



Innovation Nation

# 2015 INNOVATION NATION

CONFERENCE & ROBOTICS COMPETITION



MAY 31, 2015

LIUNA STATION, HAMILTON, ON



[www.innovation-nation.ca](http://www.innovation-nation.ca)



# Acknowledgement:

The National Centres of Excellence (NCE) are committed to building on Canadian expertise in engineering, health and natural, social and biomedical sciences to enhance Canada's economic competitiveness globally by developing new discoveries and transforming these discoveries into products and services that will create jobs, build a stronger domestic economy and improve the quality of life for all Canadians.

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By funding research partnerships between academia, industry, government, and not-for-profit organizations, NCE programs turn Canadian research and entrepreneurial talent into economic and social benefits for all Canadians.

NCE initiatives engage thousands of talented researchers, attract and train tomorrow's scientific and industrial leaders.

To date the NCE networks and centres have helped to train more than 36,000 highly skilled personnel and create over 100 spin-off companies, and since its inception, the NCE has invested more than \$1.5 billion in networks and centres,

funding research, commercialization and knowledge translation to enhance the lives of Canadians.

The NCE is mobilizing Canada's best research and development talent to build a more advanced, healthy, competitive, and prosperous Canada.

In support of these objective the NCE Secretariat manages four national programs: Networks of Centres of Excellence (NCE); Centres of Excellence for Commercialization and Research (CECR); Business-Led Networks of Centres of Excellence (BL-NCE); and Industrial Research and Development Internships (IRDI).



Government of Canada  
**Networks of Centres  
of Excellence**

Gouvernement du Canada  
**Réseaux de centres  
d'excellence**

# welcome

## *Welcome to the 2015 CSii Innovation Nation Conference and Robotics Competition.*

We are pleased to once again be hosting this event in Hamilton, Ontario, where CSii offices are headquartered at St. Joseph's Healthcare Hamilton and McMaster Innovation Park.

The Innovation Nation Conference features diverse voices of national and international thought leaders whose stories showcase ideas and innovative concepts that fuel change. This event is a tribute to the talent, intellect and tenacity of the extraordinary work being done in science, medicine, commerce, and the arts and it provides us with an opportunity to glimpse the future with the insights provided by this group of gifted innovators. We've chosen individuals who are leaders in thought and action, innovators who apply their unique gifts everyday to the task of making their vision a reality and of bringing their ideas to life.

This year once again, the Robotics Competition will showcase the innovations of Canadian university, and high school students. We hope to encourage our colleagues, industry partners and friends to support the work of these dedicated students who spend much of their time and resources exploring the limits of their imaginations and their abilities to create innovations that will serve a purpose, solve a problem or create new efficiencies.

We applaud their efforts, one and all, and encourage them to continue their quest to learn more about science, engineering and medicine so that they can help to build new enterprises that create jobs for Canadians and enhance Canada's reputation as a world leader in advanced technologies.

Innovation Nation provides an opportunity for all of us to learn from the accomplishments and ideas of our distinguished guest speakers and to once again be inspired.

I would like to thank the National Centres of Excellence CECR program and the Government of Canada for their continued support of our work as well as our sponsors for helping to make this event possible.

I look forward to meeting you at the conference.

Best wishes,

**Dr. Mehran Anvari**  
CEO & Scientific Director  
Centre for Surgical Invention and Innovation, CSii





## **H. Douglas Barber**

Chair, Centre for Surgical Invention and Innovation (CSii)

Professor in Residence, McMaster University

Founder of Gennum

2013  
2014  
2015

## *Welcome to the fifth annual CSii Innovation Nation Conference.*

The Centre for Surgical Invention and Innovation (CSii) is now five years old. Under the dynamic leadership of Dr. Mehran Anvari, CSii continues to make remarkable progress towards the goal of improving the speed and accuracy of minimal access surgery through innovations in image guided robotic tools. We have focused in the first application on developing a platform and tools for biopsy and ablation of breast cancer using magnetic resonance imaging (MRI). We began clinical testing in 2014 and completed 15 tests to date in Canada. These tests demonstrated greatly improved accuracy and patient comfort. We delayed testing and approval action in the USA because of limited resources. However, funding prospects exist and we are beginning to chart the course to commercial introduction.

We are very fortunate to have a group of outstanding speakers who have advanced knowledge in many areas related to the goals of CSii. Their participation in this conference will give us opportunity to receive input and interaction that will be beneficial in our ongoing progress. We are a Centre for Commercialization and Research. Our goal is to demonstrate value in image guided robotic surgery and to establish the means to deliver that commercially to the world. Our time is short. We look forward to a productive and stimulating conference.



## Centre for Surgical Invention & Innovation

**CSii has continued the quest to adapt expertise evolving from Canada's lead in space robotics and minimally invasive surgical techniques and leverage the technology to develop and commercialize a new class of advanced surgical image guided robotic systems which will extend the diagnostic and interventional capabilities of surgeons and health care professionals through increased access, precision and dexterity.**

The research driving these technical advances will enable highly effective diagnosis and treatment of disease down to the macroscopic and microscopic cellular levels while reducing the trauma caused by accessing the treatment site.

The development of the Image Guided Automatic Robotics (IGAR) breast platform is the first product of the CSii mission to adapt image guided robotic technology to provide a targeted solution to the detection and treatment of cancer.

CSii has worked in partnership on this project with MDA, creators of the Canadarm, Canadarm2 and Dextre, MDA's advanced technologies span markets as diverse as manned and unmanned space exploration, robotic surgery and nuclear reactor maintenance and operation in the most challenging and demanding environments. MDA has partnered with CSii through every step of this journey as the primary corporate partner for CSii's robotic development.

# *The Centre for Surgical Invention and Innovation (CSii) was established in 2009 as a NCE research accelerator.*

MDA has confirmed that it is keenly invested in the success of CSii and plans to continue to partner with CSii to successfully launch our first commercial system, and to develop and build future platforms.

Early this year CSii launched Phase two of human clinical trials for the IGAR Breast robotic system in Quebec City and Hamilton at St. Joseph's Hospital with excellent results. In addition CSii has worked with the Additive Manufacturing Lab at Mohawk College to develop 3D printed tools that can be used with IGAR medical devices.

