

2014 INNOVATION NATION

CONFERENCE & ROBOTICS COMPETITION



JULY 28–29, 2014

LIUNA STATION, HAMILTON, ON



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.

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 2014 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 Hospital and McMaster University's 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, sports 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 event sponsors for helping to make this event possible.

I look forward to meeting you at the conference.

Best wishes,

Dr. Mehran Anvari
Scientific Director and Chief Executive Officer
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

2012

2013

2014

2015

2016

2017

Welcome to the fourth annual CSii Innovation Nation Conference.

Welcome to the fourth CSii Innovation Conference. The Centre for Surgical Invention and Innovation 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 IGAR (Image Guided Automated Robot).

The focus is the first application of an IGAR with tools for biopsy and ablation of breast cancer using Magnetic Resonance Imaging (MRI). The excitement in this last year has been completion of Phase 1 Clinical studies with outstanding improvements in speed, accuracy and much reduced bruising and healing time. We are now preparing for Phase II clinical studies. We are moving ahead aggressively on testing, regulatory approvals, commercial partnerships, broadening on the business capability to include ultrasound, and on other sources of funding. You will hear more about this in the conference.

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 Automated 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.

This spring CSii launched the first human clinical trials for the IGAR Breast robotic system in Quebec City with excellent results and will soon be entering the second phase of the trials in Hamilton at St. Joseph's Healthcare Hamilton.

With the benefit of significant financial support of the Government of Canada through the NCE

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

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. Joseph's 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 role 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 and McMaster Innovation Park (MIP) and to consolidate valued corporate

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

This year the 2014 Innovation Nation Conference will bring together some of the finest innovators in North America to share their stories and network with their peers and the assembled, scientists, physicians, academics, students and participants in attendance.

The Robotics Competition is designed to engage teams of university, college and high school students in the process of presenting and demonstrating their innovations to a panel of judges for review. This inspired addition of a student robotics competition focusing on the creation of innovations that have a potential commercial use has infused the conference with energy and underlined the focus of the event as a glimpse of future developments in applied research, technology and engineering.



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 Innovation Nation Conference and Robotics Competition.

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 like to thank the Centre for Surgical Invention and Innovation for organizing this event. By combining a roster of inspirational speakers with a robotics competition for students, you are showcasing both the present and future leaders of innovation.

As well, you and your generous sponsors are truly embodying the spirit of inclusion by making admission to this event free. Much is gained through the open exchange of information and canvassing opinions and research from the widest possible demographic. 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

I would like to extend a warm welcome to everyone attending the Innovation Nation Conference, hosted by the Centre for Surgical Invention and Innovation.

Our government knows that 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 harnessing our province's talented workforce, entrepreneurial spirit and highly developed industry clusters in order to build an innovative culture, support job creation and increase economic growth.

This conference brings together some of the best and brightest innovation leaders in Canadian sciences, the arts and technology to share their expertise, best practices and vision for the future. It also provides young people with an opportunity to showcase their talents in the Innovation Nation Robotics Competition.

This is an outstanding networking opportunity of all participants. The ideas you share here may lay the groundwork for important new discoveries that 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 Ed Holder, Minister of State (Science and Technology)



Ed Holder

On behalf of Prime Minister Harper, I am pleased to welcome you to the Centre for Surgical Invention and Innovation's 2014 Innovation Nation Conference and Robotics Competition.

This important event brings all of you together—students, researchers, entrepreneurs and innovators—to share new ideas, new concepts and new knowledge while driving innovation in robotics forward.

Beginning with the legacy of the Canadarm, Canada is recognized as a world leader in robotics. And this past spring, we reached another milestone. Dextre, the Canadian Space Agency's robotic handyman aboard the International Space Station, performed the first robotic self-repair in space.

Our government is therefore proud to continue supporting world-leading Canadian robotics research. This includes support for CSii, which is one of our Centres of Excellence for Commercialization and Research. I am eagerly following the progress of its newest innovation, IGAR, which has the potential to detect, analyze and treat breast cancer lesions in a much less invasive manner than traditional surgical methods. If successful, IGAR could have a significant impact on the lives of women in Canada and around the world.

This innovation strikes at the heart of our government's commitment to science, technology and innovation. We are making the record investments necessary to create jobs, increase prosperity and improve the quality of life of Canadians.

What's more, we are working on a renewed science, technology and innovation strategy, a long-term plan to secure Canada's position as a globally recognized leader in research and business innovation.

Please accept my warm wishes for a productive and successful conference and competition.

Kind regards,

Ed Holder

MINISTER

A Message from the Honourable Robert Bratina, Mayor of the City of Hamilton, Ontario

On behalf of Hamilton City Council and all the residents of the City of Hamilton, I extend a sincere and warm welcome to all in attendance at the 2014 Innovation Nation Conference & Robotics Competition. With an eye to the future, this conference will showcase the work of innovators who are presently redefining and redesigning our world.

Canadian Innovation is changing the way we work. It strengthens our economy, creates jobs, and enhances Canada's reputation as a world leader. I trust that this year's conference will provide all of you a chance to network with peers, scientists, researchers, engineers, surgeons, and industry experts.

I offer my congratulations to the organizers of this event, and LIUNA Station, as host, who have worked very hard to make the 2014 Innovation Nation Conference & Robotics Competition an informative and successful event.

To our visitors from near and far, I welcome you to Hamilton and encourage you to explore the cultural, entertainment and recreational riches that make Hamilton a great city to visit, to play and to stay. Be sure to sample some of our many fine restaurants and shopping areas, as well. For all your visitor information, visit our website at www.hamilton.ca.

Sincerely,

Robert Bratina

MAYOR, CITY OF HAMILTON



[conference speakers]

DATE: JULY 28, 2014

LOCATION: LIUNA STATION – GRAND CENTRAL BALLROOM

8:00 am REGISTRATION OPENS – LIUNA STATION LOBBY

8:30 am Welcome: **Dr. Mehran Anvari**, CEO and Scientific Director
Centre for Surgical Invention and Innovation (CSii)

Greetings: **Mayor Bob Bratina**, City of Hamilton

KEYNOTE SPEAKERS

9:00 am **Rodney Jones**, Executive Director, Ontario Aerospace Council
Title: Driving Innovation for Economic Gain and
Community Enrichment 14

9:30 am **Paul Ferley**, Assistant Chief Economist, Royal Bank of Canada
Title: Strengthening Canadian Growth Dependent on
Firms Responding to Rising US and Global Demand 16

10:00 am **Bob Young**, Founder and Chairman, Lulu.com
Owner, Hamilton Tiger-Cats and Vice Chair, CFL
Title: Innovation Cannot Be Planned. Yet Well-Planned
Environments are Essential for Innovation. 18

