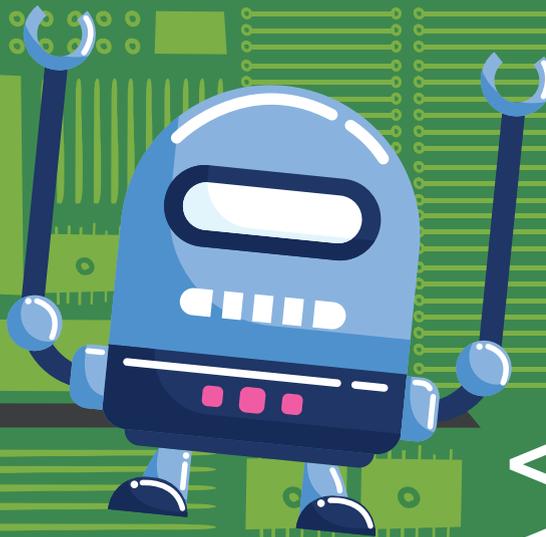
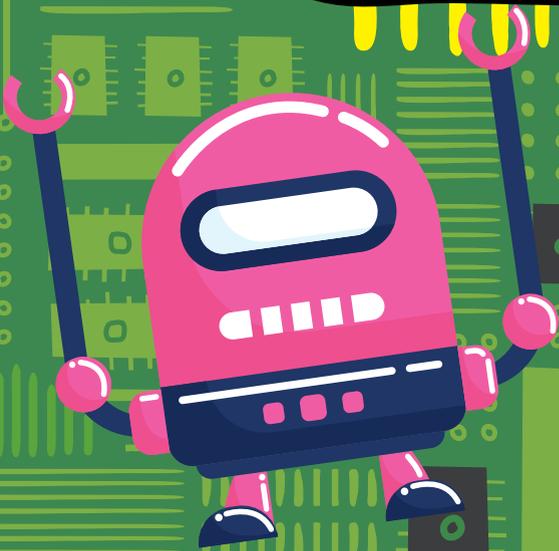


FIRST[®]
CANADA

Girls in STEM

Your Future In
CODE



<CanCODE>
<CODECan>

FOR *I*NSPIRATION & *R*ECOGNITION OF *S*CIENCE & *T*ECHNOLOGY

Dear Future Coder,

FIRST Robotics Canada is on a mission! We want to educate even more kids and youth about coding and programming. Thanks to CanCode, FIRST is embarking on some exciting new initiatives to get students engaged in tech. In particular, we want to get more girls and young women involved in coding and programming. Why? Because the coding world needs YOU!

Females bring a different perspective to problem solving and diversity of thought leads to more innovation. So what are we hearing from young people like you? You love coding but you don't know what kinds of opportunities the world of coding offers. What kind of careers are out there? What companies hire people with coding skills? Is coding fun—even when it's your job? Here at FIRST Robotics Canada, we've been asked all of these questions and more.

That's why we created Girls in STEM—Your Future In Code. In this magazine, you'll discover some cool coding facts and history about the

industry, meet super talented women doing fascinating jobs, and learn all about where you might find your place in this amazing field.

If you're interested in learning more about how coding and programming is used in the FIRST Robotics Canada programs, visit firstroboticscanada.org/cancode.

Turn the page and find your pathway to your future in code.



Kim
Kim Cooper
Vice President,
Partnerships
FIRST
Robotics
Canada



Canada is entering a critical stage of growth and innovation that requires digital skills, creative problem-solving and diversity of thought. That's why our future workforce needs coding skills and digital literacy know-how to be competitive in the global economy.

Coding is one of the next big jobs. By teaching people such as yourself to code today, we're positioning Canada for future success across all industries and sectors. And more importantly, we're making sure you have the right skills you need for the middle-class jobs of tomorrow.

I'm proud that the CanCode program is reaching kids and youth across the country to open your eyes to the amazing opportunities the digital world has to offer, and prepare you to be the leaders of tomorrow.

By meeting some of the many STEM role models in the following pages, you'll also be inspired to be Canada's next creative coder!

The Honourable Navdeep Bains
Minister of Innovation, Science and Economic Development
Government of Canada



Hi, Everybody!

Or should I say: 01001000 01101001!

Just saying hi in binary code, too—everybody speaks in binary, right? Er, maybe not.

But computers sure do. And even though the world is changing at hyper-speed these days, one thing is certain: digital technology is here to stay.

You've probably heard of STEM, right? Jobs in science, technology, engineering and math cover a huge spectrum, but the one skill recommended for all of 'em? Yup, coding.

Coding is like talking directly to computers, and getting them to do things. And it's not in zeroes and ones like the binary code above; it's in text—different languages with funny names like Java and Ruby and C.

The coding world isn't just about robotics and video games (though those are in there, for sure!). It can also be about wearable tech or shopping websites or virtual reality or public health or... Well, it can be useful for almost anything.

And imagine the problems you could solve as a future coder—programming 3D printers to create organs for people who are sick; working on efficient ways to get food and supplies to remote areas; even just making that Netflix algorithm get your "suggested watching" list 100% perfect.

Plus, coding helps train your mind to think

better. Not only do you learn a different language, but then you use that language to speak clearly and break problems down into small pieces. And did we mention you're TALKING TO COMPUTERS?! Pretty amazing.

Unfortunately, though, there aren't enough women in STEM-related jobs. And, like Kim says, when women aren't represented, the tech world is missing out.

When it comes to creativity and innovation, the more voices, the better—and yours could be one of them!

But how do you know if you'd be a good fit? Would you enjoy it? Do you have the skills?

Girls in STEM—Your Future In Code is here to help. This guide is a treasure trove of inspiration! There are so many women doing great things in coding and STEM. And what you may not know is that women have been part of this industry all along. They were the pioneers.

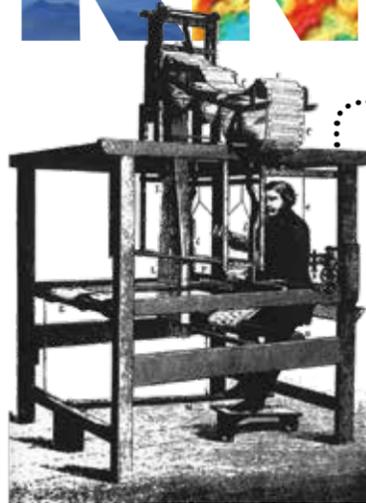
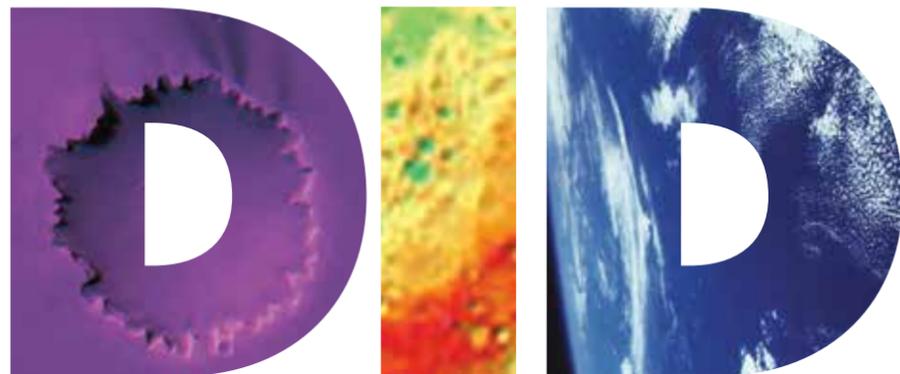
The government of Canada says that tech jobs in this country will increase so much by 2020 that there won't be enough people to fill them! So now is the perfect time for more girls to step up and find their places in tech—where they've always belonged. ■



Say hello to some talented coders in FIRST Robotics Canada programs!



© 2018 FIRST Robotics Canada



THE VERY FIRST COMPUTER WASN'T ELECTRONIC.

