



Youth Making Change





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Makers Making Change is a program of Neil Squire, a non-profit organization that empowers people with disabilities through technology. Funded by the Government of Canada, **the Youth Making Change project supports STEM programming for youth under 30 in Canada.**

Students will improve their awareness and understanding of people with disabilities while serving their local community. This project can be integrated into STEM programs or extra-curricular activities including robotics clubs, holiday clubs, and hack clubs.

The makers will create and donate assistive devices for people with disabilities while incorporating the principles of design thinking, using 3D modeling (CAD) software, and 3D printing for social good.

WITH FUNDING FROM

Canada

PROGRAM OF:



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Who We Are

According to Statistics Canada, 80% of people living with a disability use an assistive device to increase their independence, and 27% need at least one more. Cost is often cited as the main barrier. DIY assistive technology — and learning STEM skills and Makers Making Change — can help bridge the gap.

Makers Making Change is committed to creating a network of volunteer makers who support people with disabilities within their communities by creating accessible solutions. We stand by the idea of social inclusion and a productive society that includes people with disabilities and gives them equal opportunity to contribute and participate.

Our online platform features a library of various open-source assistive technology design with build instructions and reviews to support makers and device users.





SUCCESS STORY

Students and Scouts Build 100+ Switches

At Bliss Carman Middle School in Fredericton, New Brunswick, 124 students participated in switch builds as part of their experience learning about technology and electricity.

The grade 6 students spent science class learning about the possibilities of technology and the access it can create for people with disabilities. The students built over 100 light touch switches, which allow access to devices with minimal finger movement.

"[The students] felt good knowing that their effort would directly benefit someone in need," says teacher Chris Jones.

Over at the 1st St. Margaret's Scout Troop, twelve scouts, aged 11, each built a raindrop switch, which allows fingertip touch and movement to activate a switch.

The scouts learned soldering skills while gaining an understanding of assistive technology and how devices work. Four scout leaders attended as well, lending their time and skills to the Makers Making Change project.

The switches from both builds were donated and dispersed throughout New Brunswick, as well as to the assistive technology department of Stan Cassidy Centre For Rehabilitation.

STEM Education is the Future

Science, technology, engineering, and math (STEM) education is an essential part of education:

- STEM activities foster new ideas and creative exploration. Students are encouraged to be curious and use their critical thinking skills to tackle real-world challenges.
- Hands-on experience with engineering, design, robotics, coding, and manufacturing can help youth choose their post-secondary path.
- STEM teaches makers how to work with others through collaborative learning. Students are encouraged to empathize with others and share insights they've learned.



Types of STEM Workshops

There are a variety of STEM workshops available for Canadian youth under 30. These are opened to classrooms, robotics club, after-school organizations, and any youth group. **The STEM Workshop training is paid by the Government of Canada. Workshop supplies are separate but may be covered depending on your region.** Speak with your MMC regional coordinator to learn more.

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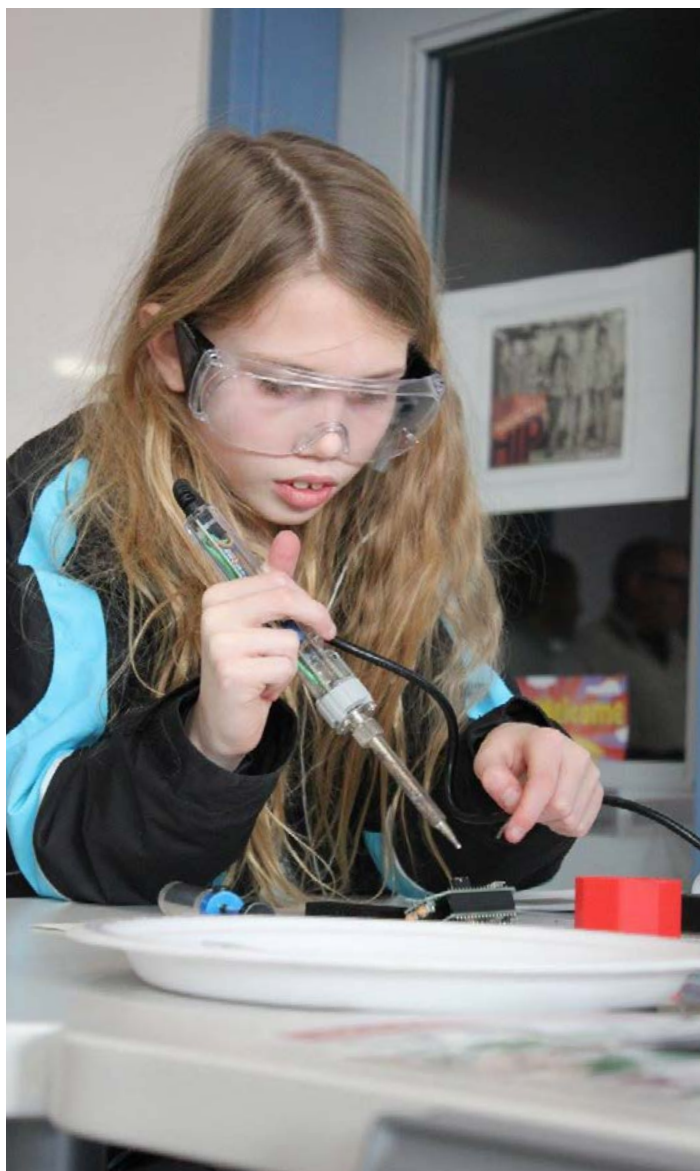
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WORKSHOP

