
PHILIP EDGCUMBE

MISSION AND HIGHLIGHTS

Philip Edgcumbe is a Canadian scientist, biomedical engineer, medical innovator, physician-in-training (MDPhD) and entrepreneur. By connecting medicine, biomedical research, and entrepreneurship, *Philip is striving to have a positive impact on the health of a billion people.*

In 2017, Philip led a team which developed an XPRIZE global crowdsourcing competition to end Alzheimer's. He has invented and licensed a medical device and has been part of three biomedical start-up companies. In 2014, Philip was the recipient of the Outstanding Young Scientist award at the Medical Image Computing and Computer-Assisted Intervention (MICCAI) international conference. In 2016, he spent the summer in Silicon Valley at Singularity University where he studied exponential technology and medical innovation. In 2017, he received the Canadian Medical Hall of Fame Award and in 2019 he received the Canadian Medical Association Young Leader Award, CFMS-MD Financial Management Leadership award and Joule Emerging Physician Innovator award. Philip speaks internationally on the topics of disruptive technology and the future of healthcare.



EDUCATION

University of British Columbia

September 2012 - August 2017

Doctor of Philosophy in Biomedical Engineering (PhD)

- Supervisors: Dr. Christopher Nguan and Dr. Robert Rohling.
- Student in the Engineers in Scrubs research training program.

University of British Columbia

September 2011 - Present

Doctor of Medicine (MD)

University of British Columbia

September 2006 - May 2011

Bachelor of Applied Science in Engineering Physics (BASc)

- Concentration in Electrical Engineering
- Included one semester academic exchange at the Indian Institute of Technology in Delhi, India.

SCHOLARSHIPS AND AWARDS

Joule Emerging Physician Innovator Award - Student [\$5,000]

2019

- This grant is awarded to two medical students who have developed an innovative health care product. The criteria for the award include development of a product with potential to provide a health care benefit, to disrupt the status quo, to scale and to meaningfully engage stakeholders.
- Learn more at: <https://joulecma.ca/innovate/grants/pico-lantern>

Canadian Medical Association Young Leader Award - Student

2019

- This award is given to two medical students that have demonstrated exemplary dedication, commitment and leadership in one of the following areas: political, clinical, educational, or research and community service. Award recipients have also: exemplified creativity, initiative and shown commitment to "making a difference", been active and effective at the local, provincial/territorial and/or national level and acted as a positive and effective role model for their peers and colleagues.
- Learn more at: <https://www.cma.ca/cma-award-young-leaders-student-2019-recipient-philip-edgcumbe>

Canadian Federation of Medical Students-MD Financial Leadership Award [\$2,000]

2019

- One student from each medical school receives this award. The award recognizes passionate, dedicated and caring medical student leaders across Canada who have made innovative contributions to their schools and communities.