10:30 am REFRESHMENT BREAK – EXHIBITION HALL

11:00 am **BJ Hardman**, Chief Executive Officer, Sanarus Technologies
Title: The Future is Now for Breast Cancer Treatment 20

11:30 am **Dr. David Sackett**, Director, Trout Research and Education Center
Professor Emeritus, McMaster University
Title: Is It Time to Retire the Randomized Trial? 22

12:00 pm **Dr. Kevin Smith**,
President and Chief Executive Officer, St. Joseph's Health System
Title: Investing in Our Future 24

CONFERENCE AGENDA

- 12:30 pm Special Presentation to **Charles and Margaret Juravinski**
Presented By: **Dr. Mehran Anvari**
- 12:40 pm BUFFET LUNCHEON – EXHIBITION HALL – GRAND BALLROOM
- 1:30 pm **Antoine Cantin**,
World Record Holder for Solving the Rubik’s Cube One-Handed
Title: Pushing the Limits of the Rubik’s Cube _____ **26**
- 2:00 pm **Ian Heynen**, Vice President and General Manager
Hologic Specialty Imaging Products Division
Title: Building a Successful Innovative Business:
Personal Experiences _____ **28**
- 2:30 pm **Dr. Mark Knudson**,
President and Chief Executive Officer, EnteroMedics Inc.
Title: Innovation: The Path Toward
Regulatory Approval _____ **30**
- 3:00 pm REFRESHMENT BREAK - EXHIBITION HALL
- 3:30 pm **Edward Fan**, PIP Partner, TROYS LLP
Title: Do Something With It! Commercializing Your
Innovation and the Role of IP Law _____ **32**
- 4:00 pm **Laura Fortino**,
Olympic Gold Medalist, Canadian Women’s Hockey Team
Title: Sochi 2014 – A Heart of Gold _____ **34**
- 4:30 pm **David Saint-Jacques**,
Canadian Astronaut, Canadian Space Agency, NASA – NEEMO
Title: Follow Your Dreams _____ **36**
- 5:00 pm Closing Remarks - **Dr. Mehran Anvari**

ROD JONES



Rod Jones

Executive Director

Ontario Aerospace Council (OAC)

Rod Jones is Executive Director of the Ontario Aerospace Council (OAC). He is an experienced executive whose expertise is focused in strategic management, business development, marketing and government relations.

In the aerospace industry, he has broad knowledge and strategic insight developed through general management of aerospace SMEs and active leadership in industry associations and related organizations at the national and provincial levels. He was instrumental in the creation and development of the OAC, Ontario's aerospace sector organization. Rod is a Director of the Aerospace Industries Association of Canada, and serves on the Advisory Board for the Ryerson Institute for Aerospace Design and Innovation (RIADI).

PAUL FERLEY



Paul Ferley

Assistant Chief Economist

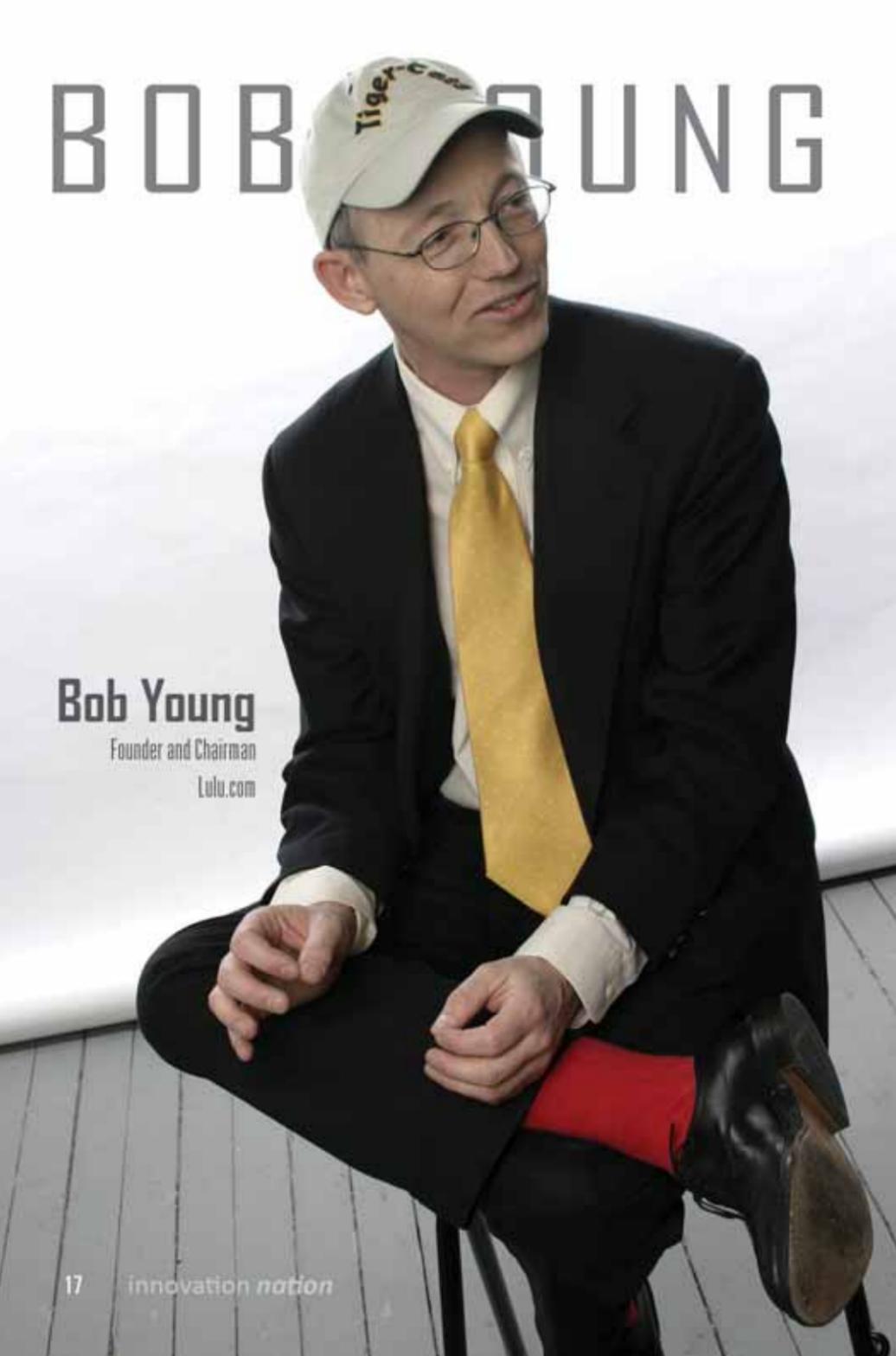
Royal Bank of Canada

As Assistant Chief Economist, Paul is responsible for the analysis and forecasting of macroeconomic and financial market developments in Canada, the United States and key overseas economies and is a regular contributor to a number of RBC publications.