Circuits and Electronics



■ 11 year-old Isabel and 24 other students learned how to solder at a buildathon with STEM Learning Labs in Calgary, AB.

Isabel is the youngest person to build the LipSync sip and puff device!

The shift to electronics has become a trend in many industries, and assistive technology is no different. From simple circuits used to switch adapt a toy, to the more complex workings of a sip and puff device, there is plenty for youth to explore and engage with.

Students will get a deep understand of various assistive technologies and how devices work from the inside out.

SKILLS LEARNED

Circuits, electronics, PCBs, soldering, and technical assembly.

SUGGESTED ACTIVITIES

Beginner: Students will get an introduction to assistive switches and how devices can be created with just a few components. The lesson involves building the Raindrop or Light Touch Switch. *1 hour.*

Intermediate: Hack into a simple battery-operated toy or build the Interact Switch. Makers will use flush cutters and a soldering iron in this workshop and develop the confidence to create their own DIY assistive device. *2 hours.*

Advanced: Explore electronics and circuitry more in depth by building the LipSync sip & puff device. This device is comprised of 3D printed parts and a variety of electronic parts (like resistors, PCB boards, breakaway headers, to name a few). *3-4 hours.*

WORKSHOP

Design for 3D Printing



■ A MMC staff explaining the LipSync 3D printed design to students at Burnaby South Secondary School in Burnaby, BC.

"You got to see the entire process, how it fits onto a wheelchair and then how that person will be able to access [the 3D printed device]" says student Angela.

Watch: tiny.cc/sd41

Learning computer aided design (CAD) is the first step to designing DIY assistive technology. Typical 3D design work is done in CAD modelling programs such as Autodesk Fusion 360 and Tinkercad. The Design for 3D Printing workshop provides hands-on experience with CAD programs and design techniques to improve efficiency and reduce waste.

SKILLS LEARNED

Computer aided design (CAD), manufacturing, material science, and 3D prototyping.

SUGGESTED ACTIVITIES

Beginner: Get hands on experience with computer aided design (CAD) using Tinkercad. Students will get a fundamental understanding of how 2D shapes can be translated into 3D objects. At the end of this workshop, learners will design a custom topper for the Interact Switch. *2 hours.*

Intermediate: Explore the basics of Autodesk Fusion 360, a CAD program used by engineers and designers. Student will apply what they've learned by creating and modifying 3D designs. *1-2 hours.*

Advanced: In this more advanced CAD workshop, students will use Autodesk Fusion 360 to create more complex design. They'll learn advanced CAD techniques used by engineers. *2-3 hours.*

WORKSHOP

3D Printing 101



■ Gr. 12 students examining a row of Prusa 3D printers at the North Forge Fabrication Lab in Winnipeg, MB.

The students received hands-on 3D printing lessons from MMC staff and mentors from Women in 3D Printing Winnipeg and North Forge.

Watch: tiny.cc/northforge

3D printing is a quick and easy way to make assistive devices. Makers can select from a variety of materials and colours to suit the users needs. The best part? A single roll of filament can print dozens of devices, which significantly lowers the cost compared to traditionally manufactured assistive tech.

This workshop walks students through the basics of 3D printing, as well as tips and tricks to optimize their prints, so they can independently 3D print devices at school or at home.

SKILLS LEARNED

Manufacturing, 3D printing, material science, and printer operation and maintenance.

