COMMON OF STEM LEADERS, INVOLATORS, PARO SCIENCE COMMON UNICATORS **ANNUAL REPORT 2020** 



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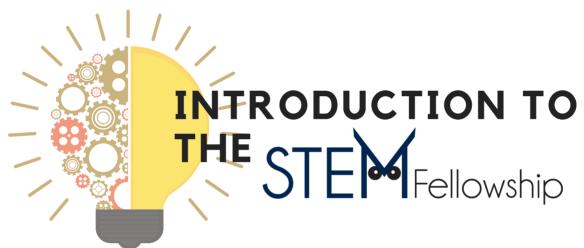
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STEM Fellowship is a registered Canadian charity that employs mentorship and experiential learning to foster a diverse community of STEM leaders, innovators, and science communicators. The youth-led organization was founded in February 2015 and has since expanded to high schools and universities across Canada. We currently have 20 university branches and 20 high school chapters encompassing nine provinces, and we're still growing!



We present a new philosophy for student-driven experiential learning in STEM and, thus, provide youth with tools that help them in the current STEM research and education ecosystem. STEM Fellowship seeks to provide a virtual meeting place for advanced STEM learning: a place where students can collaborate to develop their ideas, while equipping themselves with skills in data analytics, science communication, and inquiry. We provide opportunities for driven learners to discuss ideas with world-class experts, peer-review their work, and work towards individual goals, including scholarly publications.



#### A NOTE FROM THE CEO

This year has been an extraordinary one for STEM Fellowship and everyone across the globe—one that taught us the importance of resilience and adaptability in an uncertain world, among many other lessons. Here, we remember the lives of Mohammad and Zeynab Asadi-Lari, celebrate the efforts of the STEM Fellowship team in overcoming the challenges presented by this year, and discuss our hopes and vision for a more inclusive future.

In January 2020, we learned of the tragic passing of Mohammad and Zeynab Asadi–Lari. Both siblings were passengers in the Ukraine International Airlines flight that was shot down over Iran.

Mohammad served a crucial role in helping to create and grow our organization. He worked tirelessly to develop the organization's mission and vision as a Co-Founder, served as the Managing Director of the organization and the first Chair of STEM Fellowship Journal's Student Editorial Board, expanded the scope of our Big Data Challenges, and spearheaded our policy outreach work. He was continuously fostering a strong community, developing others' potential, and inspiring them to unite around a common cause with his humanitarian ethos.

Zeynab made invaluable contributions to STEM Fellowship by creating the Human Resources Committee within our organization and effectively developing many policies and procedures that have formed a foundation for our organizational strategy to this day. Driven to develop STEM skills amongst her campus community, she also founded a STEM Fellowship branch at the University of Toronto Mississauga. She was a patient and encouraging mentor, always willing to lend a hand and support to those around her.



Arshvir Singh Dhari, CEO, August 2020 - Present



Hannah Rahim, CEO, January 2019 - August 2020

A few months later, the COVID-19 pandemic was on the headlines. STEM Fellowship was well-situated for the shift to virtual communication platforms, as the charity normally operates on a remote working model. In-person programs, however—such as the Big Data Days, Research Exploration Opportunity placements, and local events by university branches, high school chapters, and outreach ambassadors—were quickly adapted into online formats. Our committees worked diligently to ensure a smooth transition, with some programs breaking previous records and setting new ones. Namely, this year's Undergraduate Big Data Challenge and the current High School Big Data Challenge saw record-breaking participants, the Scholarly Writing Challenge received its highest number of submissions, and the upcoming STEM Fellowship Journal issue will feature our largest collection of high school and undergraduate student research articles covering multiple STEM disciplines. Our STEM Fellowship-led Team Canada also secured first place at the 2020 Online International Young Physicists' Tournament.