A graduate of Queen's University and the University of Manitoba, Paul joined the Economics Department of RBC in 2007 after working for twenty years at another major financial institution where he was responsible for generating the macroeconomic outlook for the United States, Canada and Canadian regional economies. Paul started his professional career as an economist in the Research Department at the Bank of Canada.

Paul is a member of the Economic Policy Committee of the Canadian Chamber of Commerce and former member on the Editorial Board of Canadian Public Policy/Analyse de politiques. Paul is also Past President and Director of the Toronto Association of Business and Economics (TABE).

BOB YOUNG

A photograph of Bob Young, founder and chairman of Lulu.com. He is sitting on a black stool, leaning forward with his hands clasped. He is wearing a dark suit jacket, a white dress shirt, a bright yellow tie, glasses, and a white baseball cap with the word 'Tiger' written on it. He is also wearing red socks and black shoes. The background is a plain, light-colored wall.

Bob Young

Founder and Chairman

Lulu.com

BOB YOUNG

Bob Young is the founder and chairman of Lulu.com, a premiere international marketplace for new digital content on the Internet, with more than 300,000 recently published titles and more than 15,000 new creators from 80 different countries joining each week.

Lulu.com, founded in 2002, is Young's most recent endeavour. The success of this company has earned Young notable recognition; he was named one of the "Top 50 Agenda-Setters in the Technology Industry in 2006" and was ranked as the fourth "Top Entrepreneur for 2006," both by Silicon.com.

In 1993, Young co-founded Red Hat (NYSE: RHT), the open-source software company that gives hardware and software vendors a standard platform on which to certify their technology. Red Hat is a Fortune 500 company and chief rival to Microsoft. His success at Red Hat won him industry accolades, including nomination as one of Business Week's "Top Entrepreneurs" in 1999. Before founding Red Hat, Young spent 20 years at the helm of two computer-leasing companies that he founded. His experiences as a high tech entrepreneur combined with his innate marketing savvy led to Red Hat's success. His book, "Under the Radar", chronicles how Red Hat's open source strategy successfully won wide industry acceptance in a market previously dominated by proprietary binary-only systems. Young has also imparted the lessons learned from his entrepreneurial experiences through his contributions to the books to "You've GOT to Read This Book!" and "Chicken Soup for the Entrepreneur's Soul."

In 2000, Young co-founded the Center for Public Domain, a non-profit foundation created to bolster healthy conversation of intellectual property, patent and copyright law, and the management of the public domain for the common good. Grant recipients included the Electronic Frontier Foundation, the Creative Commons, the Free Software Foundation, and the Future of Music Coalition.

Young graduated from the University of Toronto in 1976 prior to beginning his career in the computer finance arena.

In 2003, Young purchased the Hamilton Tiger-Cats of the Canadian Football League and currently serves as the league's vice chairman.

In addition to enjoying fly fishing, Young collects calculators and antique typewriters, a nod to his beginnings as a typewriter salesman and can usually be found sporting a pair of red socks. However, instead of red on his head, Young now tips his orange hat.

BJ HARTMAN



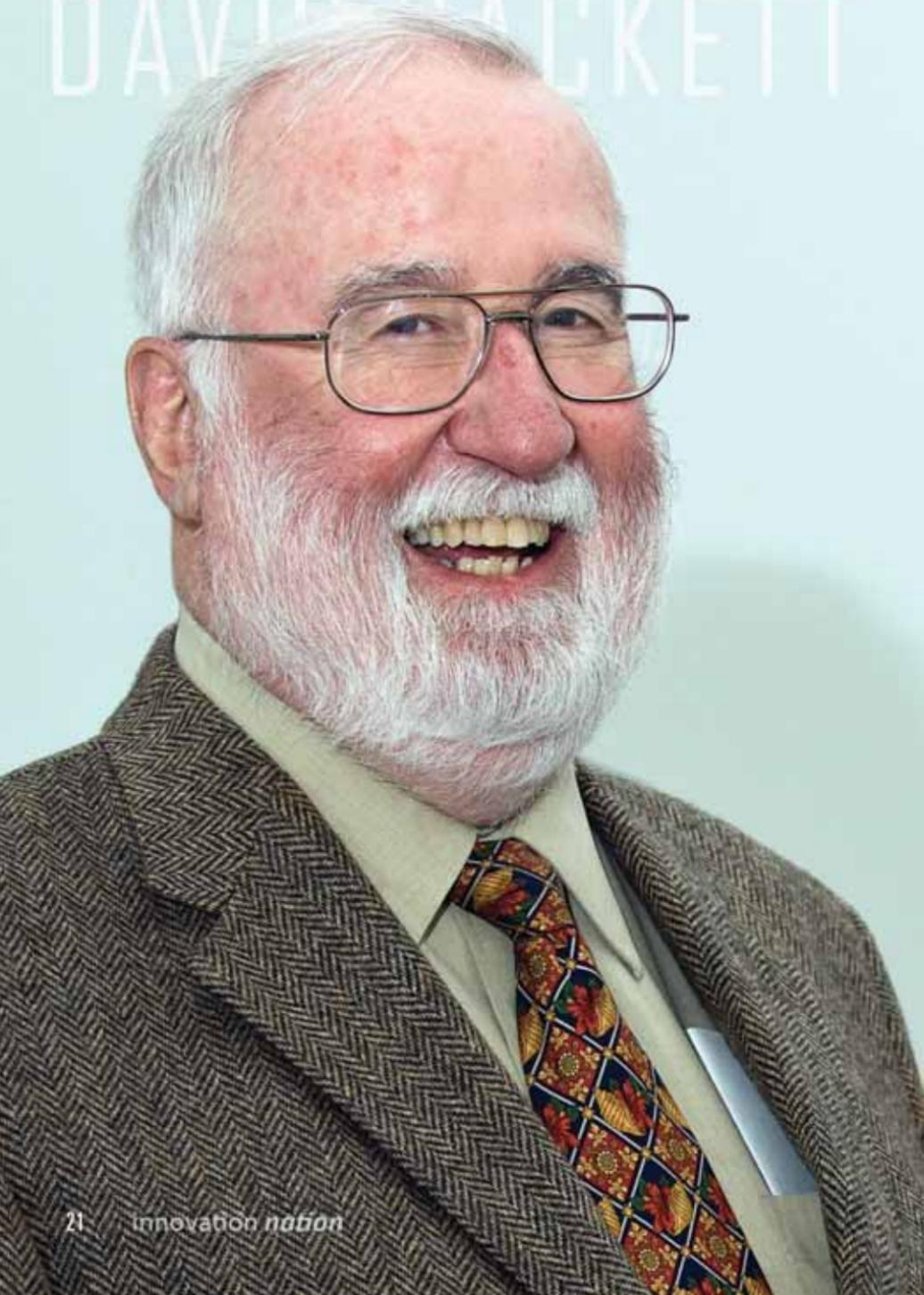
BJ Hardman

Chief Executive Officer

Sanarus Technologies, Inc.

