CHIN INSTITUTE

rotmanexecutive.com/ESG

St. George campus plans to cut carbon emissions in half by 2027

Groundbreaking plan comes on the heels of U of T's number-one sustainability ranking

T he block-shaped, brick industrial facility at 17 Ursula Franklin Street might not be U of T's most iconic building, but in many ways, it is the unsung hero that enables the St. George campus's more well-known edifices to function.

It's the heart of the district energy system – the central steam plant. There, water is boiled to make steam that is piped around to heat most buildings on campus, as well as some nearby non-university properties such as the Royal Ontario Museum.

But the plant was built in the early 1950s and needs an eco-friendly upgrade. Its boilers burn natural gas. Switching from gas to electric boilers would make a huge dent in the university's carbon footprint – but also cost more (electricity is 10 times

more expensive than natural gas in Ontario).

Ron Saporta, U of T's chief operating officer of property and sustainability, dubs this the "carbon versus cost" quandary: to curb carbon emissions from the steam plant, the university needs to slash energy use and costs. That requires a big financial commitment. Enter the Canada Infrastructure Bank's $50-million investment to kickstart the university's Project Leap, a collection of building modernizations that will help the St. George campus halve its carbon emissions in three years, and eliminate more greenhouse gases than it emits well before 2050 – the year by which all three campuses have pledged to become climate-positive.

Costing $138 million in total, Project Leap uses a unique funding model that draws partly on federal and provincial grants and partly on private financing, on top of the investment by the Canada Infrastructure Bank.

The first pillar of the project will be to carry out extensive retrofits of the most power-hungry buildings to cut their energy costs. These tend to be buildings with lots of science labs; a single fume hood, which removes hazardous or toxic fumes, can use as much electricity as three homes.

To put that into perspective, just three of the buildings selected for Project Leap – the Medical Sciences Building, the Donnelly Centre and Leslie L. Dan Pharmacy Building – contain 243 fume hoods among them. "In these wet lab-heavy buildings, we'll carry out something called 'active heat recovery,' where you take heat out of the air being exhausted and reuse it to heat the building," Saporta says.

The savings that result from active heat recovery and other retrofits will go toward purchasing electricity to power two new electric boilers (which will replace one large natural gas boiler).

Meanwhile, buildings around King's College Circle will be connected with the new geo-exchange system beneath front campus that will heat them in winter and cool them in the summer, while helping to substantially reduce greenhouse gas emissions.

These retrofits will be completed by the end of 2027, by which point the St. George campus will have breezed past emission reduction targets for 2030 set by the federal government, the university's own Low-Carbon Action Plan and – impressively – the UN Intergovernmental Panel on Climate Change goal, which aims to keep global warming to less than 1.5 degrees Celsius.

Similar carbon reduction efforts are underway at U of T Mississauga, which plans to convert gas boilers in its central utilities plant to electric. The campus is also constructing two "nodal plants" – essentially mini utilities plants – to more efficiently heat buildings located farther from the main hub. A new geo-exchange system will cover most of the energy needs of the New Science Building.

U OF T'S GIANT LEAP

The St. George campus aims to cut annual carbon emissions by 46,000 tonnes. This equals the emissions generated by:

Flying
41,600
people from Toronto to Paris

Driving
10,000
gas-powered passenger vehicles for one year

3,022
Canadians in a year

U of T Mississauga's most energy-intensive structure is the William G. Davis Building, which houses everything from labs and lecture halls to food services. The building is being evaluated by grad students taking the "Ha/f Research Seminar," in which they measure the carbon footprint of U of T buildings and assess the impact of potential renovations (see page 44). The seminar is one of hundreds of U of T projects where students, faculty and staff collaborate to analyze the sustainability of university infrastructure and provide recommendations.

Last year, U of T Scarborough carried out an airtightness test of its Humanities Wing, part of the Andrews Building, to figure out how much air leaks out of the structure. The test was one element of a comprehensive study of energy performance that will inform future retrofits to the building. "This is a very difficult test to do with a 1960s building of this size with open spaces, underground tunnels and connections to other buildings," says the

campus's sustainability manager, Patricia Escobar.

While it looks to renew older buildings, U of T Scarborough is also ensuring that new construction is climate-responsible. Last fall, it opened Harmony Commons, a 746-bed student residence that meets the rigorous (but voluntary) Passive House standard for energy efficiency. The upcoming Scarborough Academy of Medicine and Integrated Health will boast an array of sustainability features, including solar panels built into the facade. The campus is also setting up a new geo-exchange system to add to the three it already has.

The scale of these tri-campus sustainability measures hasn't gone unnoticed. In December, U of T was named the most sustainable university in the world in the QS Sustainability Rankings, besting 1,400 institutions in 95 countries.