With the benefit of significant financial support from the Government of Canada through the NCE CECR program, CSii has continued to adapt a multi-disciplinary approach to research and development that has enabled the Centre to combine the medical, engineering, biological, information technology and systems integration expertise available at McMaster University, St Josephs Healthcare Hamilton and institutions and corporations located throughout Canada to develop the IGAR breast platform which is expandable and to develop research projects from associated medical fields.

The Centre is committed to attracting exceptional human talent and Canadian industry support to accommodate new development projects working with clinical experts both here and abroad to refine our approach to the development of robotic instruments

that have a direct impact on clinical use.

CSii will expand its roll to enable inspired research to reach commercialization in record time, obtain the necessary regulatory approvals for medical robotic technologies in Canada and internationally and to provide training opportunities for highly qualified personnel in medical and engineering fields.

The Centre has continued to recruit key staff and position them within host facilities at St. Joseph's Healthcare Hamilton, McMaster University and McMaster Innovation Park (MIP) and to consolidate valued corporate partnerships.

The outstanding success of the past Innovation Nation Conferences and Robotics Competitions reinforced the Centre's commitment to professional development and educational outreach.

This year the 2015 Innovation Nation Conference will bring together an eclectic and interesting group of innovators to share their stories and network with the assembled, researchers, physicians, academics, students and participants in attendance.



## *A Personal Message from the Premier of Ontario*

On behalf of the Government of Ontario, I am delighted to extend warm greetings to everyone participating in the 2015 Innovation Nation Conference and Robotics Competition at the LIUNA Station in Hamilton.

I would like to thank the Centre for Surgical Invention and Innovation for organizing this event. By attracting world renowned inspirational speakers, along with hosting a robotics competition for students, you are showcasing both the present and future leaders of innovation.

Innovation and creativity are the backbone of Ontario's economy and the key to a prosperous future. This year's program is sure to encourage future discoveries and advance our understanding of how technology can be utilized to better the world for us all.

I would also like to thank all of the generous sponsors who truly embody the spirit of inclusion by making admission to this event free. The open exchange of information and sharing of opinions and research from the widest possible demographic is much appreciated.

Thank you for your thoughtful consideration and support of the technology sector.

Please accept my best wishes for a most inspiring event.

# Kathleen Wynne

*PREMIER OF ONTARIO*



## *A Message from the Honourable Reza Moridi, Minister of Research and Innovation*

On behalf of the Government of Ontario, I would like to extend a warm welcome to everyone attending the 2015 Innovation Nation Conference, hosted by the Centre for Surgical Invention and Innovation.

Ontario's future prosperity depends on our ability to innovate and to enhance our knowledge-based economy. The Ministry of Research and Innovation is committed to harness the province's talented workforce, entrepreneurial spirit and industry sectors to build an innovative culture, support job creation and foster economic growth.

The conference brings together some of the best and brightest innovation leaders in Canadian arts, science and technology. It also provides young people with an opportunity to showcase their talents in the Innovation Nation Robotics Competition.

This is an outstanding networking opportunity for all participants to share their expertise, best practices and vision for the future. The ideas you share here will lay the groundwork for the discoveries that will bring greater economic and cultural prosperity to all Canadians.

Please accept my best wishes for an informative and productive conference.

# Reza Moridi

*MINISTER*



## *A Message from the Honourable Fred Eisenberger, Mayor of the City of Hamilton, Ontario*

On behalf of the City of Hamilton, my sincere congratulations to those participating in the 5th Annual Innovation Nation Conference and Robotic Competition, taking place at LIUNA Station on Sunday May 31st 2015.

We are pleased to welcome visitors to our great city for this conference and robotic competition, where you will have the opportunity to listen to keynotes from top innovators who are leaders in their field and network with peers in business, science, engineering and arts.

I hope you will find some time to explore the city. We are proud of our cultural attractions, heritage buildings and vibrant downtown boasting a wide range of culinary experiences and a focus on the arts.

On behalf of City Council and the City of Hamilton, welcome and I wish you an informative and enjoyable stay.

Sincerely,

**Fred Eisenberger**  
*MAYOR, CITY OF HAMILTON*



Fred Eisenberger



[ conference speakers |

# CONFERENCE AGENDA

DATE: SUNDAY, MAY 31, 2015

LOCATION: LIUNA STATION – GRAND CENTRAL BALLROOM

7:30 am Registration - Grand Ballroom Concourse

9:00 am Opening Remarks

Dr. Mehran Anvari, CEO & Scientific Director, CSii

## KEYNOTE SPEAKERS

- 9:10 am David Carter, Executive Director, Innovation Factory  14  
Topic: "Fostering Innovation and Creating Clusters" \_\_\_\_\_
- 9:35 am Kevin Tuer, Vice President Strategic Initiatives, Communitech 16  
Topic: "The Genesis of IoT" \_\_\_\_\_
- 10:00 am Michael Waterston, Business Development, CIMTEC 18  
Topic: "Crossing Death Valley" \_\_\_\_\_
- 10:25 am Paul Cooper, Vice President of Strategic Development – MDA 20  
Topic: "How the Urge to Explore Drives Innovation" \_\_\_\_\_
- 10:50 am Laura Cole, Singer/Songwriter 22  
Topic: "Born Singing" \_\_\_\_\_
- 11:10 am Refreshment Break – Grand Ballroom
- 11:30 am Shahira Bhimani, Manager, Strategic Initiatives, HTX 24  
Topic: "Medtech Market Access: Increasing Complexity Demands a Proactive Approach" \_\_\_\_\_
- 11:55 pm Robert Gerristen, Professor of Mechanical Engineering, Mohawk College 26  
Topic: "Design and the Future of Additive Manufacturing" \_\_\_\_\_
- 12:20 pm Patrick McKenna, Actor, Gemini Award Winner, Comedy and Drama 28  
Topic: "Is it me or the A.D.D.?" \_\_\_\_\_

# DAVID CARTER



## David Carter

Executive Director, Innovation Factory

David Carter is the Executive Director of the Innovation Factory (iF). iF is Hamilton's Regional Innovation Centre with the mandate to "be a catalyst for innovation in Hamilton".