UBC Faculty of Medicine Louis Lipsey Toohill Scholarship [\$2,000]	<i>2018</i>
<ul style="list-style-type: none"> • The award is for students in the Faculty of Medicine at the University of British Columbia. Preference is given to students showing an aptitude for study related to research in cancer, arthritis, and rheumatism. 	
Canadian Medical Hall of Fame Award [\$5,000]	<i>2017</i>
<ul style="list-style-type: none"> • Awarded to one medical student from each medical school who demonstrates perseverance, collaboration, an entrepreneurial spirit and outstanding potential as future leaders and innovators of health care in Canada. • Learn more about the award at: http://www.cdnmedhall.org/2017awardrecipients 	
British Columbia Medtech Award in Biomedical Engineering, 2017 [\$1,150]	<i>2017</i>
<ul style="list-style-type: none"> • This award is given to a student with an entrepreneurial spirit, an interest in the local biomedical engineering industry and demonstrated leadership and communication skills. 	
Nestor Korchinsky Leadership Award [\$2500]	<i>2017</i>
<ul style="list-style-type: none"> • This award is given to a University of British Columbia student who has demonstrated a commitment to leadership and positive change within the community, both on and/or off the University campus. 	
R Howard Webster Foundation Fellowship [\$2500]	<i>2016</i>
<ul style="list-style-type: none"> • This award is given annually to 10 new graduate student Resident Members of Green College. 	
Global Solutions Program - Singularity University - Full Scholarship [\$30,000]	<i>2016</i>
<ul style="list-style-type: none"> • Awarded to 80 applicants, from a group of over 3,000 applicants. 	
Outstanding Young Scientist Award, MICCAI [\$500]	<i>2014</i>
<ul style="list-style-type: none"> • Awarded to five graduate students (out of 900 international applicants) at the 2014 Medical Image Analysis and Computer Aided Imaging Conference (MICCAI). 	
Vanier Canada Graduate Scholarship, [\$150,000]	<i>2014</i>
<ul style="list-style-type: none"> • Awarded to approximately 150 graduate students per year. All PhD students in Canada are eligible to apply. • The selection criteria are equally weighted between: Academic Excellence, Research Potential, and Leadership. 	
Student Travel Award, UBC Engineers in Scrubs Research Training Program, [\$1,000]	<i>2014</i>
Graduate Studentship Award, Prostate Cancer Canada, [\$40,000]	<i>2013</i>
Dr. John Ankenman Clinical Research Prize, Dep of Urology, UBC, [\$500]	<i>2013</i>
Frederick Banting and Charles Best Canada Graduate Scholarship (CIHR) [\$17,500]	<i>2012-2013</i>
Alexander Graham Bell Canada Graduate Scholarship (NSERC) [\$17,500]	<i>2011-2012</i>
MPhD Studentship Award [\$132,000]	<i>2012-2018</i>
HSBC Emerging Leader Scholarship [\$5,000]	<i>2011</i>
UBC Wesbrook Scholar [\$1,000]	<i>2011</i>
Accepted to the MIT Electrical Engineering PhD Program (declined)	<i>2011</i>
Accepted to the Stanford BioEngineering PhD Program (declined)	<i>2011</i>
Ahmad Bhimani Memorial Scholarship [\$1,000]	<i>2011</i>
UBC Thunderbird Men's Field Hockey Award [\$500]	<i>2011</i>
Undergraduate Student Research Award, NSERC, 2010 [\$5,625]	<i>2010</i>
Duke of Edinburgh Gold Award	<i>2010</i>
RISE Internship Research Award in Germany [\$3,000]	<i>2009</i>
Irvin K. Barber One World Scholarship [\$1,500]	<i>2009</i>

PATENTS

- Robert Rohling, *Philip Edgcumbe*, Christopher Nguan. System for Structured Light and Dynamic Imagery During Surgery. US Provisional Patent Application No: 62/175,595. Filed on June 15th, 2015.
- Robert Rohling, *Philip Edgcumbe*, Christopher Nguan. Imagery System. US Patent Application No: 15/183,458. Filed on June 15th, 2016. Granted on September 4th, 2019
 - In June, 2015, UBC entered a licensing agreement with Northern Digital Inc (NDI), a biomedical engineering company based in Waterloo, Ontario.

PUBLICATIONS

For more details, please see Philip's list of publications on Google Scholar via this link: goo.gl/nu1oTB.