It was actually a loom—the kind that weaves fabric! Unveiled in 1801, the loom ran on punch cards that told it what design to create. Pretty crafty!

ENI-WHAT?

In the 1940s, the first all-electronic computer was invented. It was called the Electronic Numerical Integrator and Computer—ENIAC for short. This ginormous contraption was programmed by a team of six women, who had to hand-wire it to get it up and running. Girl power!



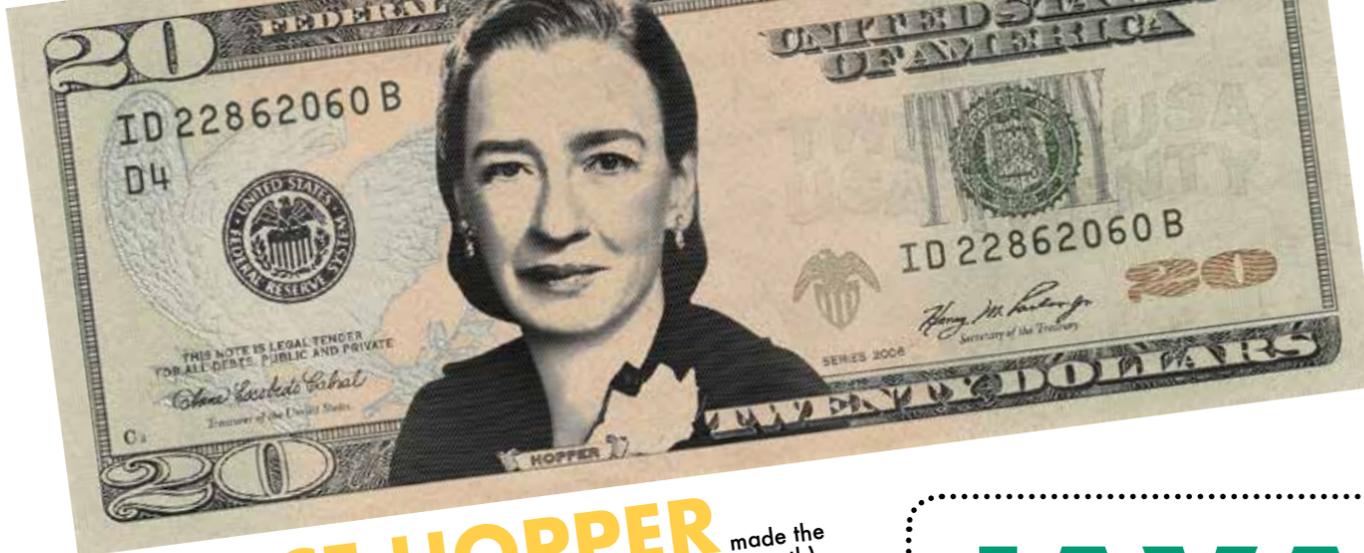
A MACHINE THAT COMPUTES

In 1837, **Charles Babbage** designed the first electronic computer, called the Analytical Engine—but he couldn't get the money to build it. If he had, it would have been so big, it would have needed its own room! A protégé of Charles Babbage, **Ada Lovelace** devised a program for his invention, becoming the first computer programmer in history. Lovelace was brilliant enough to realize that computers could do more than just calculate. She predicted that they could do anything, including write music, create pictures, and solve problems.

TODAY, WOMEN HOLD ONLY ABOUT A QUARTER OF ALL TECH JOBS.

Girls are just as good at math and science, but they tend to lose self-confidence in their teen years. It's all about the attitude—you can do this!

PHOTOS: NASA.COM (TEXT IMAGERY); WIKIPEDIA (LOOM AND GRACE HOPPER BILLY); SCIENCE MUSEUM (ANALYTICAL MACHINE); U.S. ARMY (ENIAC WOMEN); STAPLES.CA (CALCULATOR); PEXELS.COM (GUITAR)



GRACE HOPPER made the term "computer bug" popular—when she found an actual bug (a moth) botching up the workings of the Harvard Mark II computer in 1945. In the late 1950s, the same Grace Hopper invented FLOW-MATIC. It sounds like a fancy vacuum cleaner, but it was actually one of the first computer programming languages—made so people could use language instead of numbers to communicate with computers.

THE WORD COMPUTER

—and calculator, too—used to mean a person who did the math! Eventually, when machines were created to do those calculations, people called them "computers". And the name stuck. Now you never call someone a computer... unless perhaps you're talking to a robot!



**JAVA
RUBY
PYTHON
PHP**

There are hundreds of different coding languages! But don't worry, you don't have to learn them all. A handful of languages—like Java, Ruby, Python, and PHP—are the most in demand, because they're the most versatile.

MAKING CODE SING

Coding isn't all about math and science. Musicians make great coders because they know how to use symbols within certain rules to create patterns and messages.



Meet ANNIKA PINT

STEM Teacher and Robot Builder Extraordinaire



Annika Pint is a passionate advocate for robotics and coding. Her role is to help teachers bring robotics into classrooms, raise awareness about STEM opportunities, and to get kids learning and having extreme fun with code!

HOW DOES YOUR JOB INVOLVE CODING AND PROGRAMMING?

As FIRST Robotics Administrator at the Toronto District School Board, I provide support and training for teachers who would like to engage their students and teach them valuable skills by either integrating coding and robotics into the curriculum or by starting FIRST LEGO League Junior, FIRST LEGO League, or FIRST Robotics Competition teams at their schools.

WHAT WAS YOUR CAREER PATH?

After studying mechanical engineering at the University of Toronto, I became an intermediate science teacher and introduced my students to engineering design principles by providing them with opportunities to do research into real-world problems—and to design, create, and test solutions for them. When asked to coach the FIRST LEGO League robotics team at my school, I was reluctant



because I didn't know how to build or program robots, but finally I agreed—and I learned alongside the students on my all-girls team. I also realized that building and programming robots was a great way for students to learn about engineering design principles, with the added benefit of developing coding, collaboration, and communication skills!

Now I have the great privilege of working with courageous and innovative teachers throughout my school board who want to provide meaningful, relevant, and engaging learning opportunities to their students through the use of coding and robotics in the classroom.

WHY IS YOUR ROLE IMPORTANT?

Students need to develop skills such as collaboration, creativity, communication, critical thinking, problem solving, resilience, and perseverance. Participation in robotics is a very effective way to engage learners of all kinds, and it helps foster these global competencies. The more comfortable, prepared, and supported teachers feel about introducing coding and robotics to their students, the more likely it is that students will have learning experiences in which they can develop these skills.

WHAT IS THE BEST PART ABOUT WORKING WITH KIDS AND ROBOTS?

The best part is seeing them persevere despite frustration; observing the sense of accomplishment that students experience when, after many failed attempts, their robots work the way they want them to; and seeing students have so much fun while learning! It also provides me with an opportunity to keep learning myself, which is one of my favourite things to do! Not a day goes by that I can answer every question I am asked. At first, I felt "stupid" for not knowing all of the answers, but now I get so excited because I know that I am going to learn something new when someone asks me a tough question!

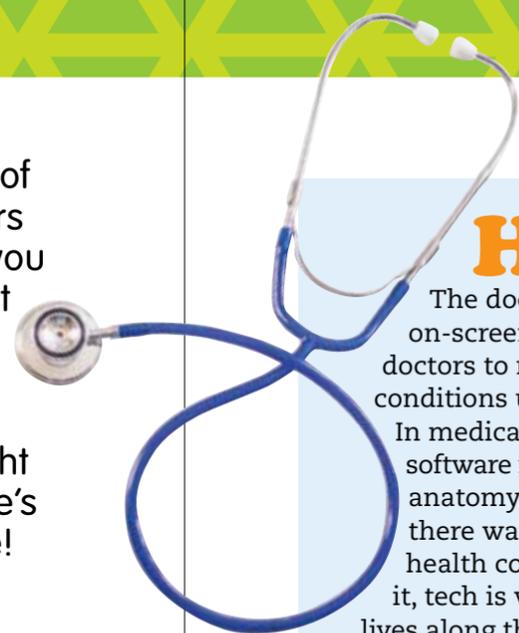
WHAT IS YOUR ADVICE FOR OTHERS WHO ARE INTERESTED IN A CAREER LIKE YOURS?