It is an accolade that Saporta appreciates, even if he doesn't view climate action as a competitive endeavour. His sustainability team recently organized workshops with counterparts at the University of California, Berkeley – which placed second behind U of T in the ranking – to exchange knowledge and best practices. U of T is also working with the Toronto Region Board of Trade on a playbook that can guide other institutions in drafting decarbonization initiatives inspired by Project Leap's model.

"Many institutions are struggling with the UN targets and saying, 'These targets are too aggressive, we can't do it.' Well, we're going to prove to everyone that you can do it," Saporta says. "Our solutions are highly replicable and can be used by institutions in North America and beyond to address the climate challenge. "It's about getting everybody to improve," he adds. "It's one Earth." —Rahul Kalvapalle

Think twice before tapping

With advances in AI and other technologies, web scammers are getting a lot craftier, says Daniel Tsai, a lecturer at U of T Mississauga's Institute for Communication, Culture, Information and Technology. "When in doubt, always verify," he warns. Tsai, an expert in online fraud, offered these four tips on how to spot — and avoid — a cyberswindle. —Kate Martin

They look legitimate
Scammers send texts and emails that look like they are coming from institutions such as banks, with partial account numbers and requests for passwords. Examine them carefully, says Tsai. "I received a fake request from TD Bank with the first four digits of my bank card. Turns out those digits are the same four digits on every TD card."

Scrutinize the source
Phishing emails often ask readers to click a link, download a file or purchase a gift card. But they often contain an error, says Tsai. "It looks like it's from your boss, but the name or address is misspelled." The best defence, says Tsai, is to confirm directly with the source. "Don't email back; it will just go to the scammer," says Tsai. "Call the person or, if work-related, pop into their office."

Unwanted calls
Even legitimate businesses are reducing staff and relying on AI to robocall customers. Tsai advises using a filter — available on your phone or from a cell provider — to block unknown numbers. "I use it, and it has dramatically reduced my robocalls," he says.

Attack of the clones
The latest scam is voice replication. A fraudster downloads a video from your Facebook feed, copies your voice with AI and impersonates you on a call to grandma, asking for $2,000 to get you out of jail. A good rule of thumb, especially when cash or personal info is requested: hang up and call the person yourself.

Drawing connections
Professor Ai Taniguchi explores how art and language can bring us together

Ai Taniguchi was six when her family moved to the United States from Japan, and she'll never forget how scary and lonely it felt to start Grade 1 barely knowing a word of English. She learned quickly, but it was her love of art that first helped her bridge the language barrier.

"I'd sit with my notebook on a bench drawing at recess, and the kids would come over and ask me to draw them or their favourite cartoon characters," she says. "It was like they saw a part of me even though we didn't speak the same language, and I felt a lot of joy."

Today, Taniguchi is an assistant professor of linguistics at University of Toronto Mississauga, where she uses art – specifically Japanese-style comics called manga, which she grew up reading – in her teaching and public outreach aimed at increasing awareness of the crucial role language plays in people's everyday lives.

"Comics are inherently relatable because they're easy to read, understand and share," she says, noting that an image plus a few words can convey complex linguistics concepts. When she's teaching about sentence ambiguity, for example, she shows a comic illustrating the two potential meanings of "Darth Vader will poke the dog with a lightsaber." (See below.)

She even coined a term, "graphic linguistics," to describe the intersection between her two passions. "Art has always been my safe space," says Taniguchi, who has never had formal art training. "It allows me to capture the chaos of all the ideas going around in my head."

Last year, at 33, she was diagnosed with ADHD – something that has helped her make sense of what she calls the "hyperactivity in my mind." While she acknowledges that it's difficult to tease out the connection between her lifelong visual creativity and how her brain works, Taniguchi knows that she has consistently turned to images to make sense of the world. "Injecting art into everything that I do has just been an instinctive practice for me," she says.

Darth Vader will poke the dog with a lightsaber

Meaning 1: Darth Vader will use a lightsaber to poke the dog

Meaning 2: Darth Vader (using his finger) will poke the dog, who has a lightsaber

Ai Taniguchi is
a linguistics
professor at UTM
←

Yet she's also naturally inclined toward learning about languages. "Being bilingual in Japanese and English, I was constantly wondering about things like the patterns across languages and why there were words for certain things in Japanese but not in English," she says (see next page). "When I was deciding what to study at university, I ended up Googling 'Is there a study of languages?' and discovered linguistics. That's where it all started."

The first time Taniguchi formally combined her two interests was when she created a comic related to an undergraduate linguistics class she was taking. "It was a goofy little thing on a piece of paper with two cats talking about sentence structure. I sent a picture of it to my professor, who put it up on her office door," she says. "Eventually, I posted it online, where it got a lot of attention from linguistics groups on social media."

At first, Taniguchi was aiming for a research career in linguistics, driven by the thrill she got from discovering new things and believing that she was too introverted to be a good teacher. Then she got her first teaching assignment in grad school.