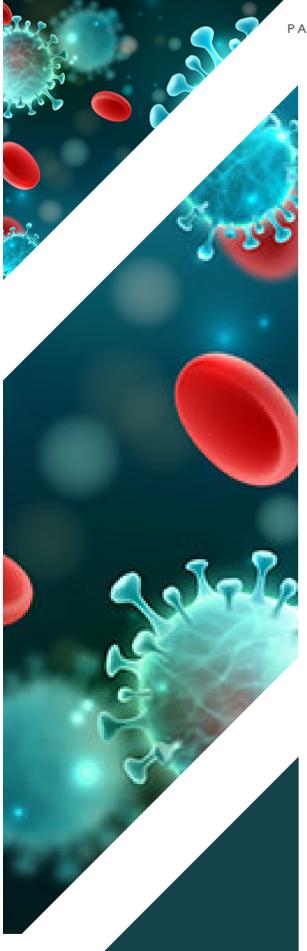
Despite the instability in the lives of our volunteers due to the pandemic, we are grateful that they have continued to dedicate their time to our cause. This is a testament to the drive and passion that over 400 members bring to the STEM Fellowship team. With a growing national network, it is worth noting that many past STEM Fellowship program participants are returning as volunteers to help deliver the very programs that they once participated in, as a way of continuously improving the programs and giving back to the community.

The COVID-19 pandemic has highlighted stark health and socioeconomic inequities in Canada and around the world, underscoring the importance of STEM Fellowship's efforts to increase diversity in research environments. In light of the Black Lives Matter movement and global discussions surrounding anti-racism and implicit bias, STEM Fellowship sought to reflect on our own commitment to diversity and inclusion. Our report, based on a diversity and inclusion survey, featured a number of recommendations from our members, serving as a reminder about the important work that is still needed to be done to ensure equitable STEM education. Our vision moving forward is to increase targeted outreach to communities underrepresented in STEM and to strengthen representation of all youth in our initiatives. We also hope to expand our presence into Francophone and remote communities across the country. Internally, our goal is to recruit more underrepresented students into our organization, to increase retention of these students, and to support them in reaching higher ranks, via internal mentorship and support by our executives.

As you read through our year-in-review, we would like to extend our gratitude to our volunteers, partners, sponsors, and supporters for being a crucial part of our mission and vision this year.

Hannah Rahim, CEO, January 2019 - August 2020 Arshvir Singh Dhari, CEO, August 2020 - Present





# ADJUSTING TO COVID-19

Ever since COVID-19 was declared a pandemic in early March, the Canadian government has been advising Canadian citizens to stay home and adjust to social distancing precautions for their health and safety. Many changes were needed, and, as a result, the STEM Fellowship team worked tirelessly to transition their events, programs, and initiatives to a virtual setting. Since school boards placed restrictions on non-academic events, STEM Fellowship ambassadors searched for various online mediums to represent and deliver presentations about the organization and host webinars to replace their in-person workshops in the long run. The STEM Fellowship Data Science Committee needed to completely alter their operations and planning for the annual Undergraduate Big Data Challenge (UnBDC) to facilitate this transition. However, despite COVID-19, the event was revolutionized and reached a far greater audience with a recordbreaking attendance of 523 participants, which is considerably larger than the 234 participants from the 2019 UnBDC. With the focus of attracting people remotely, they reached 56,221 people through social media.

This year's UnBDC theme, Personal and Public Health Decisions in a New Open Data Reality, encouraged competing teams to examine COVID-19 data and understand the demographics of COVID-19 cases, nationally and internationally. Participants were able to receive resources and mentorship remotely from any location with the help of technology, such as Internet access. COVID-19 had also significantly impacted the Research Exploration Opportunity program for both 2020 and 2021 year, causing them to switch to virtual programs. Throughout the 2020 program, there was a series of online lectures from Pls and graduate students that allowed participants to gain insight into the labs' work and network with panelists. Although COVID-19 created challenges for STEM Fellowship and required many adjustments, the result of their events could not have been better thanks to hard work and perseverance. Through the use of virtual platforms, STEM Fellowship was also able to reach out to more students from across the country.