Volunteer at as many FIRST events as possible and in as many different roles as possible or, even better, coach a FIRST team! You will have an opportunity to learn about coding and robotics and to witness firsthand the positive impact that participation in FIRST programs can have on students. ■



WHERE THE CODING JOBS ARE (Hint: Everywhere!)

We've put together a list of industries that use coders and programmers. As you can see, they cover a lot of ground... and there are still more we didn't include. So take a peek and see what area might suit your interests. There's something for everyone!

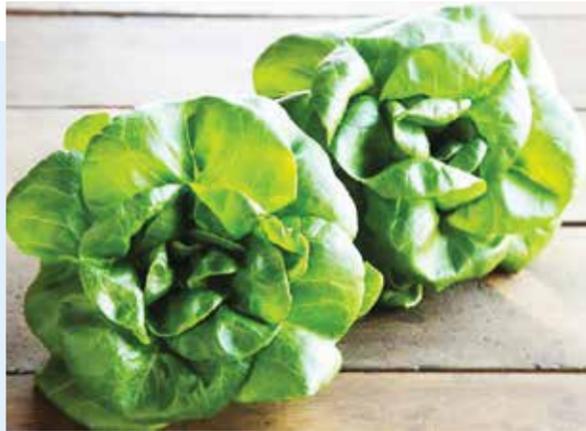


HEALTH

The doctor will see you now... on-screen, that is. New programs allow doctors to remotely monitor patients' conditions using Bluetooth-enabled devices. In medical schools, augmented-reality software is letting student docs learn anatomy in interactive 3D. And what if there was a gadget that could manage a health condition automatically? You name it, tech is working on it. And it's saving lives along the way.

AEROSPACE

To infinity and beyond! Oh wait, that's Buzz Lightyear. But it could be the motto for tech jobs in aerospace too. Airplanes nowadays rely on flight operations programs and navigation software to help pilots guide them to where they're going. And space exploration requires a load of talented individuals—to design and test spacecraft, construct satellites, research different planets... The sky's the limit!



AGRICULTURE

Farming and agriculture has definitely gone futuristic. From greenhouse growers adjusting light and water exposure remotely to large-scale agricultural companies using analytics to improve food production to farms using biotechnology to create the newest and strongest crops, one thing is for sure: coding is the newest way to farm.

NON-PROFITS

Technology is about making things easier—so imagine the results when we put it to work for the greater good. There are tech jobs programming drones to deliver food or medical supplies to people in need; using satellites to map data about natural disasters; and developing apps that let humanitarian workers communicate live with colleagues around the world during a crisis. Tech to the rescue!

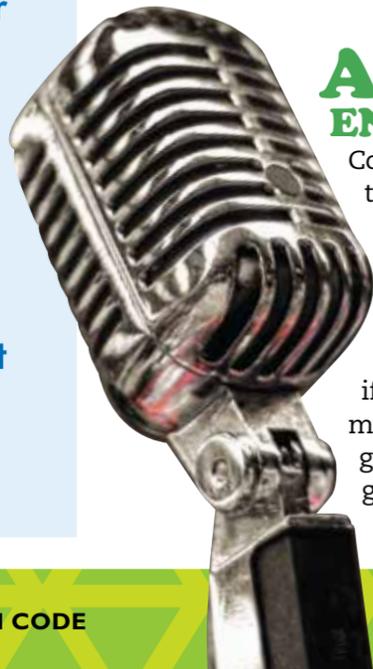


FINANCE

The world of finance is high stakes... and high tech! Bank customers want to be able to manage their accounts 24-7, with no hassle. Investors need financial companies to stay on top of global markets and earn them money, with less risk. Insurance company clients want to submit claims right away, so they can get reimbursed faster. You can bet your bottom dollar these services are all possible because of coders.

ARTS & ENTERTAINMENT

Coding might seem science-centric, but there's a huge place for it in the arts. Music and video streaming services need people with coding expertise to deliver the newest content quickly and smoothly. Museums and art galleries are offering virtual reality tours. And if you want to flex your own artistic muscles, there's plenty of room in video game design, multimedia animation, and graphic design for your creative touch.



GOVERNMENT

Your government needs YOU! Canadians can do a lot of official business online now, from filling out the census to filing taxes, so programmers are needed to build easy-to-use websites that can handle the traffic and keep information secure. Provincial governments use data analytics to help develop new policies and improve services. For municipalities, infrastructure (like roads and sewers) needs to be designed... and that's all digital. So you can serve your community, with code!



GREEN TECH

Everyone knows humans need to clean up our act. Luckily, new tech is here to help. Canadian companies are developing programs to help purify our wastewater, green up our electricity, make solar power more readily available for homes, and reduce greenhouse gas emissions. Wouldn't it be nice to use your noggin to keep our home planet thriving?



TEACHING AND EDUCATION

Those who code, teach! With the increase in coding jobs in the workforce, Canada's school system will be weaving coding into its curriculum—which means positions for coding teachers should crop up too. But teaching doesn't just happen in schools. A job in developer relations means teaching third party developers how to use your company's software. Or there's a career in educational technology (EdTech), which is all about developing devices and tech to make learning easier and more accessible. Sounds like an A+ idea!

TECH & TELECOMMUNICATIONS



This one is a given: mobile phone and tech companies need coders and programmers galore. Smartphone companies constantly upgrade their gadgets, to include options like fingerprint-ID software and mobile payment services. Software developers are always expanding, from cloud computing to designing wearable tech to managing data storage. And don't forget the always-exciting world of start-ups. No matter where you end up, you'll be on the cutting edge.

AUTOMOTIVE

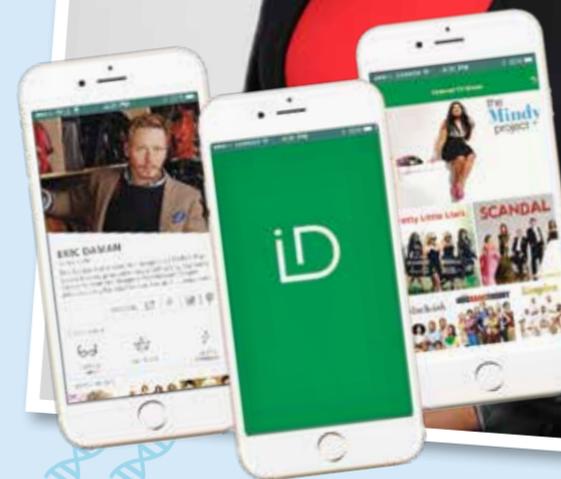
Cars today are like computers on wheels. They have sensors to help drivers detect obstacles, microprocessors to alert drivers to problems before they get worse, and Engine Control Units (ECUs) to adjust engine usage to burn less fuel and reduce emissions. Soon, self-driving cars will be out on the roads too. The automotive industry is evolving like never before, so it's a fun time to get on board! ■



Meet **SARAH: JUMA**

FOUNDER OF INNOVATE INCLUSION

From creating a genius app that lets you order the clothes you see on celebrities to launching Innovate Inclusion, a company that advocates for underrepresented groups in the tech industry, Sarah Juma has shown herself to be one step ahead—putting great ideas into practice and making positive change.



What is Innovate Inclusion and why was it started?

Innovate Inclusion is a not-for-profit that I founded in an effort to advocate for the success of underrepresented communities in technology and entrepreneurship. I use my knowledge of the industry to foster awareness around the importance of inclusive community engagement and offer programs that support entrepreneurs on their journey.

What inspired you to start the StyleID app?

I was inspired to develop it after a long and frustrating online search for a dress that I spotted an actress wearing on TV. Initially, I waited for someone else to create my dream app because I mistakenly thought that app development wasn't for me. It wasn't until I took the time to research the tech world that I realized app development was for me... It's for anyone who is willing to put in the effort.