"I suddenly realized that teaching might be one of my talents, because I know from my cultural and linguistic background what it's like to literally not understand or be understood by people," she says. "That's a very tough thing. It's a feeling that I don't want other people to experience, especially when something can be made more accessible."

Long before she knew she had ADHD, Taniguchi used teaching strategies that would have helped her when she was a student, such

as simplified explanations, repetition and drawings – often humorous ones.

"I immediately found a lot of satisfaction and joy in thinking about how to make linguistics fun and relatable to students," she says. "I know now that if I teach for an ADHD brain like mine, it also benefits neurotypical people." Her students say that she makes complicated ideas relatable and that she creates a welcoming environment for all types of learners – in part by sharing her ADHD diagnosis. "Her teaching approach is compassionate and engaging to students from all walks of life," says PhD student Kate Prigaro. "She frequently uses comics to start conversations about the relationship between language and our lived experiences – including neurodivergence, immigration, racism and more."

Taniguchi recently completed a major project that used her comics – which she now draws digitally using a large tablet and stylus – to illustrate the individual stories of U of T students who speak languages ranging from Arabic and Anishinaabemowin to Punjabi and Urdu. The project idea sprang from students' reactions to comics she had created and shared in class about her own challenges navigating two languages.

"The comics are quite personal, and students expressed gratitude that I'd highlighted things they had been through," she says, adding that she has learned through conversations with experts in the more established field of graphic medicine that comics can make the treatment of heavy topics easier. "I started making comics because I wanted a lighthearted

FINDING THE RIGHT WORD
Sometimes a term in one language has no direct equivalent in another. Taniguchi gave us three of her favourite examples from Japanese and English.

さすが (*sasuga*)
This means, "I'm impressed by something you've done but, knowing you, I shouldn't be." For example, you, Sal and Teresa go hiking, but you and Sal forget to bring sunscreen. Teresa, the responsible one, reveals that she brought sunscreen for everyone. You might say "*sasuga* Teresa."

お疲れ様 (*otsukaresama*)
This greeting acknowledges someone's hard work with a general sense of gratitude and care for their well-being. You might say to a colleague leaving the office to go home, "*otsukaresama!*"

切ない (*setsunai*)
A mix of sentimental, sweet, painful, heartbreaking and pure. You find out that your crush is dating someone new by seeing the two of them out on a date. This is *setsunai*.

way to explore the painful parts of my history, but I also hoped that many people would relate to it in a place as diverse as U of T."

When she put out the call for multilingual students to share their stories for the project the response was overwhelming. In the end, she secured enough funding to interview and create comics for 13 students. Their stories focused on misconceptions about their languages, racism, the ups and downs of multilingual families and more. Infographics with facts about the featured languages accompanied each comic. Taniguchi shared the comics widely through social media and an exhibit at U of T Mississauga.

"The participants said that they felt seen and not alone because they got to tell their story and witness people relating to it through online and in-person comments," she says. "At the exhibit, it was heartwarming to see so many people read the comics and say, 'That exact thing happened to me.'"

"I STARTED MAKING COMICS BECAUSE I WANTED A LIGHTHEARTED WAY TO EXPLORE THE PAINFUL PARTS OF MY HISTORY"

Beyond the classroom, Taniguchi makes time to educate the wider community about linguistics through her website, public lectures, high school talks and social media. No matter the platform, she incorporates drawings and comics. "My drive to reach a big audience comes from my experience," she says. "I struggled with my sense of identity as a Japanese-English bilingual person growing up in a very white neighbourhood in Peachtree City, Georgia. I was one of few visible minorities, and I was made to feel like being Japanese and speaking Japanese wasn't cool."

When Taniguchi arrived at U of T Mississauga in 2020 and realized how richly diverse the student body was, she says she felt safe and seen. "The normalization and appreciation of diversity here is very different from the communities I grew up in. What linguistics can do is get people curious about different languages, rather than saying, 'I don't like it because it's different.'"

The path has been bumpy, but Taniguchi now celebrates her differences, whether it's the language she speaks, the way her brain operates, or her comics-based academic methods. "We've had standard expectations for teaching and communicating research for a long time, but they don't work for all students *or* professors," she says. "I'm glad to challenge those norms."