- *Philip Edgcumbe*. "Let's Create the Future of Health Care Together - Embracing Health Care Technology and Developing an Innovation Mindset in Medical Education." 41st Canadian Federation of Medical Students Annual Review, 2019.
- *Philip Edgcumbe*, Rohit Singla, Philip Pratt, Caitlin Schneider, Christopher Nguan and Robert Rohling. "Follow the light: projector-based augmented reality intracorporeal system for laparoscopic surgery." *Journal of Medical Imaging* 5(2), 2018.
- *Philip Edgcumbe*. Developing surgical navigation tools for minimally invasive surgery using ultrasound, structured light, tissue tracking and augmented reality. Doctoral dissertation, University of British Columbia, 2017.
- Rohit Single, *Philip Edgcumbe*, Philip Pratt, Caitlin Schneider, Christopher Nguan, and Robert Rohling. Intra-operative Ultrasound-based Augmented Reality Guidance for Laparoscopic Surgery. *Healthcare technology letters*, 4(5), pp.204-209, 2017.
- *Philip Edgcumbe**, Rohit Singla*, Philip Pratt, Caitlin Schneider, Christopher Nguan, and Robert Rohling. "Augmented reality imaging for robot-assisted partial nephrectomy surgery." *International Conference on Medical Imaging and Virtual Reality*, pp. 139-150. Springer International Publishing, 2016.
- *Philip Edgcumbe*, Philip Pratt, Guang-Zhong Yang, Christopher Nguan, and Robert Rohling. "Pico Lantern: Surface reconstruction and augmented reality in laparoscopic surgery using a pick-up laser projector." *Medical Image Analysis* 25(1), pp. 95-102, 2015.
- *Philip Edgcumbe*, Philip Pratt, Guang-Zhong Yang, Chris Nguan, and Rob Rohling. "Pico lantern: a pick-up projector for augmented reality in laparoscopic surgery." *Medical Image Computing and Computer-Assisted Intervention. Lecture Notes of Computer Science*, Part 1, 8673, pp. 432-439. Springer International Publishing, 2014.
- *Philip Edgcumbe*, Christopher Nguan, and Robert Rohling. "Calibration and stereo tracking of a laparoscopic ultrasound transducer for augmented reality in surgery." *Augmented Reality Environments for Medical Imaging and Computer-Assisted Interventions, Lecture Notes in Computer Science*, 8090, pp. 258-267. Springer Berlin Heidelberg, 2013.

SELECTED CONFERENCE ABSTRACTS

- *Edgcumbe P*, Pratt P, Yang GZ, Nguan C, Rohling R. "Miniature Laser Projector for Guidance and Augmented Reality in Laparoscopic Surgery." In Proceedings of the UBC Department of Urological Sciences Annual Lorne D. Sullivan Research Day. Vancouver, Canada. June, 2014.
- *Edgcumbe P*, Nguan C, Rohling R. "Advances in ultrasound-endoscope calibration for surgery using the da Vinci surgical system." In Proceedings of the UBC Department of Urological Sciences Annual Lorne D. Sullivan Research Day. Vancouver, Canada. June, 2013.
- *Edgcumbe P*, Podgorski K, Haas K. "Ultra-fast two-photon microscope based on acousto-optic deflector for imaging of synaptic and neuronal morphology in brain of in vivo *Xenopus* Tadpole for study of schizophrenia." In Proceedings of the Canadian Investigator Trainee Association of Canada Annual Scientific Meeting. Ottawa, Canada. September, 2012.
- *Edgcumbe P*, Noe, F. "Optimizing computer simulations of protein interaction by dynamically updating discretization of state space." In Proc. of the Annual Canadian Undergraduate Physics Conference. Edmonton, Canada. September, 2009.

LEADERSHIP AND WORK EXPERIENCE

Singularity University Canada - Toronto, Canada

September 2018 - Present

Faculty Member, Medicine

- The mission of Singularity University is to educate, empower, and inspire leaders to leverage exponential technologies to solve humanity's grand challenges. Grand challenges include health, energy, learning and others.
- The health grand challenge is to create a world with optimal physical and mental health, including access to cost-effective prevention, early diagnosis, and personalized therapy for individuals and communities.
- Faculty Members in Medicine help people and organizations to understand the opportunities and implications of exponential technology in medicine and health care and to work towards achieving the health grand challenge.

Canadian Medical Association Innovation Lab - Ottawa, Canada

May 2018 - July 2019

Innovator-in-Residence

- Provided strategic advise for a variety of projects which support the work of the Canadian Medical Association (CMA) Innovation Lab. The CMA Innovation Lab was established to support the CMA 2020 strategic plan.

XPRIZE Foundation - Los Angeles, California, USA

May 2017- January 2018

Bold Innovator (Project Team Lead)

- Led a team that developed a proposal for an Alzheimer's XPRIZE (crowdsourcing incentive competition to end Alzheimer's). The Alzheimer's XPRIZE proposal was selected by the XPRIZE Foundation's (www.xprize.org) board and supporters as the top priority XPRIZE at the 2017 XPRIZE Visioneers Summit. Furthermore, Ric and Jean Edelman generously pledged \$25,000,000 USD in support of the Alzheimer's XPRIZE initiative.
- An XPRIZE is a highly leveraged, incentivize prize competition that pushes the limit of what is possible. It captures the world's imagination, inspires others to reach for similar goals, spurs innovation and accelerates the rate of positive change.