What does it take to launch a successful app?

It takes persistence, a dedicated team, and self-care. Having a start-up is like riding a roller-

coaster; there are a lot of ups and downs. Working with a team who can support you contributes to the necessary endurance. And putting self-care first is the key to success. Always take the time you need to rejuvenate your mind, body, and soul.

What advice do you have for youth who want to follow a career in digital innovation?

Get involved with your local incubator. Most of them have access to free tools and supports to help you lay a foundation. Then, do your research and find mentors who you connect with on different levels. Always keep an open mind; success isn't a straight line. Opportunities don't always present themselves in the way you plan.

What is the best part of being an entrepreneur?

Having the opportunity to work on something you're passionate about. It gives new challenges every day and a feeling of accomplishment. For me, I enjoy watching others attain success and I'm happy to be a part of that. ■

HOW WELL DO YOU KNOW WOMEN IN STEM?

Take our quiz to find out!

(And hey, if you don't know them yet, no need to fret! These she-roes haven't got enough attention over the years... But we hope this inspires you to dig deeper.)

1 When NASA sent the first American to orbit the earth, astronaut John Glenn said that as long as this woman verified the numbers, he'd be ready to go.

- A Roberta Bondar
- B Katherine Johnson
- C Julie Robinson



4 This inventor of the term "software engineer" was the first programmer NASA hired to send a human to the moon (on what became the Apollo 11 flight).

- A Julie Payette
- B Ava Gabor
- C Margaret Hamilton

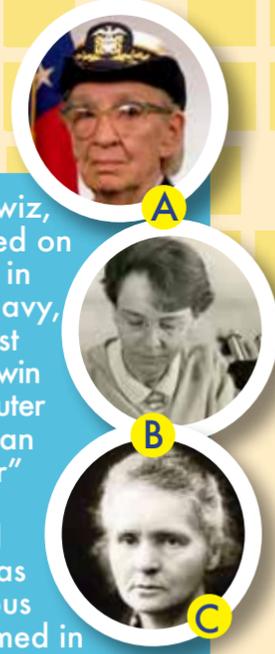
5 Even though she was a stunning Hollywood actress, this woman preferred inventing. During World War II, she devised a communications system in which radio signals would switch to different channels in a set pattern ("frequency-hopping") that was actually a precursor to the Wi-Fi we all know and love.

- A Ava Gardner
- B Hedy Lamarr
- C Lucille Ball



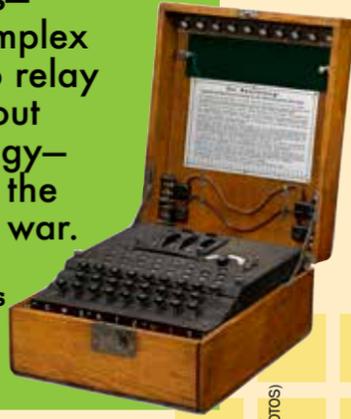
2 This math wiz, who worked on computers in the U.S. Navy, was the first person to win the "Computer Science Man of the Year" award in 1969 (and now she has a prestigious award named in her own honour).

- A Grace Hopper
- B Barbara McClintock
- C Marie Curie



3 Working with Alan Turing during World War II, this cryptanalyst (code-breaker) was the only woman to help decode the German Enigma codes— incredibly complex codes used to relay messages about military strategy—which helped the Allies win the war.

- A Joan Clarke
- B Sally Struthers
- C Mary Somerville



PHOTOS: NASA (UNIVAC-A AND ANNIE EASLEY); DR. ANTHONY BONATO (IMOGEN COE); FACEBOOK (KIMBERLEY BRYANT); WIKIPEDIA (ALL OTHER PHOTOS)

6 Named *Forbes* magazine's #1 most powerful woman in technology in 2017, she founded a non-profit agency called Lean In, aimed at helping women achieve equality in the workplace.

- A Ginni Rometty
- B Sheryl Sandberg
- C Jean Liu



8 Now the digital minister for Taiwan, this woman wrote her first computer game when she was eight, and founded a search-engine company when she was just fourteen:

- A Audrey Tang
- B Monica Lam
- C Jade Raymond



10 This woman, who worked on the first commercial computer in the United States, the UNIVAC-1, put herself through college by working 12-hour days as a nurse's aide.

- A Ida Rhodes
- B Florence Nightingale
- C Elizabeth Blackwell



7 This former Dean of the Faculty of Science for Ryerson University who does groundbreaking cancer research speaks out about making STEM accessible to everyone—and thinks sometimes people forget one of the best things about science... it's super fun!

- A Imogen Coe
- B Jennie Trout
- C Mary Leakey

9 Charles Babbage (inventor of the first digital computer) gave this nickname to Ada Lovelace, who created an algorithm which is recognized as the first-ever computer program.

- A Princess of Programming
- B Queen of Computers
- C Enchantress of Numbers



11 This computer scientist wasn't seeing many women of colour in the tech industry, so she launched Black Girls Code—with the goal of teaching 1 million girls of colour to code by the year 2040:

- A Sheryl Sandberg
- B Kimberly Bryant
- C Annie Easley

Meet TARANEH KHAZAEI

AI Expert



Taraneh Khazaei has been blazing a trail in the tech industry for years now. She started off at TD Bank and Zero Gravity Labs before moving to her current job as a data scientist at Microsoft, where she helps clients use Artificial Intelligence (AI) to solve problems and improve customer experience.

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? FOR WHAT PURPOSES?

Mostly, I build AI applications to gain insight from raw data. For example, based on people's past shopping data, I have built systems that can recommend products and services to users that are tailored to their unique taste.

COULD YOU DESCRIBE A TYPICAL WORK DAY?

A typical day includes meetings and discussions with clients to better understand their data and AI problems and requirements. For instance, a major bank may ask us to write an AI app to monitor credit card transactions and identify potential theft and fraud. The rest of the day is often spent on brainstorming, research, problem-solving, and finally coding the solution.

WHAT IS THE MOST EXCITING PART OF YOUR JOB?

Continuous learning... There is something new and interesting to learn every single day. Also, most of our customers are large corporations, so seeing the impact of our projects on their organizations and their millions of customers is very fulfilling.

AND WHAT IS THE MOST CHALLENGING PART?

AI solutions are normally built on top of large datasets, which can include personal and sensitive data. Also, like the human brain, AI is subject to bias. Two of the most important and challenging aspects of my job are to ensure that adequate privacy measures are in place every step of the way and that the machine intelligence developed is free of biases.

HOW DID YOU GET STARTED ON THIS CAREER PATH?

It all started when my parents bought me my first computer when I was almost thirteen years old. Back then, I was glued to that screen several hours a day, browsing the web, playing video games, and coding small animated clips in Flash and ActionScript. That was when I came to realize my passion for technology and coding. A few years later, I started studying computer science and continued all the way to my PhD.

WHAT EDUCATION DO YOU NEED TO DO YOUR JOB?

I think the computer science program is the best education to get into AI. However, mathematics and statistics are also two core components of AI and are alternative paths.

WHAT PROGRAMMING LANGUAGES DO YOU USE?

I use different languages depending on the nature of the project I am working on, but the languages that I use most often are Java, Scala, and Python.

WHAT KINDS OF CHALLENGES DO YOUNG WOMEN FACE IN THE TECH INDUSTRY?

Even though there has been a lot of progress, women are still heavily outnumbered in tech. In such a male-dominated field, women sometimes feel that they don't fit in, which can cause them to underestimate their skills and abilities. This lack of confidence can hold women back, so it is very important for young techies to be aware of this issue before joining the industry, so they can avoid it as much as possible.

WHAT'S YOUR ADVICE FOR GIRLS WANTING TO GET INTO CODING?

Get help and support from the community! There are very successful initiatives here in Canada, such as Ladies Learning Code and #movethedial, that empower young girls and other underrepresented groups in tech by providing equal learning opportunities. ■

What type of **CODER** are you?