"The great thing about comics is that they tell stories that hook people. They can help students understand a complicated linguistics concept or allow them to share their experiences managing multiple languages and identities. Personally, comics have allowed me to say, 'Hey, is there anyone out there who's like me?' When people respond, I have a sense of visibility and community, and it feels like my identity is valid."
—Megan Easton

ILLUSTRATION BY DAVID SPARSHOTT
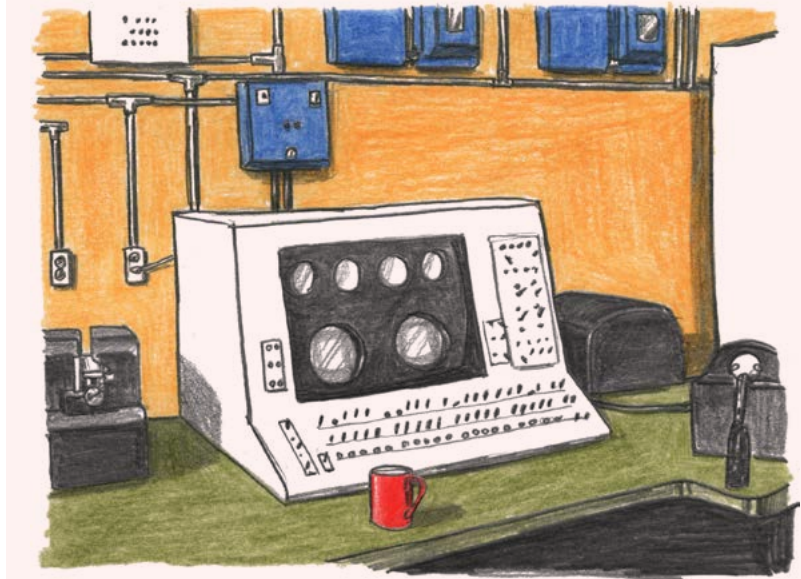
Canada's information era began at U of T

A room-sized machine that could do calculations faster than humans first took shape here 75 years ago

By 1949, a massive electronic brain was slowly awakening deep within U of T's physics building. The room-sized assembly of wires, vacuum tubes and other electronic parts — Canada's first electronic computer — promised to quickly solve equations a human might take months to crack.

The University of Toronto Electronic Computer Mark I (UTEC) was developed by several grad students, professor V.G. Smith of electrical engineering, and Calvin Gotlieb, the acting director of U of T's computational centre. "The computer's great advantage," Gotlieb told the *Globe and Mail* in 1949, "is that it saves drudgery … it can do in an instant what would take a trained mathematician days or even years." (Although UTEC was a major technological leap, today's smartphones are a trillion times more powerful.)

The project was funded by Canada's National Research Council and the Defence Research Board to avoid having important computational work — for the country's military and nuclear labs, for example — sent abroad.

Development proved difficult and slow. Few companies made computer parts and the parts that were available were expensive, so the students often had to design and build their own from scratch. To have something to show for their efforts, the team created a simplified prototype called UTEC Jr., which was functional by 1950.

UTEC Jr. worked well but was frustratingly delicate. Hair static could erase the contents of one of its 800 vacuum tubes; one bad solder among thousands might take days to find. Still, the project helped catapult U of T to the forefront of computer science in Canada, laying the foundation for a department that, decades later, would help lead the development of AI.

The end for UTEC came when a ready-made Ferranti computer became available in Britain. U of T bought it and had it running by 1952. Today, all that remains of Canada's first computer are a few blueprints, photographs and written descriptions.
—Chris Bateman

Expecting the best, receiving less

More people with disabilities are having children. Our health-care system is unprepared, says researcher Hilary Brown

At

one of Wendy Porch's early pre-natal appointments, her doctor reached over, yanked up the sleeve of her medical gown and said to an accompanying resident: "As you can see, she was born with this deformity. But we think she's going to be a great mom."

For Porch, it brought back bad memories of what it was like to be a child with a disability in Ontario. Once a year, she was made to sit in front of her X-rays, while medical students got to look at and sketch the way her left hand and right arm had missing parts – as though she was a specimen. "And here I was feeling very vulnerable and, like any mom-to-be, excited and scared," says Porch, who is now the executive director of the Centre for Independent Living in Toronto. Suddenly, she was back in that room again. "There is a need for a better understanding of how to support disabled parents," she says.

People with disabilities are more likely to have a child these days than previously: about one in eight Ontario births are to people with physical, sensory or intellectual disabilities, according to Hilary Brown, an associate professor in the department of health and society at U of T Scarborough. That's around 13 per cent of all births in the province, up from nine per cent in 2003. The increase is partly due to medical advances. But it is also due to a legacy of forced sterilization and institutionalization, which kept birth rates for people with disabilities artificially low.

Despite growing numbers, however, our health-care system has been slow to respond, says Brown, who has been studying the intersection of pregnancy and disability for more than a decade.

Looking at health data from 2003 to 2018, Brown determined that, in Ontario, people with disabilities are more likely than non-disabled people to die or have something go seriously wrong during pregnancy, childbirth or the postnatal period. They are also more likely to become depressed, less likely to breastfeed and less likely to get adequate postpartum follow up. Their babies fare worse too: they are more likely to be born early, to be born small and to spend time in the neonatal intensive care unit.

To better understand why this is happening, Brown and her colleagues interviewed 31 individuals about their experiences of pregnancy, childbirth and its aftermath. Fourteen interviewees had physical disabilities; seven had intellectual or developmental disabilities; and four had two or more of these. Eighteen of the people interviewed used assistive or communication devices regularly.