#### **OUTREACH AMBASSADORS COMMITTEE**

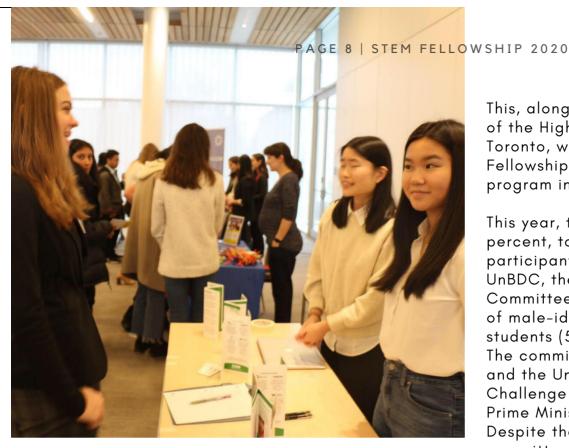
The Outreach Ambassadors Committee's vision is to support STEM Fellowship by providing young innovators with the opportunity to spread their passion for STEM and present the charity's initiatives to their local communities by connecting youth within a specific region and community at large with our organization's initiatives. Currently, STEM Fellowship's outreach ambassadors come from 32 different high schools and 10 different universities in Canada. The outreach ambassadors promote the STEM Fellowship Journal and other programs through various means, such as social media platforms, in-class presentations, and word-of-mouth. They also represent STEM Fellowship at conferences in their communities, such as science fairs and career conferences. Additionally, outreach ambassadors carry out online region-wide and province-wide projects, which include hosting webinars on diversity in STEM, creating brochures and banners for promotional events, developing online coding resources, robotics workshops at their high schools, and more.

They also support other committees by collaborating with members of the Partnerships and Sponsorships Committee, to establish connections with community organizations, find grant funding opportunities, and form new external partnerships. The committee aims to expand to new regions within Canada and, as a result, enhance STEM Fellowship's reach and presence, with a focus on underrepresented areas that may not have engaged in STEM Fellowship's initiatives before.

#### MARKETING COMMITTEE

Our social media platforms grew exponentially in 2020 in terms of our following, reach, and engagement. This was portrayed the best on our Instagram platform, where the majority of our engagement for 2020's events was due to the large high school audience. Successful crosspromotion with other STEM organizations and sponsors, and the use of different graphic styles and animations, have allowed us to expand our reach on all social media accounts. Leading on, our YouTube channel was also renewed this year with an increase in our following and engagement from the consistent release of engaging STEM videos and the promotion of them on social media.

Furthermore, STEM Fellowship encourages its volunteers to explore their own interests and, more specifically, by involving themselves in the ongoing STEM Fellowship Podcast. Initiated by a member of the Design Development Team with a passion for podcasts, this initiative will interview prominent members of the STEM field based on questions that high school and university students may have. This not only allows for individualistic growth, but also aligns with the organization's overarching goal to inform and provide opportunities for youth to get involved in the STEM field.



### DATA SCIENCE EDUCATION COMMITTEE

STEM Fellowship's Data Science Education
Committee grew significantly this year in regards to
its two major challenges: the High School Big Data
Challenge (HSBDC) and the Undergraduate Big Data
Challenge (UnBDC). The Big Data Challenge
program enables students to develop skills in data
analytics, problem-solving, and critical thinking,
while using technology to address socioeconomic
and environmental issues in their communities.

In February 2020, the 2019–2020 HSBDC's finale event, Big Data Day, took place. Here finalist teams presented their findings to various research topics pertaining to the overarching theme of *New Climate* and *Information Realities: From Oceans to Glass of Water*.

At the High School Big Data Day, there was also representation from the Canadian Commission for UNESCO, Let's Talk Science, National Research Council, Environment and Climate Change Canada, and Canadian Science Publishing, among other notable guests outlined in the "Partnerships and Sponsorships Committee" section.

This, alongside <u>CityNew's media coverage</u> of the High School Big Data Day in Toronto, worked to highlight STEM Fellowship's success with the HSBDC program in 2020.