CEO, BJ Hardman, part of the acquisition team that formed Sanarus Technologies, Inc. in 2009, leads Sanarus. BJ has broad executive and financial management experience with J&J, Argonaut Group, KPMG Consulting, GE Capital and PointStar Consulting. Her Industry experience includes biomedical devices, financial services, manufacturing, and distribution. She holds a MS in Business Management and is a Sloan Fellow from Stanford University, and has a BA in Finance from California State University, San Jose.

DAVID BACKETT



DAVID SACKETT

David L. Sackett, OC, FRSC, MD, MDHC x 2, FRCP

Director, Trout Research and Education Center at Irish Lake

Professor Emeritus, McMaster University, Hamilton, Ontario

After training in internal medicine, nephrology and epidemiology, Dave Sackett coined the term “clinical epidemiology” and began his first career (age 32) as the founding Chair of Clinical Epidemiology and Biostatistics at McMaster University’s new medical school. In his second career he began to design, execute, interpret, monitor, write and teach about randomized clinical trials, an activity that continues to the present, some 200 trials later. His third career was dedicated to developing and disseminating “critical appraisal” strategies for busy clinicians, and ended when he decided he was out of date clinically and returned (at age 49) to a two-year “retreading” residency in Hospitalist Internal Medicine. His fifth and sixth careers were largely clinical, as Physician-in-Chief at Chedoke-McMaster Hospitals, and as Head of the Division of General Internal Medicine for the Hamilton region. In 1994 a Chair was created for him at the University of Oxford, where he took up his seventh career as Foundation Director of the NHS R&D Centre for Evidence-Based Medicine, Consultant on the Medical Service at the John Radcliffe Hospital, Foundation Chair of the Cochrane Collaboration Steering Group, and Foundation Co-Editor of Evidence-Based Medicine. Retired from clinical practice in 1999, he began his eighth career by returning to Canada and setting up the Trout Research and Education Centre, where he reads, researches, writes and teaches about randomized clinical trials. Along the way, he has published 12 books, chapters for 60-some others, and about 300 papers in medical and scientific journals.

KEVIN SMITH



Kevin Smith

President and Chief Executive Officer
St. Joseph's Health System

Kevin P. D. Smith is President and CEO of St. Joseph's Health System, and the Niagara Health System. Kevin holds an appointment Associate Professor in the Department of Medicine, Faculty of Health Sciences, McMaster University.

Educated in Canada, the United States and Great Britain, Dr. Smith began his career in medical education, followed by leadership roles in university administration and academic hospitals and health systems.

Kevin's continuing education has focused on governance in the public and private sectors and is professionally certified by the Institute of Corporate Directors and has completed the Harvard Program in Effective Governance.

Kevin is fortunate to be a frequent advisor to Governments at home and abroad. Dr. Smith is privileged to Chair the Canada Foundation for Innovation and Home Capital Group.

ANTOINE CANTIN

Antoine Cantin

World Record Holder for solving the
Rubik's Cube one-handed.



ANTOINE CANTIN

Antoine is a perfectly bilingual, modest teenager from the École secondaire catholique L'Escale in Rockland (near Ottawa), Ontario. On April 26, 2014, with an average time of 12.56 seconds, he became the first Canadian ever to hold the World Record in solving the Rubik's Cube one-handed. In fact, he is the only Canadian record-holder ever to obtain a World record average time for any of the current World Cube Association records.

Since November 2010, he has participated in more than 17 official World Cube Association official competitions. In his last three competitions, he finished top-3 in each of 8 events offered at each of the competitions. On August 1-3, he will take part in all of the 18 WCA official events in the US Nationals Rubik's Cube Competition. He currently has held or improved on 11 different Canadian Records 23 times; three times on North American records, and on one World record. He can solve the Rubik's cube behind his back while skating, with his feet, and even one-handed while blindfolded.

His achievements do not stop at speedcubing. His robotics team finished first in the 2012 Ottawa IEEE Robotics Competition. He finished second in the 2012 Eastern Ontario Optimist Mathematics Competition; from 2012 to 2014 received multiple Certificates of Distinction from University of Waterloo Mathematics Contests. Last Fall, he and his team won first place in the "Place à la Jeunesse" 2013-14 University of Ottawa Marketing Competition, open to all levels of all French High Schools in Ontario.

To top it all, his friends and family always enjoy Antoine's cooking!

I A M E Y N E N

Ian Heynen

Vice President and General Manager

Hologic Specialty Imaging Products Division

Ian Heynen is the Vice President and General Manager of the Hologic Specialty Imaging Products Division, having global responsibility for the Skeletal Imaging and MRI businesses within Hologic. Mr. Heynen has been on the management team for Sentinelle since 2008, and assumed the General Manager role for the MRI business shortly following the Sentinelle acquisition by Hologic in August 2010. Mr. Heynen brings 10 years of medical imaging industry experience from both Hologic and GE Healthcare and has been active in technology and product development across industries for his entire career. Mr. Heynen holds a BAsC from University of Waterloo, an MASc from UBC, and an MBA from Wilfrid Laurier University. Mr. Heynen is a Licenses Professional Engineer and a Certified Management Accountant.

MARK KNUDSON

A professional headshot of Mark Knudson, a middle-aged man with short brown hair, smiling slightly. He is wearing a dark navy blue suit jacket, a white dress shirt, and a striped tie with shades of blue, brown, and tan. The background is a neutral, textured brown.

MARK B. KNUDSON

Mark B. Knudson, PhD

President and Chief Executive Officer

EnteroMedics Inc.

Dr. Knudson is Founder, Chairman, President and Chief Executive Officer of EnteroMedics Inc (NASDAQ:ETRM). He has served as managing partner of an early stage venture capital firm and as President of Johnson and Johnson Professional Diagnostics, a Johnson and Johnson Company, following Johnson and Johnson's (NYSE:JNJ) 1986 acquisition of Arden Medical Systems, a company he founded in 1983. Subsequently, Dr. Knudson was the founder or involved in the founding of over 20 healthcare companies and successfully exited these companies via acquisitions or initial public offerings (IPO) of the stock of the companies. He held positions in Research and Development management at Cardiac Pacemakers, Inc. (CPI-Guidant) and was a member of the faculty of the University of Washington School of Medicine. He was the recipient of an Individual Post-doctoral Fellowship Award from the National Institutes of Health. Dr. Knudson received the PhD in physiology from Washington State University and a BS degree in biology from Pacific Lutheran University. He holds numerous United States patents. He serves or has served on boards of several companies and institutions, both public and private. Dr. Knudson was elected to membership in Sigma Xi, the Scientific Research Honor Society of North America in 1975 and is a Fellow of the American Heart Association

EDWARD FAN



Edward Fan

Partner, Torys LLP

(Toronto, New York, Calgary, Montreal)

Edward Fan's practice focuses on the acquisition, enforcement and exploitation of intellectual property, and issues relating to technology transfers. In addition to advising on issues relating to portfolio management, Edward is also involved in negotiating and crafting intellectual property and other technology-related licenses and agreements. He regularly advises clients on the acquisition and exploitation of intellectual property portfolios in different industries.