The research team found that, as Porch's experience shows, problems can start early. When one woman told her doctor that she had just discovered she was pregnant, the doctor looked at her wheelchair, looked at her, then asked, "Are you here to get an abortion?" The woman was stunned. She and her husband had been trying to get pregnant for a year and were excited about having succeeded.

Another woman's doctor questioned her ability to parent because of her blindness. The doctor turned to her husband and said they would have to find someone else to take care of the child, because how could this blind mother tell, for instance, if the baby turned blue? The doctor suggested that child protective services might even remove the child from their home. The woman, an immigrant, considered going back to her home country and raising her child there.

Brown's team found that most doctors, nurses and other health-care providers had received little or no formal training in treating pregnant people with disabilities. What training they did have regarding disabilities was how to prevent them. "That's a problem," says Brown.

There were also various accommodations that could have made a huge difference but were not there for patients who needed them. One Deaf patient told the researchers about how she thought her doctor had told her she would have a miscarriage. Because she had no American Sign Language interpreter – which the doctor was obliged by law to provide but hadn't – she had misunderstood. Another patient, who had an intellectual disability, described not understanding the medical words doctors used. Then there was the patient who was blind and had developed gestational diabetes,

13%
of all births in Ontario are to people with physical, sensory or intellectual disabilities. That's up from nine per cent in 2003.

—

Women with disabilities are
30%
more likely to visit an emergency department in pregnancy than women without a disability.
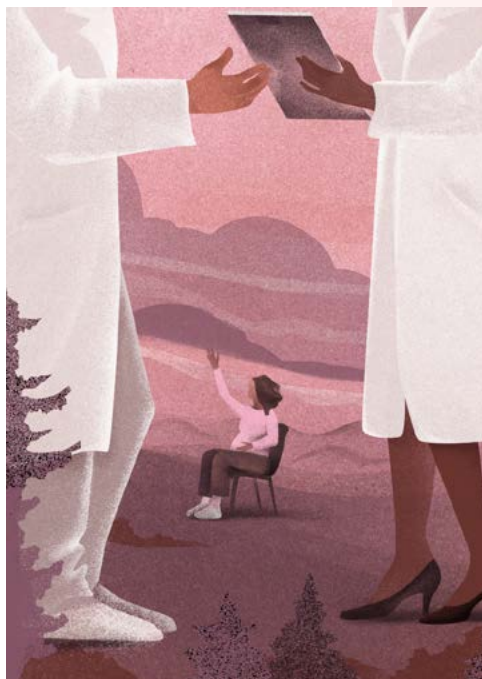
so had to test glucose levels four times a day – using a tool that was entirely dependent on vision to interpret.

There were inaccessible bathrooms and inaccessible examination tables. One woman, in order to be weighed, had to be lifted like a baby by her husband, so they could be weighed together and then have his weight subtracted. "There were these really kind of infantilizing, uncomfortable situations that could have been avoided through accessible equipment," says Brown.

On the positive side, Toronto is home to the Accessible Care Pregnancy Clinic, at Sunnybrook Hospital – one of very few clinics of its kind in North America. But Brown laments that there are still few clinical guidelines in the province on caring for people with disabilities during pregnancy. She points out that in addition to having accommodation needs, people with disabilities tend to experience higher rates of poverty and greater barriers to education and employment, so they are likely to enter pregnancy with poorer overall health than others. "It's not necessarily because of the disability, but because of all the social things that go along with that," she says.

"So much research is dedicated toward disability in children," says Brown. "But kids grow up. And they want their own families. Where are the supports for that?"

In the bigger picture, Brown says more should be done to promote the health of people with disabilities generally. "Their health care is almost entirely focused on their disability," says Brown. This means they are not screened as often for cancer, not offered advice on family planning or contraception, or provided with guidance for diet and exercise. The result, says Brown, is "your broader needs are neglected, and you enter pregnancy with more risk factors that could have been avoided." —Alison Motluk

For greener buildings, we need to rethink how we construct them

Concrete and steel are used in almost every building in Canada. These materials are relatively inexpensive and incredibly strong, but they have a hidden cost: a lot of carbon dioxide is emitted in producing them. About 13 per cent of the country's annual carbon emissions are generated by the construction industry.

If Canada intends to meet its UN pledge to be carbon neutral by 2050, it will have to find a way to reduce the carbon emissions embodied in construction materials.

Using more organic substitutes, such as mass timber, is one answer. But Kelly Alvarez Doran, an adjunct professor at the Daniels Faculty of Architecture, Landscape, and Design, says Toronto needs to make several other changes as well, such as eliminating underground parking, ditching "stepbacks" and reducing average window-to-wall ratios (see right).