Appropriately, David's career has been working in innovation since he joined the workforce. It started as a consultant in the burgeoning personal computer industry and then as an International Markets Analyst at the Toronto Stock Exchange in the late 80's. At Microsoft he worked through the revolution in desktop computing and the internet in the 90s. In 2001, after 11 years at Microsoft he decided to start his own company. From 2001 until 2012 he and his partner took their start-up from a small office in Burlington, to a Boston based firm raising \$20million in venture capital.

Carter is thrilled to support today's entrepreneurs in Hamilton and to be a part of the larger Hamilton ecosystem.

# KEVIN TUER



## Kevin Tuer, PhD PEng

Managing Director, Open Data Exchange

Vice President Strategic Initiatives, Communitech

KEVIN TUER is Managing Director of the Open Data Exchange, a national initiative launched in the fall of 2014 with a mandate to help the private sector adopt and commercialize data from public and private sources for the purpose of enhancing their current products or creating new products.

As Vice President Strategic Initiatives for Communitech, Kevin leads cluster building activities including open data, Internet of Things (IoT) and digital media, for the purpose of creating or accelerating new opportunities in emerging fields to the private sector. In his role as Vice President, Kevin is also responsible for developing and deploying Communitech's international strategy. Previously, Kevin was the founding Managing Director of the Canadian Digital Media Network (CDMN), a federal Centre of Excellence for Commercialization and Research, which is dedicated to establishing Canada as a world leader in Digital Media by enabling connections and collaboration of people across the country and bringing more digital solutions to market. He led the design and deployment of the Communitech Hub, a world leading innovation centre located in the Waterloo Region as well as the CDMN's national network and associated programming strategy.

Prior to launching the CDMN, Kevin held several engineering and senior management positions in the high tech industry including Senior Research Engineer with Computing Devices Canada (now General Dynamics Canada), VP Engineering for Control Advancements Inc., as well as co-founder and CTO of Handshake VR. Kevin holds a BAsC (Honours) in Mechanical Engineering, a MASc in Mechanical Engineering, and a PhD in Electrical Engineering from the University of Waterloo. Further information can be found at [ca.linkedin.com/in/kevintuer/](https://ca.linkedin.com/in/kevintuer/).

# MICHAEL WATERSTON



# MICHAEL WATERSTON

## Michael Waterston

Business Development, CIMTEC

Michael Waterston heads the business development team at CIMTEC, the Centre for Imaging Technology Commercialization.

At CIMTEC, Michael fosters new medical imaging engineering and clinical testing projects to prepare clients for market launch. Before coming to CIMTEC, Michael worked in neuroscience commercialization at the Rotman Research Institute in Toronto where he implemented an entrepreneur-centric incubation model. Michael has held leadership positions in both start-up and world-leading software development firms, including Microsoft and Amazon.

Michael holds an MSc from the Montreal Neurological Institute at McGill University and an MA in economics from the University of British Columbia.

# PAUL COOPER



## Paul Cooper

Vice President of Strategic Development — MDA

Paul Cooper is Vice President of Strategic Development at MacDonald, Dettwiler and Associates (MDA); one of Canada's largest technology companies, where he is responsible for mergers and acquisitions and new business creation.

A former entrepreneur and university professor, he has a Ph.D. in Computer Science. Paul is also on the Board of Family Outreach and Response, a community mental health services organization in Toronto.

# LAURA COLE



# Laura Cole

Born into a musical family, singing came as naturally to Laura as walking and talking. As a child she entertained family and friends with renditions of old favourites around the campfires of late Canadian nights. Laura played in her first concert at age 3 where she plunked out a one handed piano solo. She sang non-stop throughout her childhood but learned to use her voice in local children's choirs.

Her solo singing career started at her school talent shows. Her pursuit of a career as a professional started in her teens when she was occasionally invited to sing a few songs with her Dad's band. Her success and love of performing live brought her to her own gigs in pubs around the Golden Horseshoe in southern Ontario where she performed cover tunes of favourites like Sam Cooke, Etta James, Amy Winehouse, Bonnie Raitt and the occasional original. She also appeared in spotlight cameo performances at the Hamilton Music Awards, Festival of Friends in Hamilton and the Fieldcote Sunday Night Music series in her hometown of Ancaster.

Her musical journey has led her to LA, Toronto and Nashville where she began in earnest writing her own songs—a blend of old jazz and blues with a new age twist.

On Valentine's Day 2014, Daniel Lanois released a single featuring Laura entitled "Papineau" - a father daughter conversation.

Laura's first all original record "Dirty Cheat" was released August 21, 2014. She kicked off with a fabulous release party at Porcelain Records, where Steve Bigas produced the whole record live off the floor.

Daniel Lanois, Executive Producer, introduced Laura, the band, and her accomplishments to date.

It was a magical evening that is still talked about to date. The Laura Cole Band has been playing their hearts out, gaining as much exposure as they can and stealing hearts across the world.

# SHAHIRA BHIMANI

A portrait of Shahira Bhimani, a woman with long brown hair, smiling. She is wearing a black top with a white polka-dot pattern on the chest and a silver necklace. The background is dark.

**Shahira Bhimani,**

B.Sc P.T, M.SC (HTA)

Hologic Specialty Imaging Products Division

# SHAHIRA BHIMANI

As Manager, Strategic Initiatives at HTX, The Health Technology Exchange, Shahira leads all local and international initiatives relating to medtech market access. Her key focus in this role has been on leading an international initiative focused on documenting the regulatory, reimbursement and HTA evidentiary requirements of Canadian and global markets for medical devices. She possesses sound knowledge on the heterogeneities and nuances of medtech commercialization within Canadian provinces as well as other major global markets. These data points as well as extensive global connectivity with key resources, are utilized to provide strategic guidance on maximizing product and clinical trial designs and develop multi-market access strategies of innovative Canadian technologies.