Edward is a registered patent agent in Canada and the United States, and a trademark agent in Canada.



Laura Fortino

Member of 2014 Gold Medal Canadian Women's Hockey Team

LAURA FORTINO

Laura Michele Fortino is a 2014 Gold Medal winner. She competed in the Winter Olympics in Sochi representing Canada on the National stage in Women's Hockey. Laura was instrumental in designing the play that would result in the overtime winning goal.

Laura's journey to becoming an Olympian is a result of 20 years of dedication both on and off the ice. In her early years she led the Hamilton boy's rep teams into city and provincial championships. As she transitioned into the PWHL she quickly earned the confidence of her coaches and teammates. When Laura wore the "C" on her jersey she was able to create an environment in which the team approach was nurtured leading to great success.

Not only did Laura play high level sports in the community, she represented her high school Bishop Tonnos Catholic Secondary School in ice-hockey, soccer and field hockey. She was part of many city championships and medaled at OFSAA. She was acknowledged as a student-athlete and received academic honours and was athlete of the year in her junior and senior years.

At Cornell University, Laura was acknowledged as rookie of the year, MVP of the team, First Team All-American her first three years, Ivy League Player of the Year, NCAA All-Tournament. She was nominated for the Patty Kazmaier award and received the Charles Moore Outstanding Senior Varsity Athlete Award and the Cornell University Female Athlete of the Year.

At the National level, Laura was on the inaugural under 18 National championship team, winning gold and progressed onto the under 22 achieving silver and gold medals followed by participation in the IHHF Worlds Championship in Vermont and Ottawa winning Gold and Silver respectively. In Vermont, Laura was named First Team Tournament All Star.

Laura graduated from Cornell University and is furthering her studies in the area of health sciences. Laura has recently been named as an ambassador to McMaster Children's Hospital Foundation. This summer, Laura will be sharing her skill through the establishment of a hockey camp. Laura understands the importance of giving back, to this end, she volunteers at several community events. Upon her return from Sochi, Laura has shared her experience at several speaking engagements.

Laura is grateful for these experiences and all those who provided her the opportunities. She values the coaches, sponsors, teammates and the community that make sport accessible.

DAVID SAINT-JACQUES



David Saint-Jacques

Astronaut, Canadian Space Agency

DAVID SAINT-JACQUES

Personal Data: Born on January 6, 1970, in Quebec City, Canada, and raised in Saint-Lambert near Montreal, Canada. He is married and has two children. He is a lifelong mountaineer, cyclist, skier and passionate sailor. He also holds a commercial pilot license. Saint-Jacques is fluent in English and French and has basic knowledge of Russian, Spanish and Japanese.

Education: Saint-Jacques earned a Bachelor of Engineering degree in Engineering Physics from École polytechnique de Montréal, Canada (1993). He earned a Ph.D. in Astrophysics from Cambridge University, UK (1998), where his studies included theoretical work on astronomical observation and design, fabrication and commissioning of instruments for the Cambridge Optical Aperture Synthesis Telescope and for the William Herschel Telescope in the Canary Islands. He earned his M.D. from Université Laval in Quebec City, Canada (2005), and completed his family medicine residency at McGill University in Montreal, Canada (2007), where his training focused on first-line, isolated medical practice.

Organizations: Collège des médecins du Québec, College of Family Physicians of Canada, Ordre des ingénieurs du Québec, International Society for Optical Engineering, Life Fellow of the Cambridge Philosophical Society.

Experience: Prior to joining the Canadian Space Program, Saint-Jacques was a medical doctor and the Co-chief of Medicine at Inuulitsivik Health Centre in Puvirnituk, Canada, an Arctic village on Hudson Bay. He also worked as a Clinical Faculty Lecturer for McGill University's Faculty of Medicine, supervising medical trainees in Nunavik. Saint-Jacques began his career as a biomedical engineer, working on the design of radiological equipment for angiography. His broad scientific background also includes astrophysics and medical training. His postdoctoral research included the development and application of the Mitaka Infrared Interferometer in Japan and the Subaru Telescope Adaptive Optics System in Hawaii (1999 to 2001), after which he joined the Astrophysics group at Université de Montréal. His international experience also includes engineering study and work in France and Hungary and medical training in Lebanon and Guatemala.

The National Aeronautics and Space Administration (NASA) Experience: Saint-Jacques was selected in May 2009 by the Canadian Space Agency (CSA) and has moved to Houston to be one of 14 members of the 20th NASA astronaut class. In 2011, he graduated from Astronaut Candidate Training that included scientific and technical briefings, intensive instruction in International Space Station (ISS) systems, Extravehicular Activity, robotics, physiological training, T-38 flight training, Russian language and water and wilderness survival training. Since graduation, he has been assigned to the Robotics Branch of the Astronaut Office. In October 2011, he participated in the underwater mission, NEEMO 15.

[robotics competitors |



COMPETITION AGENDA

DATE: JULY 29, 2014

LOCATION: LIUNA STATION – KING GEORGE BALLROOM

7:30 am REGISTRATION AND ROBOTICS SHOWCASE OPENS

8:00 am Opening Remarks and Introduction of Judging Panel:

Dr. Mehran Anvari, CEO and Scientific Director

Centre for Surgical Invention and Innovation (CSii)

8:05 am **Robotics for Space Exploration (RSX)** 40
University of Toronto

8:35 am **Command Center** 42
Gloucester High School, Ottawa

9:05 am **4618 – CN Robotics** 44
Cardinal Newman Catholic Secondary School, Oakville

9:35 am **GHGT** 46
Golden Horseshoe Green Tech, Hamilton

10:05 am **BeaverworX** 48
Our Lady of Lourdes Catholic Secondary School, Guelph

10:35 am REFRESHMENT BREAK

10:50 am **ARMADA** 50
St. Ignatius of Loyola Catholic Secondary School, Oakville