Where construction materials are sourced is also crucial. Materials such as brick and aluminum require a lot of energy to produce; how this is generated has a major impact on a building's embodied carbon. Doran recalls assessing a Toronto building that was clad in grey brick imported from Nebraska. Transporting the material here increased the embodied carbon by a few percentage points. But the state's reliance on coal had a far larger impact, generating many times more carbon per brick than if the material had been made in Ontario, which relies mostly on nuclear and hydroelectric power.

Doran notes that to minimize a building's lifetime environmental impact, architects must keep the impact of both embodied and operational carbon in mind. Triple-paned windows generate more carbon dioxide during construction, for example, but reduce emissions from heating and cooling over their lifespan.

In 2022, Doran and a former student, Juliette Cook, established Ha/f, a design consultancy that helps architectural firms with these complex assessments. The team is also collaborating with the City of Toronto on guidelines for reducing embodied carbon in the local construction industry. For Doran, the work has a deeply meaningful reward: "It's how I address my anxiety about climate change." —Scott Anderson

Stepbacks
Many of Toronto's urban design guidelines call for stepbacks, which create a tiered effect. Doran is working with the city to investigate the inefficiencies they cause – for both construction and the environment. Stepbacks require more reinforced concrete (adding to the embodied carbon), leak more thermal energy (adding to operational carbon), and can contribute to the housing crisis, since they ultimately reduce the number of units a lot can accommodate.
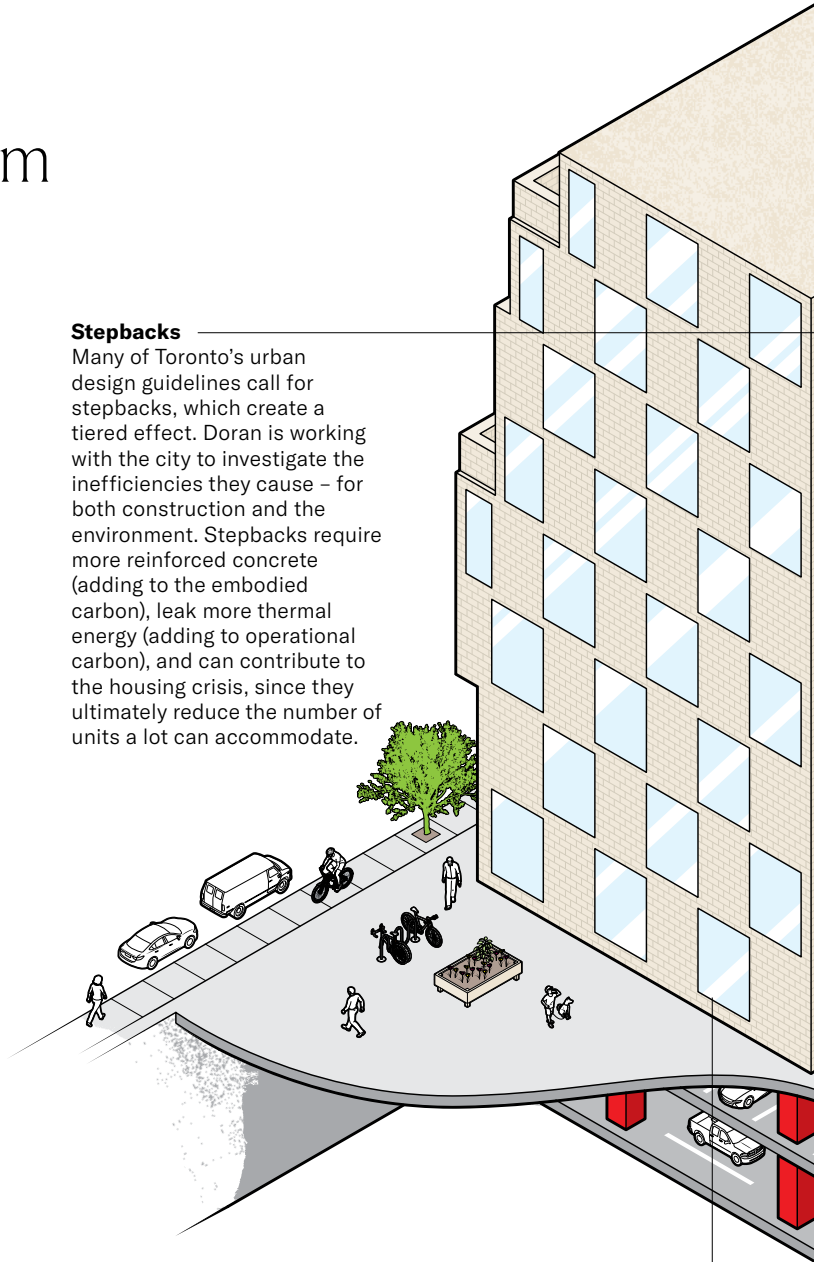
30%
The "sweet spot" for window-to-wall space – to efficiently keep the building warm in winter and cool in summer.