Prior to working in the innovation space, Shahira was a practicing clinician and entrepreneur within the health-care sector for over 15 years. Having created and operated a successful multi-disciplinary centre and managing several others, Shahira brings a unique patient and clinician perspective as well as sound business acumen to her current role in healthcare device development and commercialization.

Shahira holds a B.Sc in Physical Therapy from the University of Western Ontario and a Masters in International Health Technology Assessment and Management from the University of Montreal. Shahira has recently co-authored publications that document the Canadian regulatory, reimbursement and HTA pathways for the International Society of Pharmacoeconomics and Outcomes Research (ISPOR) and the Institute of Health Economics (IHE).

# ROBERT GERRISTEN



# ROBERT GERRISTEN

## Robert Gerristen

Professor of Mechanical Engineering at Mohawk College

Professor of Mechanical Engineering at Mohawk College and coordinator of Mohawk's state-of-the-art Additive Manufacturing Resource Center (AMRC), Robert is an expert in the tools and techniques required to create and deliver innovative designs, products and solutions quickly and cost effectively.

Robert is a Certified Engineering Technologist with a diploma from Mohawk College in Mechanical Engineering Design and an MBA from California Coast University.

# PATRICK MCKENNA



## Patrick McKenna

Actor, Gemini Award Winner - Comedy and Drama

Actor Patrick McKenna may be best known for his fifteen years of television work portraying Red Green's nerdy techno geek nephew Harold, or more recently as Frank Kanaskie in Global Television's new hit medical drama REMEDY – but it's his work on the award winning Documentary "ADD and Loving it" that brings Patrick the most satisfaction.

It was during the filming of the documentary that McKenna was "officially" diagnosed with ADHD (verses the endless family and friends rants, name calling and law suits that inferred it). He then agreed to try a prescribed medication and some life style changes that might help propel his relationships, career and driving record into a more positive direction.

Since that time McKenna has been using his hilarious ADD experiences and perspective to tour Universities, conferences and PBS stations throughout North America touting and promoting the benefits of ADHD testing in children and adults.

As McKenna notes, "Its never too late to find out what makes you fantastic!"

[ robotics competitors |



# COMPETITION AGENDA

1:45 pm	SHOWCASE REVIEW: ROBOTIC ENTRIES REVIEWED	
2:00 pm	BeaverworX Our Lady of Lourdes Catholic High School, Guelph, ON	40
2:20 pm	Ping Volta St. Jean de Brebeuf Catholic High School, Woodbridge, ON	42
2:40 pm	Westmount Robotics Westmount Secondary School, Hamilton, ON	44
3:00 pm	HSC VEX Robotics Hillfield Strathallan College, Hamilton, ON	46
3:20 pm	Roboticus Asimovus Ecole secondaire Jeunes sans frontieres, Brampton, ON	48
3:40 pm	REFRESHMENT BREAK King George Ballroom Lobby, Lower Level	
4:00 pm	Thunder Ice Thornlea Secondary School, Markham, ON	50
4:20 pm	MakeShift Robotics St. Mary Catholic Secondary School, Hamilton, ON	52
4:40 pm	Johnny Jack Rift McGill University, Montreal, QC	54
5:00 pm	Awards Presentations	56



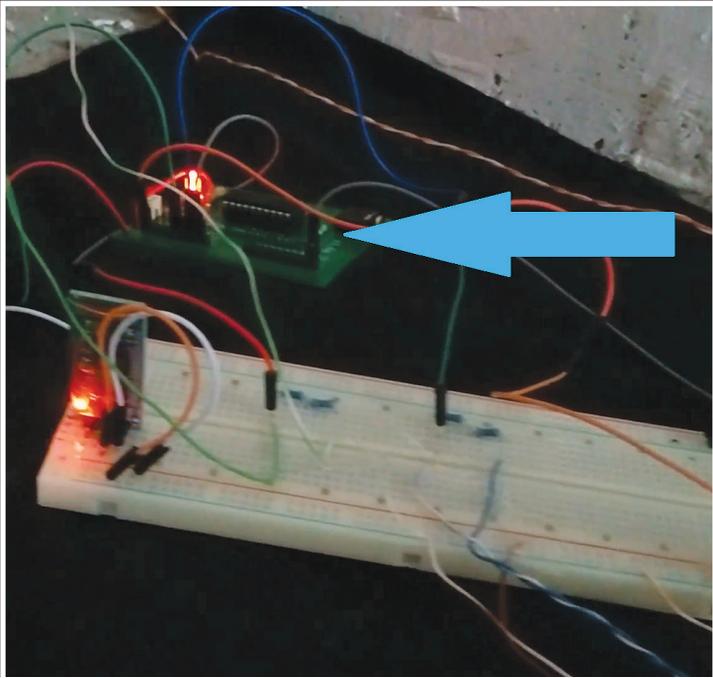
## Personal Mobile Assistive Device

**Team** HENRY NGUYEN

BILLY PARMENTER

### Robot Description

The OmniChair is 44" in diameter and 42" tall. It has been designed to assist the disabled in gaining greater degrees of mobility than those with standard electric wheelchairs. The functionality of the OmniChair is to allow the user to be able to move near the same range of motion as a non-disabled person would be able to.