There's room for all types of personalities in the coding world. Read on to find out where you fit in!

1 YOUR FAVOURITE PART OF SCHOOL IS:

- a) Debate or student council—you have stuff to say!
- b) Art class—you love to get creative
- c) Band—you like being a part of a bigger whole
- d) Science or math—you like thinking through a problem and solving it

2 FOR A GROUP PROJECT, YOU PREFER:

- a) Taking charge and delegating tasks
- b) Figuring out how you'll present it (and choosing the poster board, glitter, and markers)
- c) Talking and collaborating with your friends—the best ideas come from group brainstorming!
- d) Thinking up a totally new idea, and doing your part the best you can

3 IF YOU WERE VOLUNTEERING AT A HOMELESS SHELTER, YOU WOULD PREFER THE FOLLOWING JOB:

- a) Coordinating volunteers
- b) Tidying up and giving the place a fresh coat of paint
- c) Sitting and chatting with residents—you like getting to know people
- d) Putting any paperwork or office data in order (you love a good spreadsheet!)

4 THERE'S A PARTY COMING UP. YOU ARE:

- a) Throwing it yourself—you're a superstar at planning events
- b) Helping decorate and coming up with a theme (and dressing to kill, of course)
- c) Gathering all your friends and practicing your sweet dance moves
- d) Probably not going—but you'll help build the app for the invite!

5 ON THE WEEKEND, YOU LIKE TO:

- a) Work—you've got 2 part-time jobs so you can save up those funds!
- b) Paint, write, sculpt—whatever it is, it has to be creative
- c) Anything as long as it involves hanging out with your friends
- d) Read a book, play video games, write code. You recharge when you're by yourself

6 THE MAIN WORD YOUR FRIENDS WOULD USE TO DESCRIBE YOU WOULD BE:

- a) Determined—you always take the lead, and you get things done
- b) Artsy—you bring a dash of colour and style to everything you do
- c) Social—you are the life of the party and a true people person
- d) Independent—you like taking on a problem yourself, and you're smart as a whip

7 YOUR FAVOURITE PART OF A HOLIDAY IS:

- a) Planning the trip—you want to make sure you get to all the best spots
- b) Being the official photographer—it takes a special eye to capture the moment (and make it Instagram-worthy)
- c) Visiting friends while you're away—or meeting new ones
- d) Taking off on your own and wandering the streets—it's inspiring and gives you new ideas

Mostly As: You are an ambitious, natural leader and organizer. You see the big picture, delegate, and enjoy taking on complex projects. Some jobs that would suit you are Technical Director (outlining strategies for projects and overseeing a team), IT Project Manager, and Development Team Lead.

Mostly Bs: Your creative mindset and natural artistic ability are a perfect complement for your coding skills. Your top jobs include Art Director, Multimedia Artist, Video Game Designer, and Software Developer. Bringing design skills to projects and coming up with beautiful solutions will get you far!

Mostly Cs: You are a social butterfly, and that's a really good thing! Despite the stereotype, many jobs in coding involve a lot of collaboration. Getting other people's input and keeping communication lines open with various teams is your forte, so you might make a good Web Developer, Computer Systems Analyst, or UX Designer.

Mostly Ds: You're a great logical thinker and problem solver, and you do your best work on your own. Careers such as Database Administrator, Information Security Analyst, and Computer Network Architect require someone with a real genius for organization, analysis, and code—and would let you put that brilliant mind to work! ■



GOING ON WHEELS

WORKING IN THE AUTOMOTIVE INDUSTRY AT GENERAL MOTORS CANADA



Cars today are completely different machines than they were when your parents were young. Back then, you were lucky to have air conditioning and power windows. Now we're this close to having self-driving cars on the road. How amazing is that?

Car companies are always working away to create cutting-edge features that will make vehicles better and smarter—like rearview cameras, collision-avoidance systems, and in-vehicle Wi-Fi. All of these bells and whistles rely on, you got it: computers.

And that's why the automotive industry needs lots of creative people with coding skills to keep fine-tuning, innovating... even inventing the next big thing (maybe it's time for that hovercar?).

To give us an idea of what's out there, General Motors Canada is introducing us to some of their best and brightest. Read on for a peek at what they do (and how they got there)!



SHIMA MOUSAVI
DEVELOPMENT ENGINEER IN CONTROLS & DIAGNOSTICS

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? I'm currently working on developing a diagnostics algorithm [a series of steps to find the cause of a problem] for the brake system of autonomous vehicles.

WHAT ARE THE MOST EXCITING AND CHALLENGING PARTS OF YOUR JOB? What makes my job both exciting and challenging is that no two days are the same and no two projects are the same. This gives me the opportunity to learn new things and develop my skills every day.

HOW DID YOU GET STARTED ON THIS CAREER PATH? I've been passionate about math and programming ever since I was in high school, which led me to choose electrical engineering as my major in university. After finishing my master's degree, I started my first job at Pratt & Whitney Canada, where I had the opportunity to work with various large aircraft companies. After three years, I decided to join General Motors Canada and be a part of a huge shift in the automotive industry toward autonomous vehicles.

WHAT'S YOUR ADVICE FOR GIRLS WANTING TO GET INTO CODING? Just do it. Programming doesn't care if you're a woman or man. Pick up a book on algorithm development and read it. Download software and start playing with it. Take an online course and learn coding. Just do it.



SARAH YURCHI
INFOTAINMENT SOFTWARE DEVELOPER, CORE APPLICATIONS

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? I am developing Android system applications for future vehicle infotainment systems.

WHAT IS THE MOST EXCITING PART OF YOUR JOB? All the opportunities I've had a chance to explore outside of my daily work. This involves anything from engaging with our new hires as part of our "onboarding" process or preparing to be an MC for a recent OpenGM tech event we held at our office.

HOW DID YOU GET STARTED ON THIS CAREER PATH? I started programming in high school! One of the projects my class did was build a very basic website in HTML, and I had a lot of fun with it. I was already fascinated with computers and art, so discovering a way that I could combine the two and quickly see the result was very cool.

WHAT PROGRAMMING LANGUAGES DO YOU USE? I program in Java, which is the main language for Android development.

WHAT KIND OF STRENGTHS DO YOU THINK SOMEONE SHOULD HAVE TO SUCCEED IN PROGRAMMING? Always be willing to learn and try new things. I would also suggest being able to "Google" well. A lot of times, when you run into a programming issue, chances are someone else out there has had a similar problem.



AMULYA TOM
SOFTWARE ENGINEER, VEHICLE DYNAMICS

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? I develop controls and diagnostics software that regulate the working of trailer brakes in GM vehicles in different conditions, and what the vehicle should do in case of different fault occurrences.

WHAT IS THE MOST CHALLENGING PART OF YOUR JOB? Software presents you with new problems every time, which you must analyze, find the root cause of, and fix. It is frustrating when the root cause of the problem takes too much time to find and stalls you from moving on to further work. But there is a strange satisfaction when you're able to find a fix.

HOW DID YOU GET STARTED ON THIS CAREER PATH? I was recruited into Robert Bosch Engineering and Business Solutions in India. It was there where I developed an interest in automotive engineering.

WHAT PROGRAMMING LANGUAGES DO YOU USE? I use Embedded C for development.

WHAT KIND OF STRENGTHS DO YOU THINK SOMEONE SHOULD HAVE TO SUCCEED IN PROGRAMMING? A strong understanding of logic, and an ability to identify the simplest possible way to write code. Attention to detail is important for spotting bugs, as is an understanding of how all the code comes together to give you a functionality.





ALLIE MCMARTIN
CONTROLS SYSTEM ENGINEER,
EOCM TEST & SIMULATION

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? I work on the development of diagnostic software tailored to Active Safety systems in vehicles.

COULD YOU DESCRIBE A TYPICAL WORK DAY? It begins with running a series of validation tests on an isolated ECU (electrical control unit). Then I spend my day determining root causes of the failures seen in testing.