Window-to-wall ratio
Shrinking the proportion of windows to opaque walls helps reduce embodied *and* operational carbon. A wall of glazed windows with aluminum framing contains about three times the embodied carbon of the same-sized brick wall.

15-40%
The reduction in embodied carbon from eliminating stepbacks, or using just one.
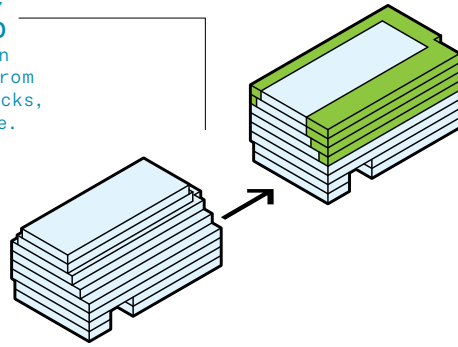
Construction materials
Simpler building forms that eliminate stepbacks allow architects to substitute mass timber for concrete, further reducing embodied carbon. Wood can cost more, but Doran says mass timber allows for faster construction, noting that the interest savings on construction loans due to a shorter completion time can fully offset the higher material cost of wood.

Transfer slabs
These heavy-duty concrete slabs help transfer the massive load of the upper floors to lower support posts and pillars. As much as a metre thick, they can be the most time-consuming part of construction, requiring 15 per cent of the total concrete. Simplifying design and eliminating underground parking reduces the need for these slabs.

Basements and underground parking
In mid- and high-rise buildings, underground parking can account for 20 to 50 per cent of the project's embodied carbon, due to the extra concrete and other materials required. The City of Toronto has dropped its requirement for developers to provide a minimum number of parking spaces with each project, but most other Ontario municipalities still insist on it.

ILLUSTRATION BY CHRIS PHILPOT

Back where it all began.

Our U of T days were full of new experiences, and Alumni Reunion 2024 is a chance to create more. Join us for five days of tri-campus fun, with events at your college or faculty, outdoor festivities, lectures by experts and hands-on discovery for the kids. Bring your family. Meet up with friends. Come back for the biggest alumni gathering of the year.

U of T Alumni Reunion 2024
May 29—June 2

Register:
alumnireunion.utoronto.ca
In-person and online events available.

@uoftalumni #uoftreunion

UNIVERSITY OF TORONTO

DEFY GRAVITY

Wendy Wacko (left), with friend and fellow artist Doris McCarthy
←

They were the picture of friendship

Painter Wendy Wacko pays homage to her mentor, Doris McCarthy, with a gift of art to U of T Scarborough

Wendy Wacko was in high school, in the 1960s, when she first came across work by artist Doris McCarthy. "I fell in love with landscape painting when I was still in my early teens," says Wacko, who herself is an artist – and former gallery owner – in Jasper, Alberta.

Wacko went on to study art at the Central Technical School's Art Centre in Toronto, where McCarthy taught classes in art history and still life. In 1977, a chance encounter with McCarthy on a flight to Alberta led Wacko to invite the older artist to paint with her in Jasper. "She was curious about everything," says Wacko. That first painting trip sparked a decades-long friendship. During that time, Wacko collected McCarthy's art and helped produce a documentary on her life.

Taught by Group of Seven member Arthur Lismer, McCarthy (BA 1989 UTSC) was known for her paintings of Canadian landscapes, especially in the Arctic, around Georgian Bay, and Alberta's Badlands. Like the Group of Seven, she took an outdoor approach to painting, hiking into the wilderness, sometimes in cold or rugged conditions, to capture the scenery around her. "The only way landscape painters get better is if they work outside," Wacko says. "A lot of painters try to regurgitate photos. But I hear her voice saying, 'Talk about it, don't copy it.'"

A member of the Order of Canada, McCarthy died in 2010, four months after her 100th birthday.

In 2019, Wacko purchased more than 600 items from McCarthy's estate, including paintings, sketches, journals and notebooks. Earlier this year, she donated 180 of the works, valued at $1.5 million, to the Doris McCarthy Gallery, which in 2024 marks its 20th anniversary. Ann MacDonald, the gallery's executive director and chief curator, welcomed Wacko's gift for its "astonishingly comprehensive" look at McCarthy's art. Wacko says her goal is to inspire the next generation of artists and art historians, noting that teaching and mentorship were as much a part of McCarthy's life as art was. "Doris showed how important it is to work outside of your comfort zone," she says.

Wacko still has about 350 items from McCarthy's estate. They serve as a continued source of artistic inspiration for Wacko, who, in her 70s, is still producing paintings of her own. But the pieces are also a reminder of the unique friendship and connection that the two artists had. "I loved her on so many levels," Wacko says. "She taught me so much." —Andrea Yu

Full court press

Basketball means the world to sports journalist Alex Wong. Here's why
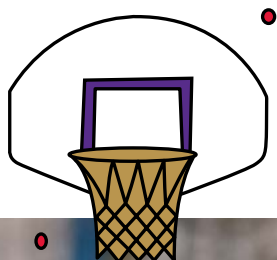
Alex Wong's life in basketball has deep roots – from the courts and playgrounds of Hong Kong to the black-tops and chain-linked parks in the Toronto area.