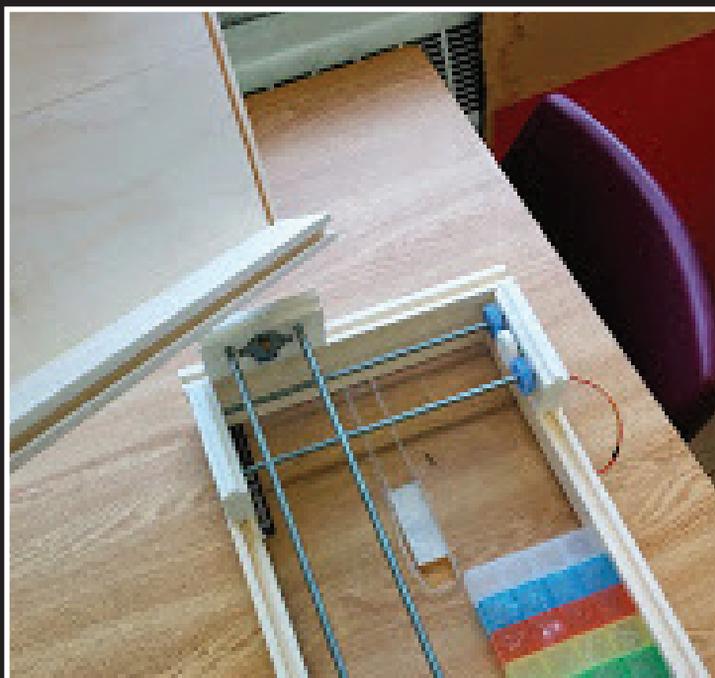


## Opening Doors Automatically

**Team** MARCELLA HATMANU      SHAHROZE HASHMI  
LEONARDO GONZALEZ      ANDRE BARRETO

### Robot Description

Through the use of a smartphone app, the user's phone connects to the Bluetooth chip of the main board and displays an overhead diagram of a vehicle with green, blue and red bars appearing on the front and sides of the image. These bars indicate the car's proximity to the walls of the garage, and prevents the user from hitting the walls of their garage by visually displaying the bars appearing and reappearing on the screen in the three spots.



## Automatic Pill Dispenser

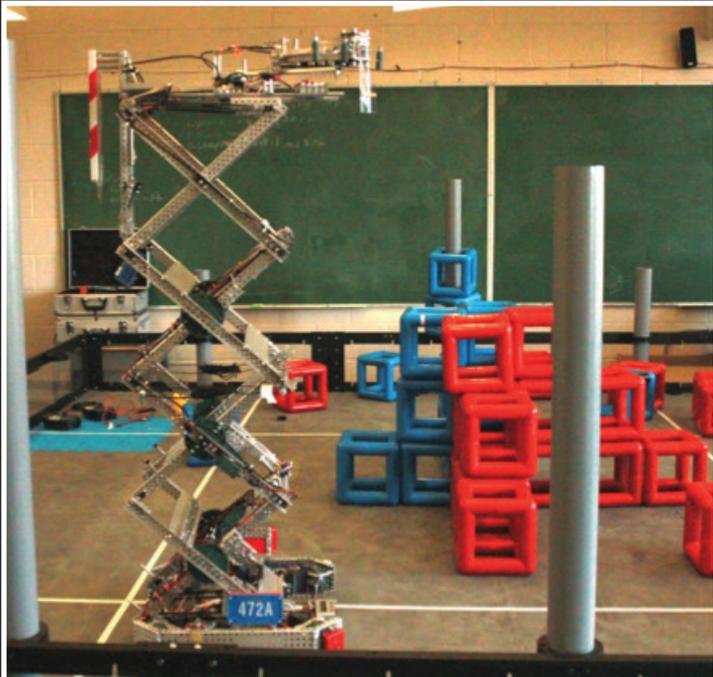
### Team

BRYNN DAVIS  
HILLARY TRAN  
HAE YOON CHA  
EVAN GAGICH

SCOTTIE YU  
DAPHNE WALFORD  
NEERAJ DIVAKARLA

### Robot Description

The robot positions a pill dose (with the appropriate prescriptions pre-loaded) to release the contained pills in each compartment at the correct time of the day (this information is stored as variable and is controlled by the doctor). The user is then pinged to press a button which then releases the pill(s) for their consumption. If the pills are not claimed (i.e. user does not press the button), they are sent to a disposal and an SMS message is sent to the family members, where they can then call the residence to see if there are any issues.



# HSC VEX ROBOTICS

HILLFIELD STRATHALLAN COLLEGE, HAMILTON, ON

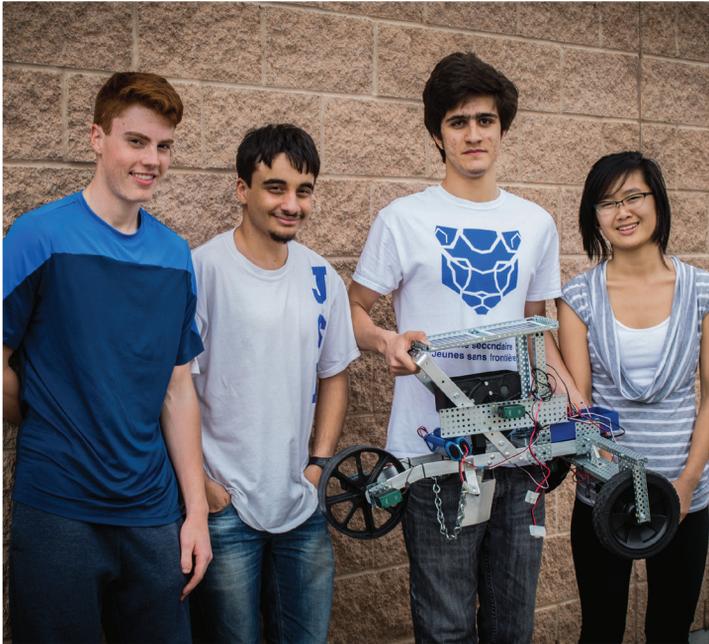
## Skyrise

### Team

THOMAS LIM	ALLIN DEMOPOLIS
ANDREW STRAUSS	NITAI PANDITH
NICHOLAS MERTIN	NICHOLAS DILORETO
ETHAN JAMES	ANDREW GRAHAM
ALEX RUFENACH	THEO OSKROBA
ERIC LEE	NIKHIL NATARAJAN
MICHELE SACCHETTI	

## Robot Description

VEX Skyrise is played on a 12' x 12' square field with robots that must fit within in an 18" cube at the beginning of the match. There are two alliances that compete against each other, one red and one blue, composed of two randomly paired teams each. Each team competes in matches consisting of a fifteen second autonomous period followed by one minute and forty-five seconds of driver-controlled play. The object of the game is to attain a higher score than the opposing alliance by scoring your colored cubes in floor goals, on posts and on your Skyrise. The cubes are 8" x 8" x 8" with hollowed out sides that allow intakes to pass through them and for them to be placed on posts and the skyrise. The Skyrise is a pole that has to be built out of 7 Skyrise sections each measuring 1' that fit inside each other. This is then mounted on a base totalling 61". Our robot has an X-Drive, which in addition to normal driving, allows us to strafe left and right making it easier to traverse the field and align our cube intake with the cubes. Our cube intake consists of two vertical, parallel c-channels which one side of the cube fits in. It can pick up two cubes at once which are secured and released by a semi-passive pneumatic hinge. It is secured to the top of our scissor lift along with our independently rotating Skyrise claw.