Department of Radiology, UBC - Vancouver, Canada

Jan 2016-March 2016

Research Assistant

- Contributed to development of the UBC Radiology Teaching App (www.ubcradiologyapp.ca).
- Labeled 700 anatomical features on X-rays.
- Supervised by Dr. Kathryn Darras (Chief Resident, UBC Radiology) and Dr. Silvia Change (Associated Professor, UBC Radiology).

Technology in Medicine Club, UBC - Vancouver, Canada

2014-2016

Co-Founder and President

- The club hosts speaker series and workshops focused on the use of technology in medicine. The club's mandate is to foster innovative and design thinking among engineering and medical students. More details at www.ubctimclub.com.

National Globalink Mentor Recruitment Team, Mitacs - Vancouver, Canada

2012-Present

Project Team Lead

- Responsible for annual recruitment and management of a team of three people who recruit and hire 120 graduate students at 50 universities across Canada to work as Globalink Mentors.

Faculty of Medicine, UBC - Vancouver, Canada

Fall 2015, Spring 2016

Teaching Assistant

- Gross Anatomy Teaching Assistant (Fall 2015): Assisted medical students in weekly cadaver dissections. Covered anatomy of back, chest, abdomen and urogenital systems.
- Neuroanatomy Teaching Assistant (Spring 2016): Assisted medical students in biweekly neuroanatomy labs. Covered anatomy of spinal cord, brainstem, limbic system, cortex and basal ganglia.

MedSweat Club - Vancouver, Canada

2012-2016

Co-Founder and Vice-President

- The MedSweat Club (originally named Spartacus Club) is a official UBC Medical Undergraduate Society club. It has a mission to promote regular fitness and well-being for medical students.

Advisory Board for Business and Administration (ABBA), AMS Student Society, UBC - Vancouver, Canada

2013-2015

Board Member (2013-15) and Chair(2015)

- The nine member ABBA board provides oversight and accountability for the businesses of the AMS. The businesses of the AMS are mostly in the food and beverage sector. The businesses have an annual revenue of \$9 million and 300 employees. In 2015 the revenue of the businesses increased by 35%.

UBC Senate

2008-2013

Member (2008-09, 11-12, 12-13) and Vice-Chair (2012-13)

- The 90 member UBC Senate is the highest academic governing body at UBC. The Vice-Chair is responsible for chairing the Senate meetings when the Chair (The President of UBC) is absent.

UBC Engineering Physics Board of Studies

2007-2011

Student Representative

- The Board of Studies helps develop the Engineering Physics program curriculum.

ENTREPRENEURSHIP

Augos - Vancouver, Canada

September 2018 - Present

Co-Founder

- Augos is a start-up company that is using digital eye health technology to make eye health more accessible.
- The two other co-founders are Dr. Steven Schendel, an ophthalmologist, and Mr. Geoff Ching, a UBC medical student.

Lume Biotics - Mountain View, California, USA

July 2016 - September 2016

Co-Founder and Chief Technology Officer

- A start-up company that was developing phototherapy devices for the treatment of bacterial infections. The goal was to provide an alternative to antibiotic treatment. Lume Biotics was started at Singularity University in Silicon Valley.

Global Solutions Program, Singularity University - NASA Ames Campus, Mountain View, California, USA

Participant

- One of 80 participants selected from a group of 3000+ applicants. Received a \$30,000 scholarship from Google and Genentech to participate.
- This 10 week program empowers participants with the tools, knowledge and skills for positively impacting billions of people.

Medical Expert

- Represented NMotive Research Inc. in San Francisco at the Johnson & Johnson Cognition Challenge business competition. Placed in the final four (out of over 40 teams) and just missed the \$100K prize that was split between the top two teams.
- Worked with the two co-founders of NMotive Research Inc. as the Medical Expert to develop Eyecelearate. Eyecelearate is an app that uses eye gaze tracking for early detection of Alzheimer's disease.