Basketball provided Wong (BBA 2007 UTSC) a springboard to jump from hobby blogger to successful journalist and author. He is a former co-host and producer of *The Raptors Show* on Sportsnet and recently published the book *Prehistoric: The Audacious and Improbable Origin Story of the Toronto Raptors*.
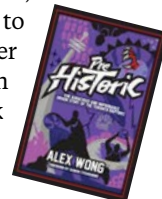
How did you get into sports journalism?

I came to Toronto with my family when I was eight. Sport, and especially basketball, was the first thing that connected me with people here. I played basketball in high school, braving snowstorms to go to practices and games. Those were some of the best years of my life. At UTSC, I specialized in accounting, got my CPA, and then worked in the field for about eight years. But I was miserable. I got laid off, moved to New York City and gave myself a year to see if I could become a writer.

You have written for big U.S. publications. Has basketball helped you become a better writer?

It helped me find my voice. I decided early on that I wasn't interested in telling stories in analytical ways. I wanted to write about people, in a way that I found interesting. Because I loved basketball, I put all of myself into writing about it.

What do you love about basketball?

Basketball is such an accessible and social sport. You can make friends playing pick-up ball at your neighbourhood court or on a more structured level, like on a high school team. I truly believe basketball breaks down barriers and helps communities come together. For me, the appeal of the game itself lies in the players' individuality; rarely are two players the same. You can appreciate the beauty and grace of a point guard weaving through the defence, and marvel at the physicality of a low-post battle.

In your book, you note the Raptors built a community in ways that other pro teams in Toronto did not. How?

I think a lot of the credit should go to the fans. There was already a community in Toronto that loved basketball. When the Raptors arrived in 1995, they put the sport in the spotlight and helped accelerate a process that was already underway. They brought professional players into communities through sports camps and school visits and helped to refurbish courts. They poured money, resources and time into developing the sport locally. —**Perry King**

↑ Watch Alex on an episode of *Joe's Basketball Diaries*
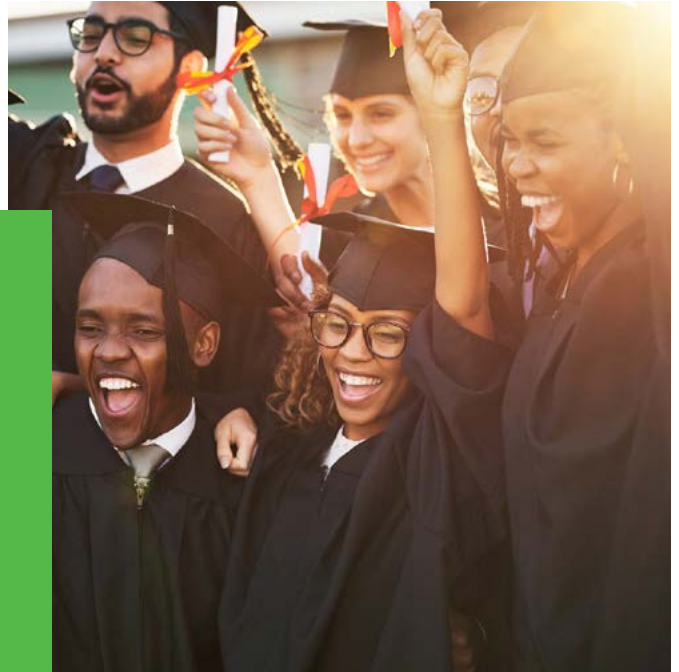
PHOTOGRAPH BY BRENT GOODEN

TD | **TD Insurance** |

See how much alumni could save on **Home, Car and Travel Insurance.**

U of T alumni enjoy preferred rates and multiple benefits.

Get a quote and see how much you could save!

**Go to tdinsurance.com/utorontoalumni
Or call 1-844-257-2365**

8015-0120

ALUMNI FEST TRI-CAMPUS TAKEOVER.

Alumni Fest is such a fan favourite we've expanded it across our three campuses. All U of T alumni are invited to St. George, Mississauga or Scarborough — no matter which campus you graduated from. Bring the family for a day of great BBQ, kids' activities and entertainment. Alumni Fest is one of 100+ events at Alumni Reunion 2024, May 29 — June 2.

Visit **alumnireunion.utoronto.ca** to register and find out more.

University of Toronto graduates belong to a community of more than 680,000 U of T alumni worldwide.
For more information about the benefits and services available to you, please visit **alumni.utoronto.ca**.
If you have moved or changed your email address, please update your contact information at **alumni.utoronto.ca/addressupdate**.

UNIVERSITY OF
TORONTO

DEFY
GRAVITY