# ROBOTICUS ASIMOVUS

ECOLE SECONDAIRE JEUNES SANS FRONTIERES, BRAMPTON, ON

## Automatic Seed Planter

### Team

MICHAEL AZIZ

DANIEL PATERSON

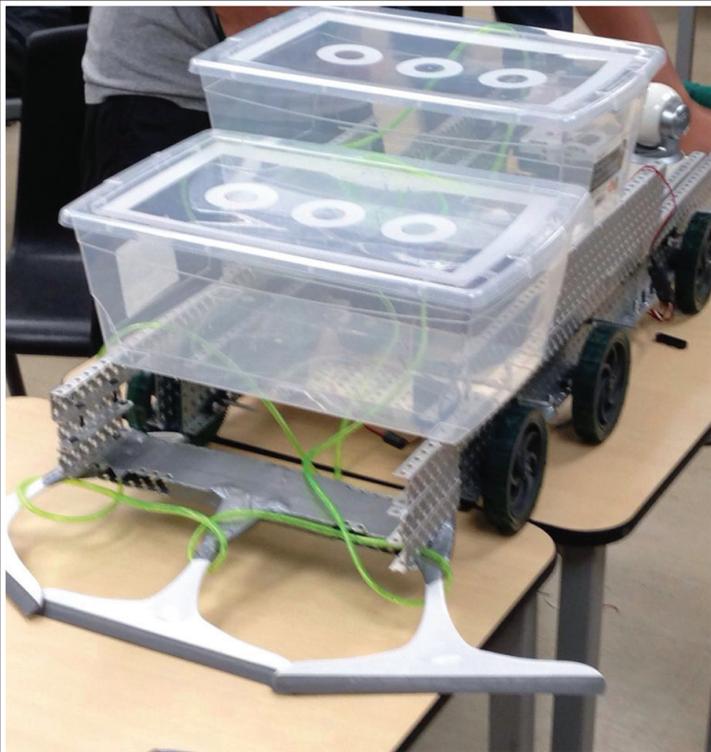
SAMI NASSIF-LACHAPELLE

LOUISE GAGNON

VINCENT BERNARD

### Robot Description

The Satellite Integrated Farmer (S.I.F) was born from an Earthway brand seed planting machine. We removed the front wheel and adapted a two wheeled cross member in order to provide drive and directionality. Seed dispensing is controlled by a motor that is programmed to dispense seeds in relation to the speed that the planter travels, thereby maintaining proper plant spacing. Forward movement is controlled by an Arduino microcontroller and servo motors. Directionality is provided by the G.P.S. component of the system. The entire system is solar rechargeable (trickle charge while in use) via the two solar panels mounted on top of the hopper. At the end of the day, the farmer can return it to a central charging station and remove the batteries for freshly recharged ones. This allows for use between many farmers of the same community. Our 3-D printer was used to fabricate parts necessary for the conversion of the seed planter (bushings, seed disc driver).



# THUNDER ICE

THORNLEA SECONDARY SCHOOL, MARKHAM, ONTARIO

## Zamboni

<b>Team</b>	FELIX WU	DANIEL KANG
	FEYNMAN LYU	ARTHUR QIN
	ROGER YANG	VANESSA TANG

## Robot Description

Thunder Ice is an ice resurfacing robotic system. It is comprised of multiple robots which map out an ice rink and then work together to clean the ice surface. They will perform their task like miniature independent Zamboni machines. A Zamboni machine with a human operator will resurface a standard ice rink in approximately 8 to 10 minutes, using 80L of water and removing 20 cubic litres of snow.

The size of this task and the person driving them make them expensive machines to operate. By having 5 autonomous robots working together, each robot needs to clean 1/5 of the surface and carry 1/5 the weight. The robots individually carry 18L of water, remove 4 cubic litres of snow therefore greatly reducing operating and machine costs. Since they are cleaning 1/5 of the surface, they can clean a single rink in 1/5 of the time that a single machine can and thus make the ice surface available sooner and for longer periods of time.