11:20 am **Kinetic Knights** 52
Kincardine District Secondary School, Kincardine

11:50 am **Humberview Alpha Dogs** 54
Humberview Secondary School, Bolton

12:20 pm Judges Panel

12:30 pm Awards Presentation

Closing Remarks: **Dr. Mehran Anvari**

Photo Session: **Cheque Presentation** Judges and Winning Teams

UNIVERSITY OF TORONTO



Origin: Martian Exploration Rover

Team

KARIM KOREITEM

RAHUL GOEL

KRAMAY PATEL

ASKAR KAZBEKOV

AAKASH GOEL

PHILIP LEE

MASHA ITKINA

KIAH BRANSCH

HE HE

BRYAN TARRAS

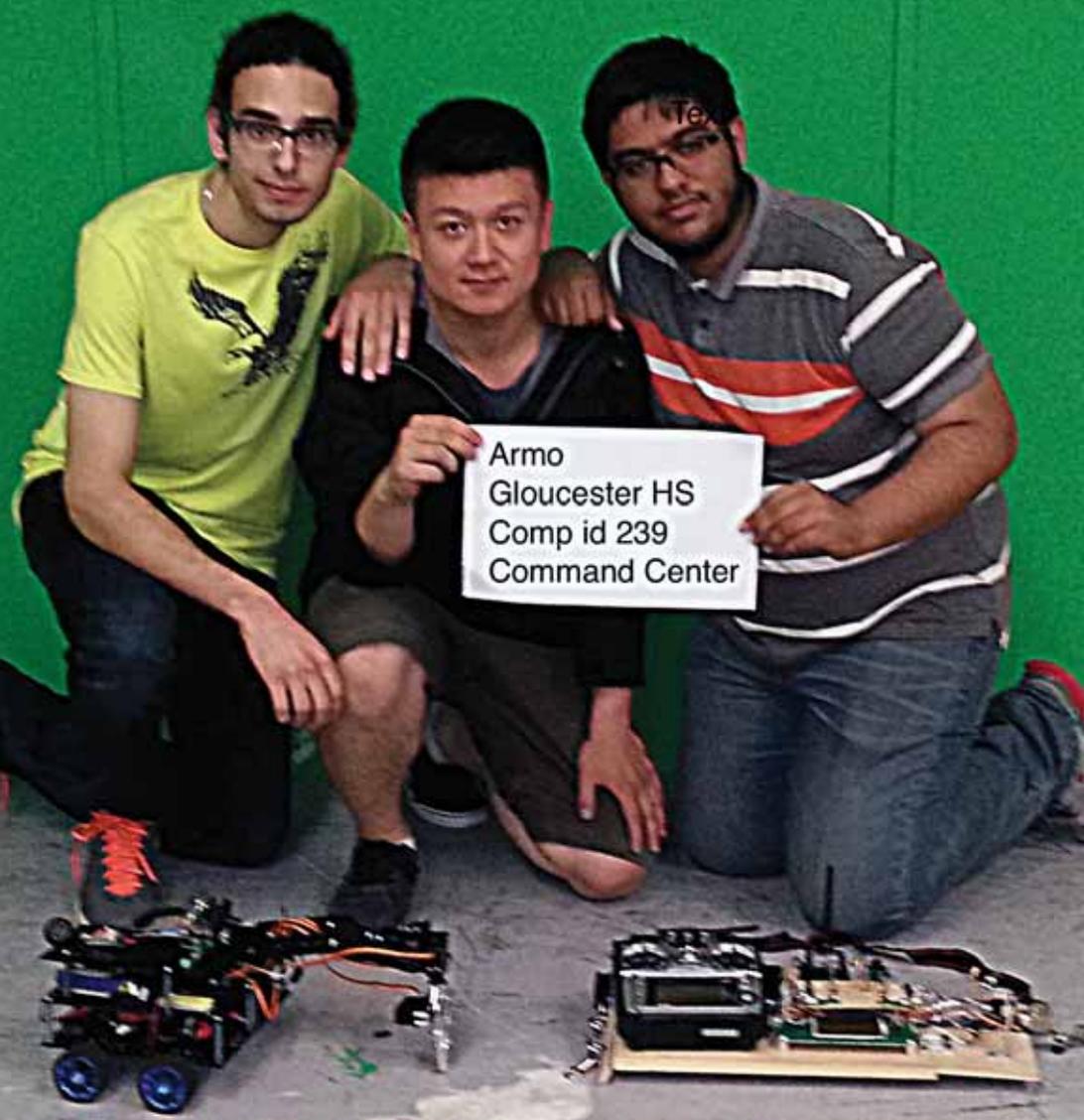
KEVIN OLSEN

EKANSH SHARMA

Robot Description

Origin is a tele-operated rover designed for planetary exploration – specifically, Mars. It is controlled from a distant base station, and is equipped with various mechanical components, sensors, and electronics. It is designed to rove and complete a variety of tasks in challenging environments where human involvement is unsafe or impossible.

COMMAND CENTER



Mobile Robotic Arm

Team MOHAMMAD HASAN TAZOOK BUKHARI
PARGUZATI KHAR

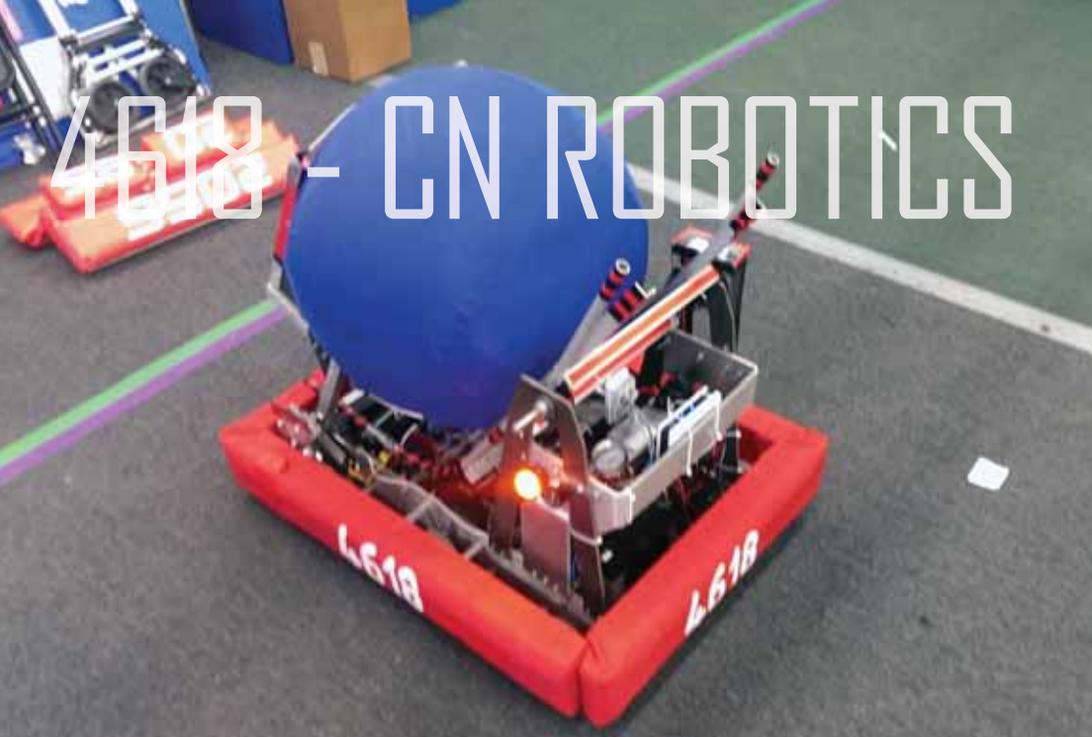
Robot Description

The robotic arm is mounted on a four wheel, all purpose, individually powered tires, high torque vehicle. The control station was built with the intention of supplying easy access and control. Therefore, by having a mobile control station enables convenient control of the robotic arm and vehicle.