SUGGESTED ACTIVITIES

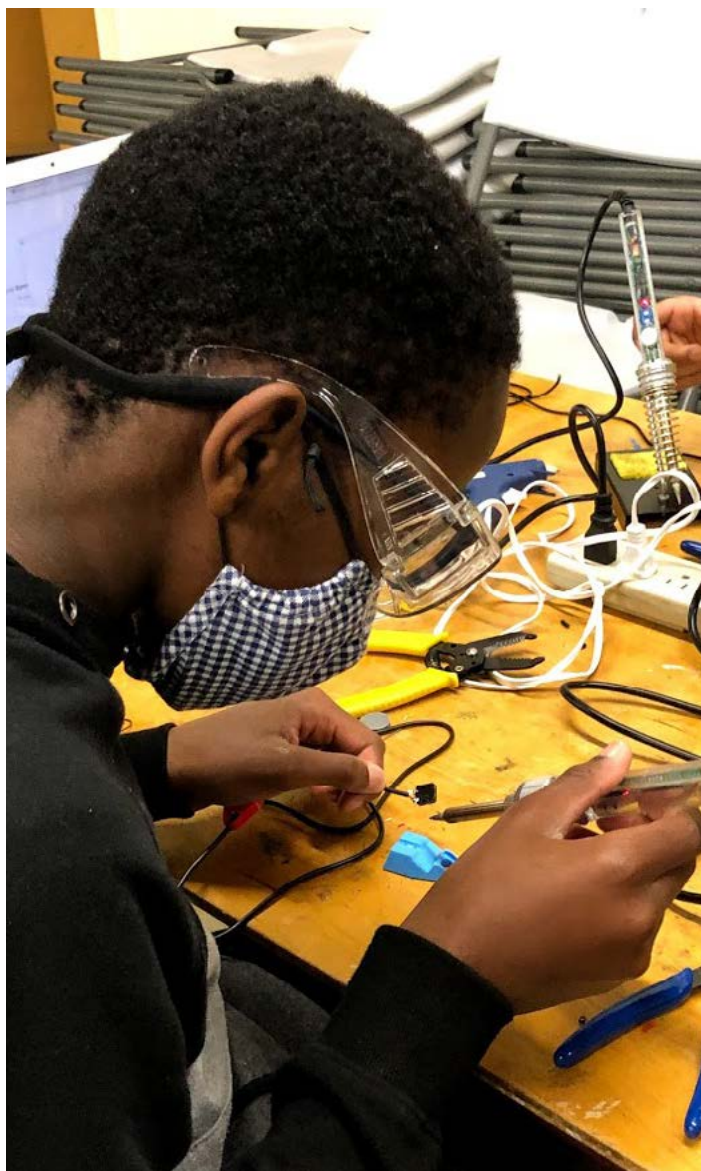
Beginner: Understand the basics of 3D printing in this workshop. Young makers will learn how a 3D printer works and the 3D printing workflow from file to object. *1 hour.*

Intermediate: Optimize designs for 3D printing using CAD and slicer programs. See how overhangs, hole placement, and walls can effect printing speed and strength. *1-2 hours.*

Advanced: Students will build the MMC60 switch and use a neat trick in Prusa Slicer to create their own custom textured toppers. *2-3 hours.*

WORKSHOP

Build Assistive Technology



■ A gr. 6 student from Bliss Carman Middle School in Fredericton, NB building the Raindrop Switch.

"[The students] felt good knowing that their effort would directly benefit someone in need," says teacher Chris Jones.

Cost is often cited as the main barrier to assistive technology (AT). By volunteering to build open source devices from AT libraries like the one from Makers Making Change, we help provide low cost and affordable solutions to those who need it.

Every device built by students will be donated to individuals with disabilities in Canada.

SKILLS LEARNED

Electronics, PCBs, soldering, technical assembly, and 3D printing.

SUGGESTED ACTIVITIES

Beginner: Discover the world of DIY assistive technology. Assemble a pen ball or wobble switch, or pick up a soldering iron to create a Raindrop or Light Touch Switch. *1 hour.*

Intermediate: Build assistive devices for people with motor challenges, like the dice rumbler, switch tester, MMC60 switch, or Interact Switch. All these devices involve assembling electronic components and 3D prints. *2 hours.*

Advanced: Challenge a student's maker skills by building the LipSync sip & puff device, complex switches, and adapting toys. Students will use their critical thinking skills and be encouraged to help each other throughout the build. *2-3 hours.*

WORKSHOP

Make:able Design Challenge



■ Michelle, the recipient of the Ready Writer, writing her name with her new device.

"We decided to help Michelle because she's around our age and we feel like we can relate to her," says designer Meghan.

Make:able is an assistive technology design challenge by PrintLab, Autodesk, and partners (including MMC).

This international challenge is for youth interested in 3D design and 3D printing. Students learn to empathize with others by designing a device for a person with disability over several months.

The 2020 Make:able challenge saw 17,000 student registrations across 72 countries.

<https://www.makeablechallenge.com/>

SKILLS LEARNED

3D design, 3D printing, and empathy

NOTABLE DESIGNS

The Ready Writer: At Copley High School, students Jasmine and Meghan were challenged to create a writing aid for their end user and classmate, Michelle, who suffers from hypotonia. Their design helps Michelle write comfortably for long periods without experiencing muscle fatigue. bit.ly/3LrV0yS

A Cut Above: The team at Westwood Elementary School designed a clever scissor adaption for a 4 year old kindergartener who has a hand disability. Working closely with the child's occupational therapist, the students' design uses the thumb and palm of the hand to operate a scissor. bit.ly/3wpJDTX

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Ready to Get Started?

Whether you're a teacher looking for class activities, STEM group leader, or just someone passionate about STEM development for youths, contact one of our offices to learn more.



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