HOW DID YOU GET STARTED ON THIS CAREER PATH? I started with General Motors Canada right out of university, after completing a mechanical engineering degree.

WHAT PROGRAMMING LANGUAGES DO YOU USE? I currently work in C programming, but also spend time scripting in Python and block coding through Matlab Simulink.

WHAT KIND OF STRENGTHS DO YOU THINK SOMEONE SHOULD HAVE TO SUCCEED IN PROGRAMMING? Programming can require reiterations of the same process multiple times, so having the patience to work through failures and backtrack an issue are extremely important.

WHAT'S YOUR ADVICE FOR GIRLS WANTING TO GET INTO CODING? Take courses and spend time playing around in different languages. Programming is a valuable skill to have and gives you a broad range of choices when choosing a career path!



LAURA BARLOW
CONTROLS TECHNICAL SPECIALIST,
ACTIVE SAFETY DIAGNOSTICS

WHAT KIND OF SOFTWARE ARE YOU DEVELOPING? A diagnostic software to support Super Cruise™, a hands-free driving feature recently launched on our 2018 Cadillac CT6.

COULD YOU DESCRIBE A TYPICAL WORK DAY? My day is typically spent meeting with different team members to discuss tasks that they are working on to provide mentorship and guidance on technical direction.

WHAT PROGRAMMING LANGUAGES DO YOU USE? Matlab Simulink, C and C++.

WHAT KIND OF CHALLENGES DO YOUNG WOMEN FACE IN YOUR INDUSTRY? Fear of old stereotypes. People want to hear what you have to say and what talent you bring. Never think that because you're a woman your input isn't as valuable as your male counterparts'.

WHAT KIND OF STRENGTHS DO YOU THINK SOMEONE SHOULD HAVE TO SUCCEED IN PROGRAMMING? Determination.

WHAT PROJECT ARE YOU MOST PROUD OF? In my previous position, I developed diagnostic software for a smart battery sensor that supports GM's 12V Stop/Start feature. Originally launched on our 2016 Chevrolet Malibu, it is now in many of the vehicles we sell today. ■

Meet EUGENIA DUODU

THE UNLIKELY SCIENTIST

Eugenia Duodu always loved science, but she didn't always see herself as a scientist. When she pictured a scientist, she thought of a man, not a woman. And certainly not a woman of colour. So she figured she'd just secretly like it and that would be that.

Then during high school, she got a chance to do some research in one of her science classes that really excited her. Even better, she got into a program geared toward youth from underrepresented communities that was all about making kids like her realize: anyone (and everyone) can be in STEM.

She went on to pursue science in university, despite struggling with some self-doubt, and then took the leap to do her doctorate.

She is now Dr. Eugenia Duodu, the CEO of Visions of Science Network for Learning, which is all about engaging kids from communities just like the one she grew up in and telling them: you, too, can be a scientist, engineer, coder, mathematician... whatever you dream of. ■



“YOU CAN, SO YOU SHOULD —One of the toughest hurdles to overcome for me was self-doubt. Every day I remind myself that I have the capability and unique opportunity to do great things, so it is my responsibility to do them.”



Over to you: Coding Opportunities Across Canada

So you're interested in STEM and coding, but you're not sure where to start? You're in luck! The Government of Canada's CanCode program is bringing tech learning to your doorstep (or computer screen). So no matter where you are, you can get hands-on experience... and have fun while you're at it. Here's a snippet of some of the incredible coding opportunities across the nation.

PROGRAM: Kid Tech Nation

WHERE: Online and at Boys and Girls Clubs across Canada

WHAT: Coding-related activities for kids 8–12, like Build the Logic and Colour Coder, and camps through select Boys and Girls Clubs kidtechnation.com

PROGRAM: Brilliant Labs

WHERE: Atlantic Canada (New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador)

WHAT: Gives kids K–12 and their teachers a chance to create and problem solve through their maker spaces and Code Camps, as well as Innovation Challenges where kids can try solving real-world problems brilliantlabs.ca

PROGRAM: Canada Learning Code

WHERE: Online and in person across Canada

WHAT: Programs like Kids Learning Code, Girls Learning Code, and Teens Learning Code offer workshops and camps for kids ages 3+; they also have a squad of Code Mobiles which are “computer labs on wheels” that travel all around the country to give kids hands-on computer experience canadalearningcode.ca

PROGRAM: Elephant Thoughts/Coders North

WHERE: Northern and Indigenous communities

WHAT: Visiting schools and offering summer camps in remote northern communities across Canada to give kids K–12 (and teachers too) the opportunity to learn coding, robotics, and computer gaming—all with “maximum excitement” codersnorth.com

PROGRAM: Let's Talk Science

WHERE: Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, and the Northwest Territories

WHAT: Volunteers visit schools to give hands-on workshops on STEM topics, and host the Let's Talk Science Challenge for grades 6–8 students who team up to have to STEM-based fun letstalkscience.ca

PROGRAM: FIRST Robotics Canada

WHERE: Online across Canada

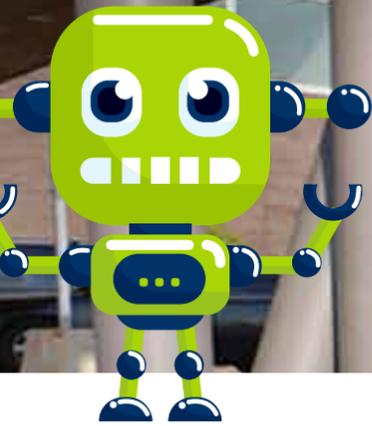
WHAT: Multiple programs for kids from grades K–12, including coding lessons, and FIRST Lego League, FIRST Tech Challenge, and FIRST Robotics Competition, which help kids gain teamwork, robotics, and problem-solving skills firstroboticscanada.org

Wait! There's more! There are so many more amazing STEM programs out there, we couldn't list them all. Check out the CanCode program at canada.ca for more opportunities.



Meet LYNN RAMPERTAB

Robotics Coordinator

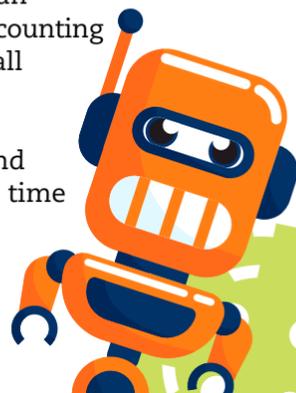


Lynn Rampertab works at the Holland Bloorview Kids Rehabilitation Hospital, helping make robotics and coding accessible to kids and youth with disabilities.

WHAT IS YOUR JOB AT HOLLAND BLOORVIEW KIDS REHABILITATION HOSPITAL AND HOW DOES IT RELATE TO CODING AND PROGRAMMING? I am the Robotics Coordinator here. The HB FIRST Robotics program has been designed to inspire young minds with imaginative play and encourage skill building. Holland Bloorview has partnered with FIRST Canada to construct a unique, inclusive, and interactive program to introduce children and youth with disabilities to technology and robotics. The program is led by hospital staff, engineers from Holland Bloorview's research institute, and FIRST Robotics Competition students in a group environment with individualized supports. Embedded in the program is coding and programming. The coding aspects help participants get their robots moving, using motors and sensors. Each class culminates in a head-to-head competition amongst participants.



WHAT IS YOUR BACKGROUND AND WHAT KIND OF SKILLS DO YOU NEED FOR YOUR JOB? I received my commerce and economics degree from the University of Toronto, then I articulated and received my professional degree at KPMG. As I started a family I became an independent consultant and managed accounting systems. I have also owned my own small business. The skills that I bring to this job include a working knowledge of computer programming, organization and communication skills, ability to manage time and people, problem solving and critical thinking, and teamwork.



WHY IS THE HB FIRST ROBOTICS PROGRAM IMPORTANT? Youth with disabilities are underrepresented in STEM in school and in the workforce. Exposing children with disabilities to STEM and robotics opens up a world of possibilities they may not have considered before. The challenges that this group faces include issues with access and traditional teaching methodologies. When you remove those barriers to access or teach using hands-on learning tools with real-time feedback, you can spark an interest in STEM.