# MAKESHIFT ROBOTICS

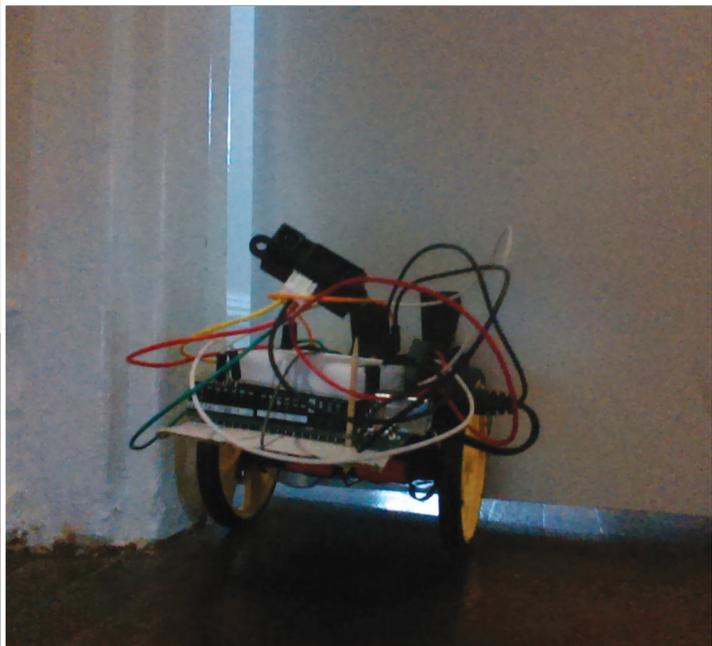
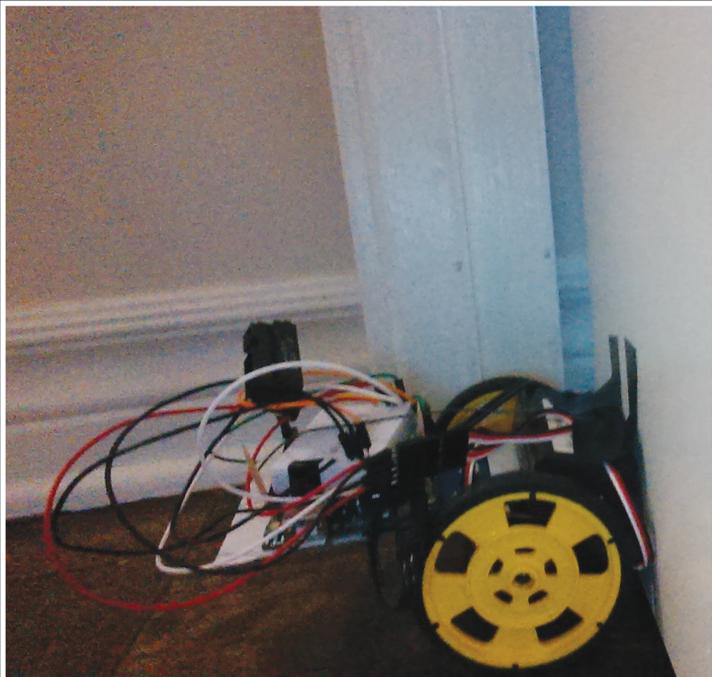
ST. MARY CATHOLIC SECONDARY SCHOOL, HAMILTON, ON

## Stacks and Loads Logistics Totes

**Team** NOAH LINTON JOHN STREMBLE  
BENJAMIN TORRES-KULIK DARIO ALDIGHIERI  
SARAH ALDERSON

### Robot Description

The robot, nicknamed ROY G BIV, is a unique three-part machine that utilizes simultaneous stacking and transporting of totes to be as efficient as possible. It consists of a mobile elevator, a stationary elevator, and a passive ramp. Each part is able to constantly carry out its specific job; while one robot stacks and creates a buffer, the other takes the completed stacks and places them in the transport vehicle. ROY is responsible for transporting and placing stacks of totes at their destination. It consists of two systems: a custom drive base and an elevator. The drive base, inspired by modern forklifts, consists of two traction wheels in the front and two omni-directional wheels in the back all independently driven by electric CIM motors. Working alongside ROY are BIV and G. G is a hinged passive ramp connected to a constant force spring. This along with side plastic guides ensure that all totes maintain a controlled and soft landing. Working with these totes is BIV; it is able to create stacks from the loaded totes. ROY then comes and picks up the completed stacks and while ROY is placing them, BIV continues to work. This constant action ensures no wasted time.



# Opening Doors Automatically

**Team** VLAD STEANTA                      GABRIEL VARINOT  
                 ANTOINE TOSO

## Robot Description

The robot is composed of a power supply, a microcontroller, two wheels and an infrared sensor for detecting movement. The chassis contains a piece that attaches the robot to the bottom part of the door to open and close the door. The robot is programmed to open the door when sensing someone and closing it after a certain delay.

The design is supposed to be invisible so the person does not feel the presence of the robot as he/she walks towards the door. The design is also accurate and fast to create and impression of smoothness.

[ contributing sponsors |

# PLATINUM SPONSORS

## ETHICON

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### Ethicon Endo-Surgery

*About Ethicon: From creating the first sutures, to revolutionizing surgery with minimally invasive procedures, Ethicon has made significant contributions to surgery for more than 80 years. Our continuing dedication to Shape the Future of Surgery is built on our commitment to help address the world's most pressing health care issues, and improve and save more lives. Through Ethicon's surgical technologies and solutions including sutures, staplers, energy devices, trocars and hemostats and our commitment to treat serious medical conditions like obesity and cancer worldwide, we deliver innovation to make a life-changing impact. Learn more at [www.ethicon.com](http://www.ethicon.com).*

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# GOLD SPONSORS

## LiUNA!

### **LiUNA – the Labourers' International Union of North America**

*Since its foundation in 1903, LiUNA, the Labourers' International Union of North America has been actively and proudly representing working men and women across Canada and the United States.*

*Today we have over 500,000 members in North America, over 100,000 of which are in Canada.*

*We employ workers in sectors including construction – commercial and institutional, industrial, residential, energy and health care among others.*

*LiUNA is also a pillar of the communities we represent. We committed to the promotion of higher education and to political, social and community causes.*

[www.liuna.ca](http://www.liuna.ca)

# SILVER SPONSORS



## Centre for Minimal Access Surgery

*(CMAS), a McMaster University Centre located at St. Joseph's Healthcare Hamilton, was established in the fall of 1999.*

*As a state-of-the-art multi disciplinary technological education and research centre, it was designed to increase the awareness and understanding, as well as support the research and development, of the specialized techniques of minimal access surgery and surgical innovation*

## McMaster University Department of Surgery

*Committed to integrating innovative clinical care, world-leading research and outstanding educational resources, the Department of Surgery aspires to continue to be a leading Department in academic surgery nationally and internationally.*

# SILVER SPONSORS



## MacDonald Dettwiler and Associates Ltd.

*MDA's Information Systems Group is one of Canada's best known and highly regarded technology leaders. Since entering the space business more than four decades ago, the company has accomplished a number of pioneering technologies in space and here on Earth.*

## Stryker

*Stryker is one of the world's leading medical technology companies and together with our customers, we are driven to make healthcare better. The Company offers a diverse array of innovative medical technologies, including reconstructive, medical and surgical, and neurotechnology and spine products to help people lead more active and more satisfying lives. Stryker products and services are available in over 100 countries around the world.*