SPEAKING EXPERIENCE

- Moonshot Thinking - Innovator MD Global Summit - San Francisco, USA. (January 12th, 2019)
- Empowering and Caring for Patients Through Viral Health Advocacy - Canadian Medical Association (CMA) Health Summit CMA Ambassador Design Workshop - Toronto, Canada. (August 11th, 2019)
- Health Care Goes Virtual: Disruptive Technology in Health and Health Care - Keynote Presentation at the Doctors of Nova Scotia AGM - Halifax, Nova Scotia. (June 8th, 2019)
- The Doctor's Challenge - Singularity University Canada Summit - Edmonton, Canada. (April 24th, 2019)
- From Science One to Clinician-Scientist, Exponential Thinking and New Models of Innovation - UBC Science One Program Career Speaker Series - Vancouver, Canada. (March 19th, 2019)
- The Future of Health Care - LifeLabs Inc. Executive Leadership Training - Vancouver, Canada. (February 20th, 2019)
- The Future of Health Care - Association of Faculties of Medicine of Canada (AFMC) 75th Celebration and Symposium - Ottawa, Canada. (October 22, 2018)
- Health Care Goes Virtual - Disruptive Technology in Health and Health Care - Canadian Medical Association National Health Policy Conference - Ottawa, Canada. (October 14, 2018)
- Will Exponential Technology Help Us Solve Alzheimer's and Unleash Our Full Human Potential? - Interface Health Summit - Vancouver, Canada. (October 10, 2018)
- Adopting Innovation in Health: What is holding us back from embracing innovation and technology in health? - Canadian Medical Association Health Summit - Winnipeg, Canada. (August 20th, 2018)
- A Call to Action - Innovation and the Future of Medicine, Canadian Medical Association Staff Professional Day - Ottawa, Canada. (June 8, 2018)
- Building a Future-Focused Medical Association - Ontario Medical Association Board Planning Retreat - Toronto, Canada. (June 6, 2018)
- The Evolving Role of the Physician - Canadian Medical Forum - Ottawa, Canada. (May 28, 2018)
- Crowdsourcing for Better Healthcare - Katapult Future Fest - Oslo, Norway. (May 16, 2018)
- Alzheimer's XPRIZE: Crowdsourcing the End of Alzheimer's - Singularity University Summit - Santiago, Chile. (March 15, 2018)
- Disruptive Technology and the Future of Healthcare - Canadian Medical Association Forum for the CEOs of the Provincial and Territorial Medical Associations - Cape Coral, Florida, USA. (February 19, 2018)
- Crowdsourcing the End of Alzheimer's, XPRIZE Visioneers Summit - Los Angeles, California, USA. (October 6, 2017)

INTERVIEWS, ARTICLES AND PODCASTS

A selected list of interviews, articles and podcasts in which Philip's work or perspective has been featured is below:

- Future Leaders Profile - Philip Edgcumbe | onboardMD Magazine | August, 2019.
- The Future of Healthcare Abundance with Philip Edgcumbe | Beyond Disruption Podcast 25 | July, 2019
- Disrupting Health Care - Philip Edgcumbe, Takes the Conversation from Linear to Exponential Thinking | Kim Bottomley | Doctors NS | June, 2019
- Technology Will Make Your Doctor More Human Again | Edmonton.com | June, 2019
- Canadian Health Care Lacks Culture of Innovation | Roger Collier | Canadian Medical Association Journal | August, 2018
- 'Google Generation' unveils gap in our health care system | Global News | August, 2018 |
- The Possibilities are Exponential in Technology and Medicine | Boldy Joule Podcast | Nov 8th, 2018

VOLUNTEERING

- Member, Greater Vancouver Regional Science Fair Organizing Committee. (2007-2017).
- Director, Science Fair Foundation of British Columbia. (2011-15).
- Vancouver General Hospital Renal Dialysis Unit - Patient Support - Weekly volunteering. (2010).
- Purdy Pavilion Long Term Care Home - Patient Support - Weekly volunteering. (2007-08).
- Teacher for 6 weeks at Joybells School and Orphanage in Northern India. (2009).
- BC Society for Neuroscience Brain Awareness Week Coordinator. (2008).
- UBC Hospital Purdy Pavillion - Exercise assistant and one-on-one visitor for elderly residents. (2007-08).
- Alumni Judge Coordinator at Kitsilano High School Science Fair (2007-10).
- President, Science One Survivors Club (2007-08).