WHAT IS THE MOST CHALLENGING PART OF YOUR JOB? Children and youth with disabilities come with a distinctive set of challenges. Each child is unique and often even two children with the same diagnosis can engage in the program in unique ways. This means that oftentimes each child requires a specialized learning plan that considers their diagnosis, method of engagement, level of independence, and ability to both gain access to the robotic materials and interface with the robotics programming palette. At Holland Bloorview, we have an underlying approach of "meeting children where they are"

For more information, please visit: hollandbloorview.ca/careers/volunteeringwithus/home

FUN FACTS ABOUT LYNN

- Robotics is a family affair in her household. As their kids started participating in robotics programs and competitions, Lynn and her husband realized that if they still wanted to see their children, they'd need to get involved!
- Before working at Holland Bloorview Kids Rehabilitation Hospital, she owned her own business where she was a wedding cake designer.
- Lynn believes in "doing what you love and loving what you do." She feels very fortunate to have had the opportunity to create unique positions for herself that have allowed her to follow her own passions.

versus forcing them to conform to the traditional approach. This means that a child with anxiety who prefers to build and program robots under a table can do so and still be able to meet their learning objectives.

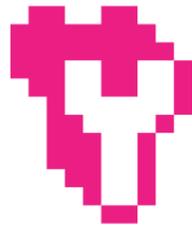
WHAT IS THE MOST REWARDING PART OF IT? From my perspective, watching children arrive to their session with enthusiasm and excitement is always rewarding. Participants have fun in the program and get an opportunity to explore their interest in computers and programming. Parents love that their kids are meaningfully engaged and eager to learn something new.

ARE THERE VOLUNTEER OPPORTUNITIES IN YOUR PROGRAM? Volunteers play an integral role in creating a world of possibility for the clients at Holland Bloorview. The HB FIRST Robotics program is always looking for volunteers who are:

- At least 16 years of age
- Interested in working with and helping children who have special needs
- Enthusiastic, patient, and flexible ■

DADS Daughters

Fathers can have a huge impact on their daughters' attitude and approach in life. Father-daughter dynamic duos can also be unstoppable forces in STEM!



You've probably heard it all before: jobs in coding are increasing all the time, and kids—especially girls—should learn to code because it will open up All The Possibilities.

But when you hear that there still aren't that many women working in tech, you wonder: why is it like that in the first place? Turns out, one reason is gender stereotypes—things society tells girls (and boys) they can and can't do. Media messaging is part of the problem. How often have you seen images of boys building with blocks and girls playing with dolls? But what about the opposite?

The messages we get sink in, even if we don't want them to. But the good news is, there are other influences in girls' lives that can help. Like their dads!

From 1987 through to the year 2000, the University of Michigan did a study on how parents' attitudes affect their kids' interest in math and science, and how this relates to girls being underrepresented in STEM jobs.

The results of the study were pretty fascinating. They found out that fathers' attitudes have a direct effect on their daughters' choices. As a father's support for old-fashioned gender roles increases, his daughter's confidence in math and science decreases.

But on the up side, the study also found that when a dad shows his daughter that a girl can be anything she wants—construction worker, engineer, surgeon, rocket scientist—then her STEM confidence soars!

Of course, mothers have a huge role to play too. Their attitudes to gender stereotypes and beliefs about where their daughters belong in the world are an enormous influence. Not to mention that they are role models unto themselves.

But sometimes the impact of fathers can get overlooked—and in turn, they don't always realize how much influence they have. That's why FIRST Robotics Canada's Girls in STEM Executive Advisory Council began a campaign all about this issue, called Dads for Daughters in STEM.

In it, they highlight some of the things that fathers can do to fight those negative stereotypes

and help their daughters stick with STEM (these work for moms too!):

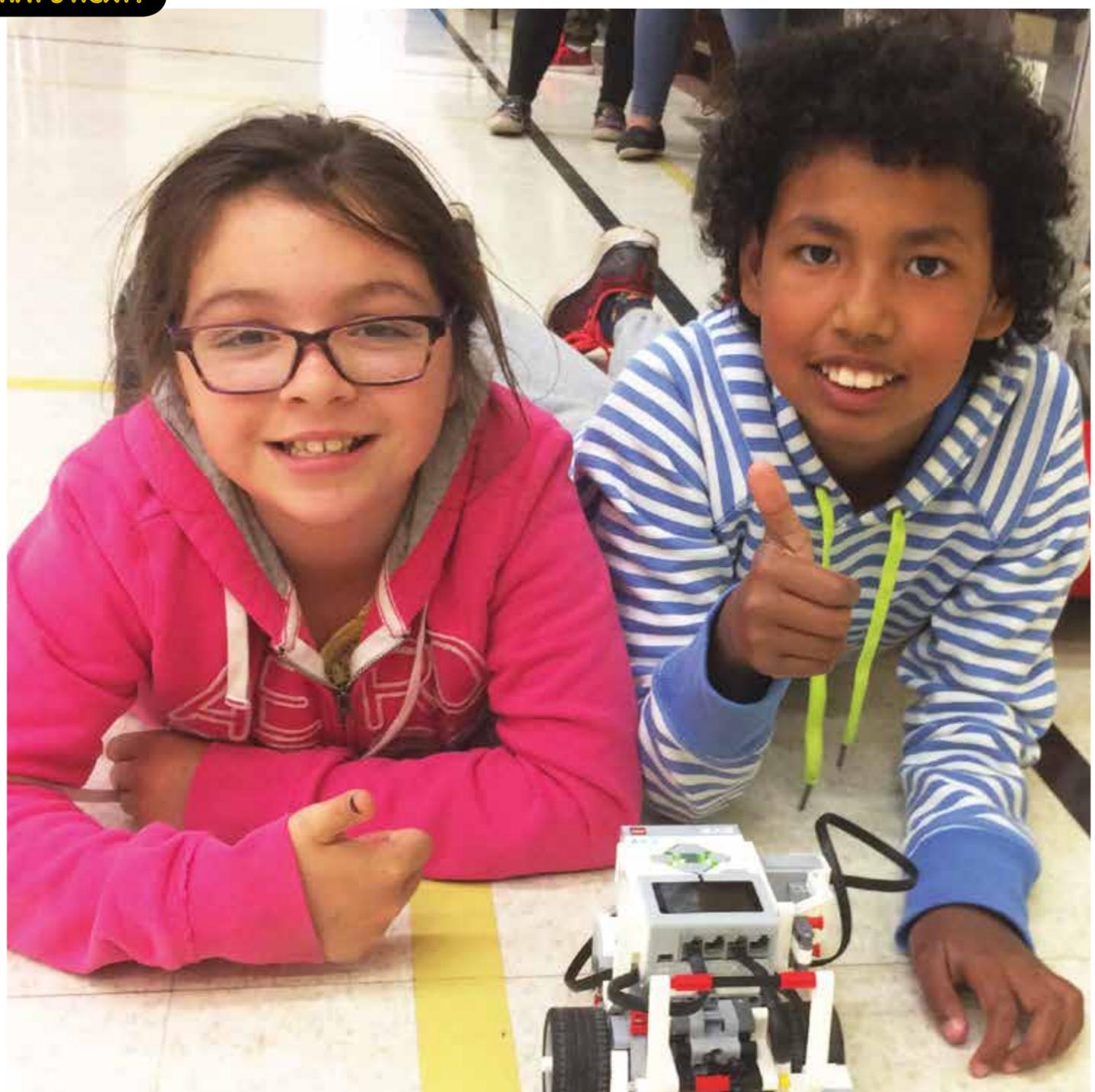
- Team up for father/daughter home repairs, DIY projects, etc. This can help girls get used to working with their hands and learning through doing. Life skills galore!
- Read books together that feature female main characters who are scientists, makers, math lovers, and so on—books like *Ada Twist, Scientist*; *5-Minute Stories for Fearless Girls*; and *Hidden Figures: The True Story of Four Black Women and the Space Race*. They're great food for thought.
- Girls need positive role models, so a dad can get to know, and talk about, some of the amazing women in STEM. If girls know other women have done it, they'll know they can too.