For the design of the robotic arm, we wanted to simulate a human arm by which we used several bearings to resemble human joints, the robotic grip resembles a cuffed human hand. In convenience, the design behind the control system was to promote and simulate natural human movements.

For the design of the robotic car, we wanted to ensure that the structure supported heavy weights when picked up and still maintain a decent speed. Also, the body holds a camera that opts for a 120 degrees range in the horizontal and 90 degrees in the vertical live view.

4618 - CN ROBOTICS



4618- CN ROBOTICS

CARDINAL NEWMAN CATHOLIC SECONDARY SCHOOL, OAKVILLE

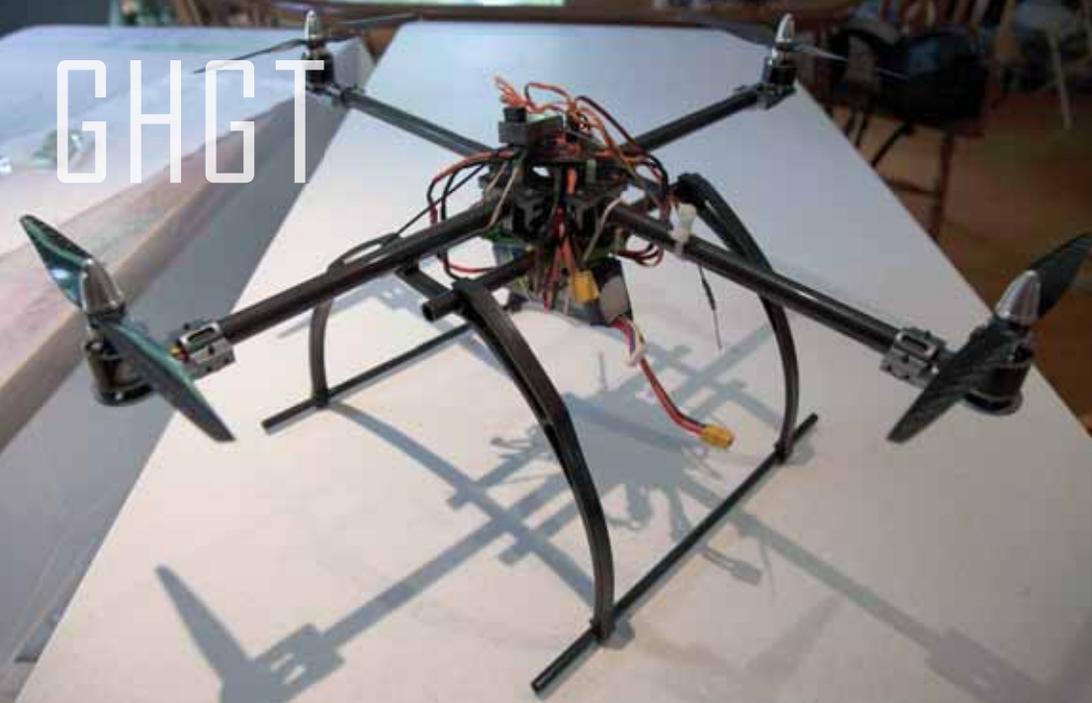
Dusty: First Robotics Competition Robot

Team	MARTIN SKOT	STEVEN CHUPUL
	PAVLE ARINZINA	PHILIP PATEMAN
	CHRISTIAN DAVIS	MATTHEW PATEMAN

Robot Description

Team 4618's robot Dusty was designed and built to play in the 2014 FIRST Robotics Competition game Ariel Assist. In order to compete, teams had to manufacture and compete with a robot that can pick up, pass and launch a large exercise ball several feet into the air. We accomplish this by using 2 large motors and a chain to rotate a catapult arm, resulting in an indefinite shot variation, for both short and long range. We intake balls through the back of the robot using 2 motors with locking transmissions to not hold the ball but secure it into place during high speed runs with the ball. The difficulty of the competition comes from the extremely strict robot rules found in the game manual, similar to auto racing and engineering projects there are tight rules regarding size, weight, motors, and electrical, and by adhering to these rules teams are still able to build thousands of unique robots.

GHGT



Robot Function: Light Painting

Team	ABDU KHODR	MICHELLE WU
	ASH LIU	VINAY YUVASHANKAR
	BEHZAD AKBARI	WALES ZHOU
	COLIN GAGICH	WILLIAM CAMERON
	DOMINIK KAUKINEN	WILLIAM ZHANG
	ETHAN D'MELLO	ZACH CANO
	MTAKO ZUBAIR	ZIYANG LU

Robot Description

The purpose of the robot designed by the GHGT Robotics Team is to produce a light painting that is based on a user's input into a connected drawing application. The robot is constructed from a drone aircraft and utilizes a LED light source to produce the drawing and an Arduino controller coupled to a WiFi Shield to receive flight instructions.

The user of the robot draws a picture using an application designed for a smartphone or tablet. This application converts the drawing into a grid of two-dimensional position coordinates and passes this information to a computer program. The computer program calculates the necessary flight path for the robot and communicates these instructions to the Arduino controller over WiFi. The robot completes this calculated flight path and the light painting is recorded by a long exposure camera. A secondary camera is also used to track the current position of the LED light source which allows for a live feedback system to be implemented into the flight calculation. This ensures that the robot's flight path instructions are corrected against variations in the surrounding air flow conditions.

BEAVERWORKS



Polar Vortex: Aerial Assist Competition Robot

Team	TOM VUONG	MAYUR SAXENA
	RELI DESOSA	BILLY PARMENTER
	KEVIN REID	

Robot Description

The robot, Polar Vortex, is a competitive game playing robot designed for the 2014 FIRST competition. FIRST imposes limits on the size and shape of the robots. Polar Vortex is 44" in its greatest diameter and 42" tall. "AERIAL ASSIST is played by two competing Alliances of three robots each on a flat 25' x 54' foot field, straddled by a truss suspended just over five feet above the floor. The objective is to score as many balls in goals as possible during a two (2)-minute and 30-second match. The more Alliances score their ball in their goals, and the more they work together to do it, the more points their Alliance receives." (US FIRST) To achieve this Polar Vortex is capable of a great deal of control of the ball. The ball can be retrieved from the ground or a teammate, ejected, or thrown at a variety of targets. Polar Vortex is also very capable of motion, being specifically designed for maneuverability. Ball pickup and ejection is achieved using a roller assembly at the end of an arm. The arm is placed over the ball and then pulls it onto a spring-loaded launcher in the centre of the robot. The arm and roller can eject the ball, or be moved out of the way to allow it to be launched.