*Stryker pushes the frontiers of medical research with uncompromising clinical integrity and innovative technologies to improve the lives of patients around the world. The key to our success is based on our close relationships with our customers, which help us to understand how we can best assist them and their patients. As a trusted partner, we work directly with thousands of healthcare providers to provide the tools they need and to build best practices into everything we do.*

*Stryker Canada was incorporated in 1990 with the responsibility of providing products and services that add value to the efforts of medical professionals and aid in the delivery of quality health care to Canadians. With Canadian headquarters in Hamilton, Ontario, Stryker Canada is made up of an energetic and committed team of employees who support customers across the country. A nation-wide network of clinically focused sales professionals is dedicated to serving surgical specialists and a wide range of patient care providers.*

[www.stryker.com](http://www.stryker.com)

# SILVER SPONSORS



## Hamilton's Economic Development Office

*The Economic Development and Real Estate Division helps businesses interested in expanding an existing operation, developing a new location, relocating or redeveloping in Hamilton. A large amount of information and resources can be found on [www.investinhamilton.ca](http://www.investinhamilton.ca), which is home to the Division's Business Development Section.*

## McMaster Innovation Park

*The McMaster Innovation Park houses laboratory, office, teaching, training and conference facilities, in support of research and development in a number of key industrial areas: advanced manufacturing and materials, nanotechnology, biotechnology, and other areas in which McMaster University has recognized emerging technology strengths.*

# EXHIBIT



## McKeil Marine

*McKeil Marine is one of Canada's leading marine service providers. Experienced and adaptive, we deliver turnkey solutions that support our customers' success in a wide range of transportation and project challenges. Customer service, safety, quality and respect for the environment are at the heart of our operations. Manned by highly skilled sailing crew, our ever-growing, diverse and versatile fleet of tugs, barges and workboats operate throughout the Great Lakes, St. Lawrence River, East Coast and Canadian Arctic.*

# MEDIA SPONSOR

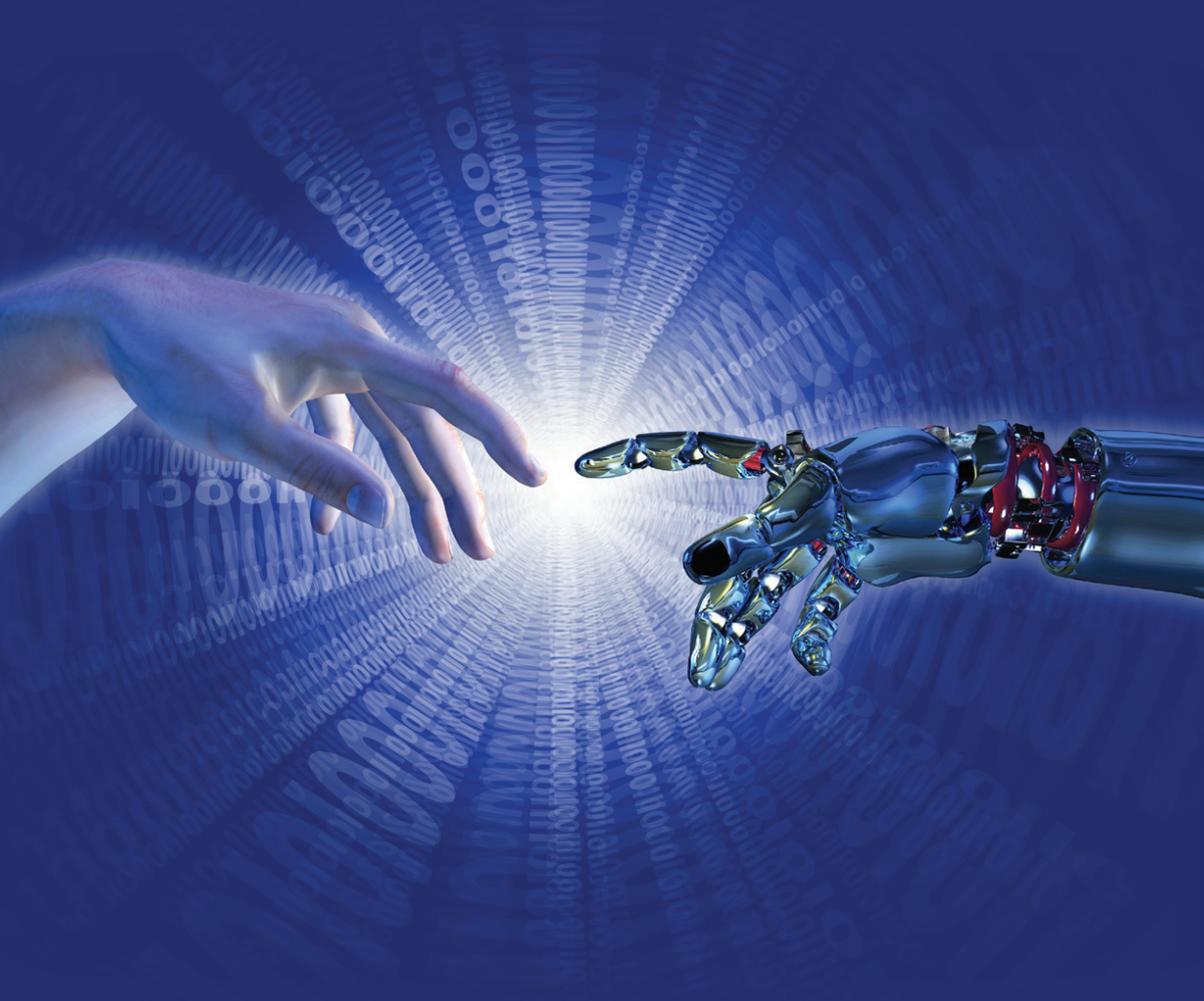


## **The Hamilton Spectator**

*The Hamilton Spectator is one of Canada's most historic and award-winning newspapers, with a daily circulation in excess of 100,000 and more than 400 employees. The Spectator- part of the Torstar group of media companies – also publishes a portfolio of related print and digital products including The Free Press, a weekly free distribution publication reaching more than 90,000 homes and thespec.com, the dominant online local news site in Hamilton.*



Innovation Nation



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