This year, the UnBDC grew by 123.5 percent, to a total of 523 registered participants across Canada. For the UnBDC, the Data Science Education Committee achieved a nearly equal split of male-identifying to female-identifying students (52.4% and 47.6%, respectively). The committee broke all internal records, and the Undergraduate Big Data Challenge received recognition by the Prime Minister of Canada, Justin Trudeau. Despite the COVID-19 pandemic, the committee was successful in planning and executing the Undergraduate Big Data Day as a remote event.

Currently, the 2020–2021 HSBDC is in progress, which grew by 49.2 percent, to a total of 394 registered participants across Canada, reaching 93 schools.

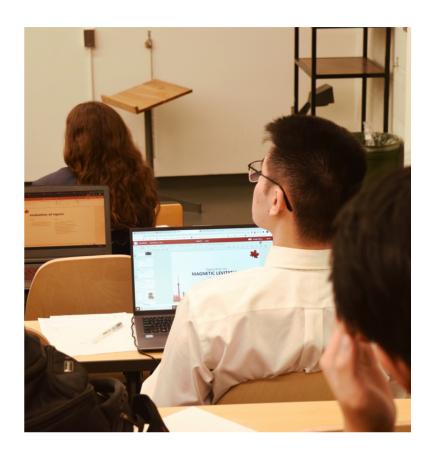
Moving forward, the committee hopes to continue expanding and improving the reach of its Big Data Challenge program. The goals of STEM Fellowship are multifaceted, yet the principal focus is always to continue to grow the organization and spread its reach to as many students as possible. Specifically, there will be a push to develop inclusive relationships with Francophone regions around Canada to ensure every region has an equal opportunity to participate in the initiatives offered by STEM Fellowship. Although the committee is always looking to grow domestically, it is also aiming to extend its reach internationally by collaborating with organizations in the United States, Hong Kong, and beyond. Moreover, the Data Science Education Committee is excited to launch an internship position for passionate youth in the near future.

### UNIVERSITY BRANCHES COMMITTEE

The University Branches Committee supports students at affiliated institutions with professional development through research opportunities, scholarly writing workshops, and data science training. Over the year, the committee promoted STEM Fellowship initiatives at universities across Canada and recruited students from the undergraduate and graduate levels to participate in the organization's programs. The committee plays a key role in maintaining STEM Fellowship's connections with academic institutions and fostering the growth and development of future leaders in STEM. During these unprecedented times, the branches continued to remotely deliver professional and personal development opportunities for undergraduates across the country.

Notably, in 2020, the University Branches Committee set up an internal grant to financially support the initiatives of its university branches. In addition, the committee expanded Indicium, a research competition program across Canada with an engagement of over 100 undergraduate students, who were able to receive direct guidance from graduate students and established post-doctoral researchers. With the pandemic affecting in-person events, the branches shifted their initiatives and programs to a virtual manner and strived to provide current students with similar opportunities offered in previous years.

The University Branches Committee hopes to expand upon its current network of 20 universities and develop an inclusive relationship with predominantly Francophone regions. The University Branches Committee has already welcomed the Quebec Regional Branch Lead, a bilingual member of the committee that will ensure smooth communication between the national committee and the individual branches at Francophone institutions.









#### PARTNERSHIPS AND SPONSORSHIPS COMMITTEE

STEM Fellowship's Partnerships and Sponsorships Team, often referred to as Partnerships, is actively engaged in the organization's inner workings of large-scale projects and initiatives. Partnerships operates with a strategic vision to increase the outreach of our programs to a greater number of target audience members.

Partnerships played a critical role in the promotion of the 2020 High School Big Data Challenge, as well as the recruitment process of mentors through large-scale outreach. The committee also procured the support of dignitaries for the 2020 High School Big Data Day, which included the:

- Governor General of Canada
- Lieutenant Governor of Alberta
- Lieutenant Governor of Ontario
- Minister of Children's Services of Alberta
- Minister of Community and Social Services of Alberta
- MLA for the Calgary-Varsity electoral district
- Associate Dean of Research, Innovation and Strategic Partnerships, at the University of Calgary's Schulich School of Engineering

Partnerships works to secure sponsorship funding for certain STEM Fellowship initiatives, inviting dignitaries to events, and initiating and maintaining relationships with science-related organizations to promote programs of partner organizations that can benefit youth. The Partnerships Committee worked to create multiple grant applications, such as the NSERC PromoScience, for our various programs by consulting with external grant-writing experts and forming an official grant-writing subcommittee.