RESEARCH EXPERIENCE

Robotics and Control Lab, UBC - Vancouver, Canada

May 2012 - Present

PhD Student

- Identified clinical challenges that are engineering opportunities. The goal of the research was to give surgeons more information about subsurface anatomy and improve surgical outcomes using ultrasound, structured light and augmented reality.
- Invented the Pico Lantern, a miniature projector for surface measurement and augmented reality in surgery. The Pico Lantern projects augmented reality images of the tumour and subsurface blood vessels onto the patient. The Pico Lantern IP was licensed to Northern Digital Inc (Waterloo, ON).
- Developed augmented reality intra-operative ultrasound navigation system for surgical guidance for the da Vinci surgical system.
- Research activities included PCB and CAD design, computer vision and augmented reality graphical overlay algorithms (Matlab, C++, OpenCV and OpenGL) and clinical validation testing in *in vivo* pig lab studies.
- Supervisors: Dr. Christopher Nguan (Surgeon and Assistant Professor in the Department of Urological Sciences) and Dr. Robert Rohling (Professor in the Departments of Mechanical and Electrical and Computer Engineering).

Brain Research Center, UBC - Vancouver, Canada *September 2009 - April 2010 and May 2011 - August 2011*

Undergraduate Research Assistant

- 2011: Used two-photon microscope to characterize complete spatiotemporal patterns of synaptic input, firing output, and structural changes throughout plasticity-inducing visual training in *Xenopus laevis* tadpoles. The goal of the project was to understand how sensory activity shapes the connectivity and structure of neurons.
- 2009-2010: Worked with three other students to design and build an ultrafast random-access two-photon microscope to simultaneously record activity in the synapses of developing neurons in awake tadpoles.
- Supervisor: Dr. Kurt Haas (Associate Professor, Department of Cellular and Physiological Science)

Microsystems and Nanotechnology Group, UBC - Vancouver, Canada

May 2010 - August 2010

Undergraduate Research Assistant

- Designed and built a heat-activated microfluidic pump. The pump is applicable to lab-on-a-chip technology.
- Supervisor: Dr. Boris Stoeber (Associate Professor, Departments of Mechanical Engineering)

Plotkin Research Group, UBC - Vancouver, Canada

September 2009 - April 2010

Undergraduate Research Assistant

- Studied how DNA sequence and temperature affect the structural stability and behaviour of DNA. Used a LAMMPS coarse-grained model of DNA to study persistence length, stacking, twist, and chirality.
- Supervisor: Dr. Steve Plotkin (Associate Professor, Department of Physics and Astronomy)

Computational Molecular Biology Research Group, Free University of Berlin - Berlin, Germany *July 2009 - September 2009*

Undergraduate Research Assistant

- Optimized algorithms in Matlab that simulated protein interactions by dynamic discretization of state space.
- Supervisor: Dr. Frank Noe (Professor, Numerical Mathematics Scientific Computing)

Brain Research Center, UBC - Vancouver, Canada *May- August 2007, August 2006 and July to August 2005*

Undergraduate Research Assistant

- 2007: Trained and managed four full time undergraduate students doing a research project to study how specific miRNA affect neuronal plasticity in *in vivo* tadpole model.
- 2005-2006: Developed novel technique for measuring the relative concentrations of free radicals in the brains of *in vivo* *Xenopus Laevis* tadpoles.
- Supervisor: Dr. Kurt Haas (Associate Professor, Department of Cellular and Physiological Science)

SPORTS AND HOBBIES

- UBC Varsity men's field hockey (2006-2011), UBC Men's elite intramural soccer (2011-2017), UBC Faculty of Medicine Vancouver Sun Run Team Captain (2015)
- Running, piano, reading (non-fiction history, science fiction, biographies), canoeing and hiking.