- Connect girls to women working in STEM—for instance, a dad could arrange a job shadowing opportunity for his daughter. Who knows, that person might even become a mentor!
- Focus on persistence rather than perfection. "If at first you don't succeed, try, try again!"

Luckily, it doesn't take that much for a dad to transform into a STEM-positive superstar and show his daughter that she is just as good a problem solver, handy-person, scientific thinker, builder (you name it!) as anyone else.

And if more dads take it upon themselves to be their daughters' champions and show them that girls can do anything they put their minds to, this next generation of women in STEM is going to rock our world. Go, dynamic duos! ■





The Coding Connection

Did you know that coding brings people together? It's true! Across Canada youth are helping their peers learn coding—with a little help from robots!

Students at this M'Chigeeng First Nation school use LEGO Mindstorms EV3 to code and build robots.

In FIRST Robotics Canada programs, students learn to help others and engage in good-natured competition. The core values of the program include respect, gracious professionalism, and cooperation. It's common to find teams helping other teams, and students giving their peers support.

FIRST Robotics Competition (FRC) team 5672 from Wasse-Abin Wikwemikong High School, led by mentor and teacher Chris Mara, is an excellent example of a team passing on their knowledge and skills to help others in First Nations communities. This First Nations robotics team, along with Manitoulin Island Secondary School FRC team members, travelled to a M'Chigeeng First Nation school and offered hands-on coding experience to 75 students from grades 3 to 8.

The result? Pure magic! The experience was rewarding for both the teachers and the students and has resulted in a domino effect. Now the elementary school students want to be the teachers and share what they learned with another First Nations community!

FIRST Robotics Canada and CanCode believe in the Coding Connection. Pass it on!



FIRST Robotics is about more than robots—it's about coding too!



Coding and making robots move takes teamwork!



Prime Minister Justin Trudeau presented Wasse-Abin Wikwemikong High School teacher Chris Mara with a Prime Minister's Award for Teaching Excellence.

COOL CODING CAREERS

It's all well and good to talk about how many opportunities are out there for people with coding skills, but let's talk about actual job titles! We've selected some interesting career paths to give you an idea of what's out there and get you started on your quest for that perfect fit. You can take it from here... Good luck!



User Experience (UX) Designer

- Helps build a company's brand by designing and testing applications to make user experiences as smooth and efficient as possible

Web and Mobile App Developer

- Translates a web or app designer's plans into reality using coding to create exceptional programs that are functional, dependable, and easy to use

Security Software Engineer

- Uses cryptography, and network and systems security to keep platforms protected; finds solutions to security threats

CNC (Computer Numerically Controlled) Programmer

- Designs and calculates instructions for computers to cut and shape metal and plastic into the parts needed for automobiles, planes, and other machines

GIS (Geographic Information Systems) Developer

- Using geography know-how and coding skills, develops GIS software and interprets specialized maps for uses from weather prediction to monitoring volcanic activity to measuring population growth

Computational Bioinformatician

- Gathers and analyzes large amounts of biological data, related to DNA, proteins, RNA, and more in industries ranging from biology to agriculture to pharmaceutical

Data Analyst

- Collects and harnesses data to solve customer problems and gathers information to help businesses improve profitability

Automotive On-Board Diagnostics Engineers

- Whether working with traditional, hybrid, or electric cars, the person in this role develops systems for data collection, storage, and analysis to optimize a car's performance

Machine Learning

- Builds and tests algorithms to help software evolve on its own by showing it how to "learn" from experience and improve (or even address new tasks) automatically

Computer Network Architect

- Designs and lays out a data communication network, such as a LAN—local area network—or intranet, including hardware and software, to best connect a company's users

3D Printer Software Development

- Develops the latest, greatest 3D printer or makes other applications for 3D printers (for instance, one new innovation is to use them for food engineering)

Natural Language Processing Software Engineer

- Uses Machine Learning and linguistics to translate real world speech and writing into something a machine can process and understand

Virtual Reality Designer

- Takes game development to the next level and translates games into virtual reality by updating them from a 2D to a 3D plane, and making services VR compatible

Cloud Architect

- Designs cloud infrastructure for clients, as well as tests and deploys it, and provides ongoing support, always keeping up to date on the newest trends

Video Game Developer

- Turns a video game designer's dreams into reality by programming games for the web, mobile, or PC using coding wizardry and design savvy



GET CODING

Here are a few cool websites that can help you get started on your coding and programming journey

code.org/learn — no matter what your age or how much you know (or don't), you can learn coding here; and you can start an hour at a time!

scratch.mit.edu — for ages 8+, this website is brought to you by MIT (definitely a reputable source); it lets you create through coding, and share what you've made with the whole wide world!

codecademy.com — for kids 13+ and adults alike, this website will let you learn languages from Java to Python to HTML through a series of projects and quizzes

crunchzilla.com/code-monster — this website lets you learn Javascript by getting right in there and doing fun things with code; good for first-timers!

appinventor.org — learn how to program mobile apps from Professor Wolber, who will take you through the steps by video (also has some Java tutorials)

kodable.com — this site gives kids a chance to learn computer science; its basic plan is free, so you can give it a whirl and see if you like it

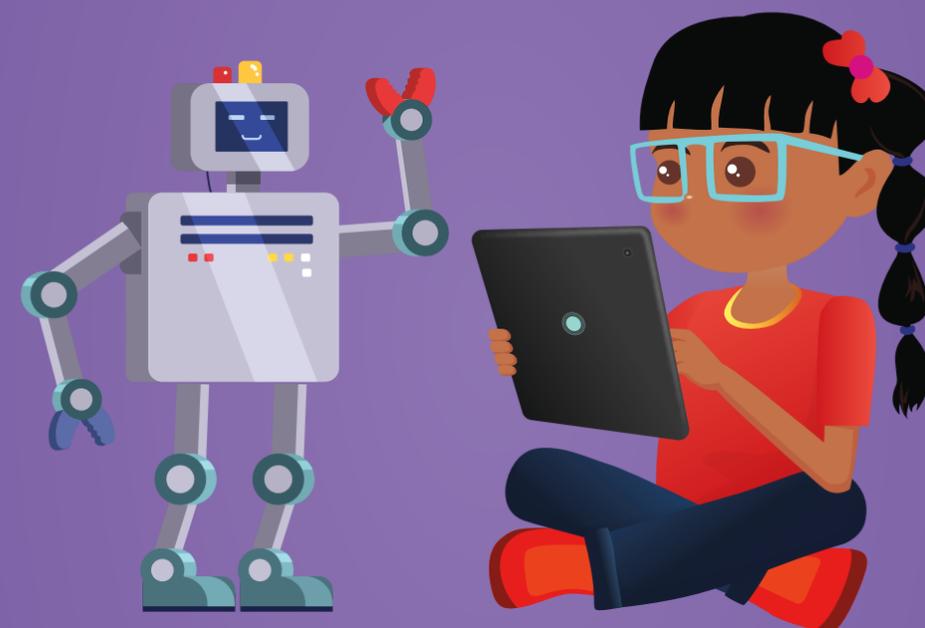
tynker.com — Tynker has courses for kids 7+, 10+ and 12+, from beginner to intermediate to advanced, on topics like coding, game design, Minecraft and more

blockly-games.appspot.com — brought to you by Google, Blockly has a series of games for beginners that teach you how to think like a programmer by arranging blocks to create programs

firstroboticscanada.org/cancode — Access free resources to learn code and have fun building a robot with the Virtual Robotics Toolkit! ■



<CanCODE> <CODECan>



canada.ca/CanCODE
#CanCODE

FOR INSPIRATION & RECOGNITION OF SCIENCE & TECHNOLOGY



<CanCODE>

<CODECan>