In the coming months, the Partnerships Committee hopes to further strengthen its grant-writing expertise to support STEM Fellowship's growing programs and to continue establishing valuable connections with organizations and corporations whose vision aligns with that of STEM Fellowship.

### HUMAN RESOURCES COMMITTEE

The Human Resources Committee has been working throughout the year to improve and facilitate positive relationships and communication between the various committees. The Human Resources Committee has sought ways to recognize and appreciate the contributions of STEM Fellowship's members through the development of such initiatives as the Volunteer Awards. This was launched during the closing of the 2020 National Volunteering Week, in acknowledgment of the contributions made by STEM Fellowship volunteers.

In 2020, the Human Resources Committee also inaugurated the STEM Fellowship Networking Events initiative for members within STEM Fellowship to network and communicate with other cross-committee members. The initial success of this event led to the implementation of quarterly Networking Events, which, in the upcoming year, will be hosted with a specific theme of interest for each session

Throughout the year, the Human Resources Committee fostered a more inclusive and rewarding volunteering environment for STEM Fellowship members, particularly through the examination of diversity and inclusivity within the charity via its 2020 STEM Fellowship Report on Diversity and Inclusion, as well as the creation of policies, such as the Volunteer Awards Policy, Mental Health Policy, COVID-19 Guidelines, Expectations, and Resources, as well as others that ensure the integrity of STEM Fellowship volunteers.

In 2021, the Human Resources Committee will also work to improve efficiency of administrative aspects of STEM Fellowship, ranging from new member orientations to member termination processes, in order to allow for smooth functioning of various committees across the charity.



### CANADIAN YOUNG PHYSICISTS' TOURNAMENT (CAYPT) COMMITTEE

The CaYPT Committee has several programs aimed at providing diverse, open-source information to help students from all backgrounds learn experimental physics. The committee maintains a crowdsourced reference kit that catalogues references related to the CaYPT and International Young Physicists' Tournament (IYPT) problems. It also received submissions from more than five different countries and has documented more than 300 references this year. In addition, the committee also makes demonstration videos to help students begin their research on the CaYPT problems. The videos were viewed more than 70,000 times in 2020.

On the national tournament front (CaYPT), the committee had a record level of student and teacher participation and built new infrastructures that will foster long-term growth of its programs. On the international tournament front (IYPT), Team Canada won first place in the 2020 Online IYPT.

In 2021, the committee will work more closely with past participating schools and reach out to several new schools. Past participants play a vital role in building a school team; as such, the committee hopes to offer continued support to past participants and their teachers in their efforts to build a community of enthusiastic physics students at their local school.





### SCIENCE COMMUNICATION COMMITTEE

The Science Communication Committee hosts the largest portfolio of programs within STEM Fellowship. Therefore, as a whole, the committee is collectively working to expand, diversify, and improve STEM Fellowship's programs and initiatives for not only domestic, but also international, audiences in China, United States, United Kingdom, and beyond. The committee encourages the participation of underrepresented and marginalized minority groups in STEM fields through its various awards, competitions, free workshops, international partnerships, and laylanguage blog posts.

This year, the committee intensified our social media promotion of its initiatives to account for COVID-19related drops in engagement and were able to not only meet, but also exceed, engagement statistics in comparison to 2019. The 2020 year was a monumental one for the Science Communication Committee, as it spearheaded a new team and initiative: the Consulting Program. Additionally, the Scholarly Writing Challenge (SWC) surpassed a record-breaking total of 110 submissions with the support of Science Communication's External Team. The SWC garnered attention from international partners and participants, and the SWC is proud to announce the support of several international sponsors for the competition this year. The biggest achievement of Science Communication's External Team has been securing a sponsorship from The Knowledge Society, which has offered STEM Fellowship scholarships worth \$2,500 in total.