A R M A D A



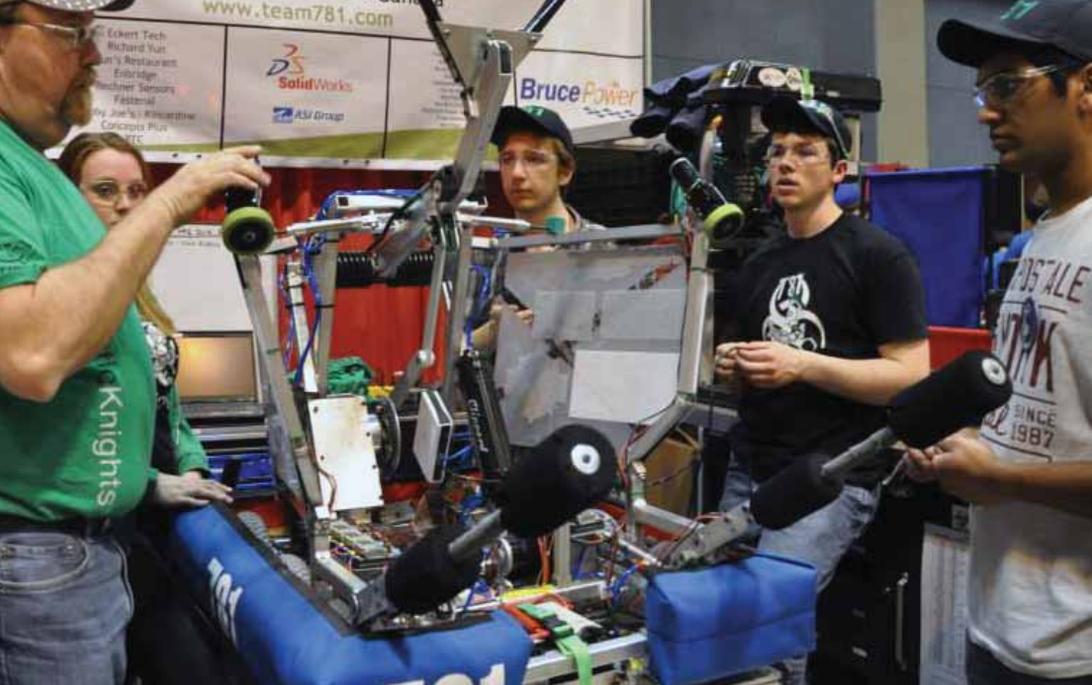
Autonomous, intelligent and cooperative robot

Team IAN BERLOT-ATTWELL

Robot Description

The robots are essentially small mobile computers with an array of sensors, communication and navigation hardware. Mobility is achieved with wheels or tracks for more rugged terrain. They operate in “swarm” mode; this is, cooperating with each other to achieve maximum efficiency. An added advantage of such a behavior is that the number of robots can be increased arbitrarily as required and therefore they can cover any surface size and adapt automatically to these new conditions. I called my robotic swarm “Armada” for Automated Robotic Monitoring and Detection Autobot. They can carry any type of available sensor (IR, radiation, chemical vapor, sound, etc.) and they know their location by either GPS or Inertial Guidance. They can be used from small areas (a house) to large areas (an airport or nuclear plant). They can perform safety or identification monitoring and either sound an alarm or communicate with a central system for reporting purposes. Their basic software is designed to cope with any surface configuration without the need for a map. They can transmit navigation information to other members, and hence automatically design a highly effective patrol pattern.

KINETIC KNIGHTS



KINETIC KNIGHTS

KINCARDINE DISTRICT SECONDARY SCHOOL, KINCARDINE

Moose: Ball Collector and Launcher

Team

CHRIS PIERCE

GREGORY DADSON

MATHEW STRADER

BRADLEY REID

GREGORY REID

NIKHIL DESHPANDE

AARON GORDON

JED GONZALES

VIRAT TRAPATHI

Robot Description

Our robot “Moose” has three main design features. The ball launching catapult, the fast and effective intake, and the powerful and robust drive train. The catapult is powered by two rear suspension springs of a snowmobile and retracted by a miniCIM motor and a linkage system that we call the “Choo-Choo”. The ball is cradled by two hockey stick blades. The intake consists of two rollers that stick out of the back of the robot to pick the ball up off of the ground. These rollers then push the ball into small fast spinning wheels which quickly put the ball into position and hold it there. The drive train is powered by a total of four CIM motors. It has two gears, a high and a low. The high gear allows the robot to go about 15 ft/sec and the low gear allows it to go about 5 ft/sec. The drive train has six 8in pneumatic wheels, this gives the robot maximum traction and pushing power. Our robot also has many sensors and various electronics to make it function well.

HUMBERVIEW ALPHA DOGS



HUMBERVIEW ALPHA DOGS

HUMBERVIEW SECONDARY SCHOOL, BOLTON

Aerial Assist Competition Robot

Team

BRENDON FALLON

STEFAN PLEAVA

JEREMY SANT

BRIAN MCCRINDLE

ALICIA MATIS

MATTHEW REYNOLDS

COLE CYR

HARRY HAUTOT

Robot Description

The 2014 FIRST Aerial Assist challenge involves the scoring of a 2 foot diameter exercise ball in both ground goals and 7 foot high goals. Our robot was built for this challenge and is able to move by itself and manipulate, through a cycle of control, the 2 foot diameter exercise ball in 3D space with a high degree of accuracy. The robot achieves this through 3 stages which are:

1. In-taking the ball into the robot through a rotating shaft with wheels
2. Holding the ball in a loading area while moving
3. Out-taking the ball either by shooting through a wheeled shooter or through the rotating shaft

Through the use of a sensor, Alph is able to eject the ball through the wheeled shooter with variable rotational speed to change the height and distance of the shot. These speeds can be saved and key bound to the operations controller for repetitive distance shooting or varied manually by the operator. The robot is also able to traverse space and fire the ball autonomously with the use of a gyroscope and ultrasonic distance sensor, which can be used to move the robot to a specific distance from a wall. The robot is controlled through the use of two joystick controllers which allow for separation of movement and operation controls for ease of task execution. The controllers are hooked up to a driver's laptop which connects to the robot via an onboard router.

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