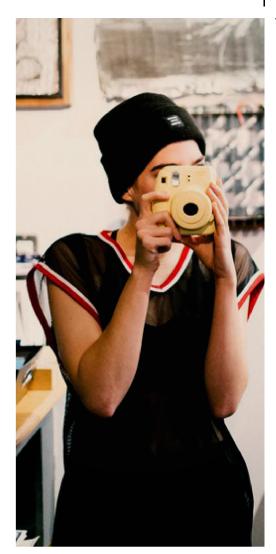
2021 will be an exciting year as the STEM Fellowship Blog Team will be expanding its team and continuing its operations. It will be increasing promotions through social media and fostering community partnerships through cross-promotions with other STEM-relevant blogs, in hopes of expanding outreach further to its target audience. Additional goals include developing a plan of action to add more interactive initiatives in the near future, such as guest collaborations with researchers in STEM industries and academia, in order to better serve students from target backgrounds.





## SPREADING OUR INFLUENCE

Our 2020 High School Big Data Challenge reached over 41,000 people on Facebook within the age range of 13 to 24 years old, while our advertisements on Instagram reached over 18,500 people of a similar age range. We aimed to target youth, specifically high school students, as well as teachers. Further, we had an event page translated in both English and French to convene more people to register for the event, while it was also used to introduce our main sponsors and prizes. We curated posts to market the unique selling points of our Big Data Challenge, such as publication in the STEM Fellowship Journal, benefits of self-directed learning, and the chance to win monetary prizes. Moreover, previous participants provided testimonials to help highlight the value of the experience that the Big Data Challenges provide.



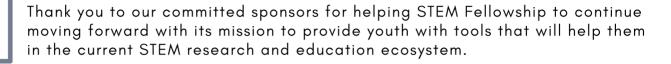
#### **SOCIAL MEDIA COVERAGE 2020**

In the past year, STEM Fellowship worked to develop its sphere of influence not only regionally, but nation-wide, as well. Our media presence increased significantly, as we emphasized news stories covering our initiatives and subsidiary domains. The number of followers on our Facebook platform grew to 2,367 followers and 2,181 page likes. Our event promotions have reached an audience nearing 40,000 in 2020, with a similar growth on our Instagram page. Statistically, our 2020-2021 HSBDC promotions are of note, reaching over 140,000 viewers. Through our ever-broadening audience on additional platforms, such as Twitter and LinkedIn, the organization continues to cement itself into the STEM community.

With our rapidly growing initiatives, STEM Fellowship is quickly gaining momentum on the Canadian stage through recognition from CityNews and other interprovincial outlets. Individuals affiliated with STEM Fellowship have also furthered their achievements in the STEM field, notably Dr. Noukhovitch's reception of the Prime Minister's Award for Teaching Excellence in STEM and the late Mohammad Asadi Lari's reception of the Posthumous Singular Award of Merit at the 2020 Canadian Medical Association Awards.

More about our media coverage can be found <u>here</u>.

#### **SPONSORS & PARTNERS**





Altmetric is a Digital Science company whose mission is to track and analyze the online activity around scholarly research outputs. Intending to allow ease in tracking a scholarly topic of interest to you, Altmetric tracks a unique range of online sources to capture the conversations relating to research output. STEM Fellowship is proud to be partnered with Altmetric and have them sponsor our STEM Fellowship Journal and the Big Data Challenges. Each manuscript published through the STEM Fellowship Journal earns an Altmetric badge, expanding the article's digital reach and allowing it to be tracked online through the badge's recognized and renowned metadata.



The Society for Canadian Women in Science and Technology, founded in Vancouver in 1981, is a not-for-profit organization that promotes, encourages, and empowers women and girls in science, engineering, and technology. They sponsored our 2020 Scholarly Writing Challenge and 2019–2020 High School Big Data Challenge.



The Pacific Institute for the Mathematical Sciences (PIMS) aims to promote research and applications of mathematics in various fields of study, as well as enrich public awareness of it through various outreach programs. With chapters set up in the University of British Columba, all the way to the University of Manitoba, PIMS aims to encourage mathematical research all across Canada. As an outreach program of PIMS, Callysto is a free, interactive, curriculum-based learning and skills development tool with the goal of building tomorrow's digital leaders. STEM Fellowship was proud to have Callysto as the primary sponsor of our 2019–2020 High School Big Data Challenge.



A non-for-profit with the goal of mobilizing science-based knowledge, they currently publish 24 various international journals in 175 countries. They are the publisher of our STEM Fellowship Journal.



SAS uses innovation, business intelligence, analytics, and data management services to help more than 75,000 customers make decisions faster. SAS has provided monetary sponsorship for several of our Big Data Challenges.



Based in London, United Kingdom, Digital Science is a technology company focused on strategic investments into startup companies that support research. STEM Fellowship was proud to have Digital Science as a monetary sponsor for our Big Data Challenges.



Headed in the technology capital of the world, Silicon Valley, CISCO is a multinational conglomerate focused upon the manufacturing and devolvement of technology. Employing over 70,000 people and with a global presence, CISCO is committed to connecting the world with their cutting edge technology. CISCO provided communication and in-kind resources for the Big Data Challenges.



A national charity that encourages youth to take an interest in the STEM fields and motivate them to fulfil their potential as both young professionals and citizens, Let's Talk Science sponsored the 2018–2019 and 2019–2020 High School Big Data Challenges.



The Schulich Foundation has donated more than \$350 million to university faculties and continues to hold scholarships for high-achieving students today. They were a monetary sponsor for the 2019 Undergraduate Big Data Challenge.



The Perimeter Institute for Theoretical Physics is the host of the Canadian Young Physicists' Tournament.



An innovation transfer and business incubator at the University of Calgary, they sponsored the 2019–2020 High School Big Data Challenge.





The Royal Bank of Canada was a monetary sponsor for the 2019–2020 High School Big Data Challenge.



Boasting Canada's largest supercomputer centre, they provide Canadian researchers with cutting edge computation resources. They sponsor STEM Fellowship's Big Data Challenges.



Being one of the top-ten universities in Canada, with a stellar sciences program, STEM Fellowship is thrilled to have had the University of Calgary's Faculty of Science sponsoring our 2019–20 High School Big Data Challenge.



The Hunter Hub strives to encourage entrepreneurial thinking and innovation across the university and the local community. They sponsored the 2019–2020 Undergraduate Big Data Challenge.



Based in Mississauga, Roche Canada is a successful pharmaceutical company that aims to bring targeted treatments to patients. Originally founded in 1896, Roche has now grown to have a global impact, having saved countless numbers of lives and improving the quality of life for millions around the world.



#### **CLOSING NOTE**

Our programs are made possible, in part, due to the generosity of our sponsors, whose funding goes towards supporting STEM Fellowship's initiatives financially. Our sponsors play a critical role in ensuring that our programs are a success, and we are proud to acknowledge their support. We hope to continue our collaborations with them and continue to bring accessible STEM learning opportunities to youth across Canada, both in 2021 and beyond. The STEM Fellowship team also extends its gratitude to all program participants for being with us during an extraordinary year. We also thank our board members for their many contributions and support in 2020, including Sacha Noukhovitch (President of STEM Fellowship), Jean Yip (Member of Parliament for Scarborough— Agincourt), Suzanne Kettley (Canadian Science Publishing), Mark Morreale (SAS), Daniel Gruner (SciNet), Adrian Stanley (Digital Science), Hannah Rahim, Tristan Wild, and Mohammad Asadi Lari (Honorary Board Member). Finally, our sincere appreciation goes out to all STEM Fellowship volunteers who help bring the charity's vision to light. We look forward to a year filled with inclusivity, discoveries, and learning in STEM fields.

