Giuseppe Di Labbio

Vanier Scholar, Ph.D. Candidate, M.A.Sc., B. Eng., Jr. Eng.

g_dilabb@encs.concordia.ca
gdilabbio.com
1455 De Maisonneuve Blvd. W.
H3G 1M8, Montréal, QC

0000–0002–1452–9074
Google Scholar/Giuseppe
Linkedin/Giuseppe

Profile

A meticulous, honest, high-caliber student and junior engineer pursuing a Ph.D. in Mechanical Engineering, specializing in experimental fluid dynamics. Has a passion for teaching and learning with a high level of competence in pure and applied fluid dynamics. Expertise in the field include numerical methods in computational fluid dynamics, experiment design and control, instrumentation, particle image velocimetry and advanced pre- and post-processing techniques for fluid flow data.

Languages	English, French, Italian
Memberships	APS, ASME, CSME, JSME, OIQ
Programming Languages	
Extensive Knowledge in	Arduino, C/C++, LabVIEW, MATLAB, Octave
Familiar with	FORTRAN, FreeMat, Maple, Mathematica, Python, Scilab, VBA
Software	
Extensive Knowledge in	CATIA, Cura, DaVis, Excel, FLUENT, Fusion 360, GIMP, Inkscape, LaTeX, LibreOffice, OpenFOAM, ParaView, PowerPoint, SolidWorks, Tec-Plot 360, VisIt, Word, WPS Office
Familiar with	ANSYS Workbench, AUTO, AutoCAD, Autodesk Inventor, Blender, CFX, COMSOL, FreeCAD, FreeFem++, GAMBIT, IrfanView, Unity, VirtualDub

Education

2015–19 **Doctor of Philosophy, Mechanical Engineering (in progress)**
Concordia University Montréal, QC
Cumulative GPA: 4.30/4.30
Thesis: Left ventricular fluid dynamics: The influence of aortic regurgitation
Honours:
- "Concordia Accelerator Award"
- "Stand-Out Graduate Research Award"
- "Ph.D. Poster Presentation Award"
- "Ph.D. Seminar Presentation Award"
- "Vanier Scholar"

2014–15 **Master of Applied Science, Mechanical Engineering**
Concordia University Montréal, QC
Cumulative GPA: 4.30/4.30
Thesis: On the evolution of flows in straight circular pipes subject to a localized transverse impulsive body force
Honours:
- Thesis accepted without modification
- "F. A. Gerard M.A.Sc. Dissertation Prize"

2010–14 **Bachelor of Engineering, Mechanical Engineering**
Concordia University Montréal, QC
Cumulative GPA: 4.23/4.30
Honours:
- Graduation with Great Distinction
- "Silas Katz Memorial Scholarship"

Current Occupations

2018–19 **Reviewer for *Journal of Biomechanics***
Journal of Biomechanics, Elsevier
Acting as a reviewer for the Journal of Biomechanics. Have reviewed 1 article out of 1 request to referee thus far.

2017–19 **Visiting Student at the Laboratoire de Dynamique des Fluides (LADyF)**
Laboratoire de Dynamique des Fluides, Polytechnique Montréal, QC
Development of expertise in Lagrangian coherent structures and wavelet transforms. The visit led to collaboration with Prof. Jérôme Vétel which, to date, has culminated in a presentation at the 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, a Gallery of Fluid Motion entry at the 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics and a publication in Physical Review Fluids. The visit was sparked by my involvement in the Mechanical, Industrial and Aerospace Engineering Graduate Student Committee during my term as chair, after I personally invited Prof. Vétel to give a research seminar at Concordia University (Montréal). Ultimately, this visit led me to pursue postdoctoral research at the LADyF with Prof. Vétel starting September 2019.

2016–19 **Reviewer for *Physics of Fluids***
Physics of Fluids, American Institute of Physics
Acting as a reviewer for the Physics of Fluids journal. Have reviewed 3 articles out of 5 requests to referee thus far.

2015–19 **Associate Director of the Laboratory of Cardiovascular Fluid Dynamics (LCFD)**
Laboratory of Cardiovascular Fluid Dynamics, Concordia University Montréal, QC
Acting as associate director of the LCFD alongside the director, Prof. Lyes Kadem. Providing lab management, supervisory and technical aid to the laboratory director and its members.

2015–19 **MIAE Graduate Student Committee Member (Chair 2016–17)**
Concordia University Montréal, QC
A volunteer-based committee that organizes biweekly seminars where international and national guest speakers are invited to discuss their research and/or industrial experiences with the graduate students of the MIAE Department as well as the ENCS Faculty. Our work led the Dean of ENCS, Prof. Robin Drew and later Prof. Amir Asif, to endorse two of our invited speakers per year (up to $2,000 per event), allowing us to invite leading researchers around the world. The committee was also the inspiration for the Graduate Community Building Fund started by the Dean of Graduate Studies, Prof. Paula Wood-Adams, in 2016 which we have been awarded multiple times. The Concordia Council on Student Life has also funded several of our student-oriented projects. The most notable speaker organized by the committee (largely thanks to member Carlos Zetina) was Dr. Jorge Cham, creator of PHD Comics, in October 2017. This committee plays a crucial role in the MIAE Ph.D. programs with the attendance of these seminars being mandatory for the students. The committee also organizes networking events, workshops, information sessions and academic parties for the MIAE Department.

Articles

Darwish, A., Di Labbio, G., Saleh, W., Smadi, O., & Kadem, L.* (2019, January). In vitro investigation of the flow downstream of a dysfunctional bileaflet mechanical aortic valve. *Artificial Organs*, **under review**.

Kadem, L.*, Mirvakili, N., Di Labbio, G., & Saleh, W. (2018, December). Flow characteristics in a model left ventricle in the presence of a dysfunctional mitral mechanical heart valve. *Journal of Visualization*, **under review**.

Di Labbio, G.*, Ben-Assa, E., & Kadem, L. (2018, December). Experimental investigation of the effect of heart rate on flow in the left ventricle in health and disease – Aortic valve regurgitation. *Journal of Biomechanical Engineering*, **under review**.

Di Labbio, G.*, & Kadem, L. (2019, March). Reduced-order modeling of left ventricular flow subject to aortic valve regurgitation. *Physics of Fluids*, **31**(3), 031901.

Di Labbio, G.*, Vétel, J., & Kadem, L. (2018, November). Material transport in the left ventricle with aortic valve regurgitation. *Physical Review Fluids*, **3**(11), 113101.

Di Labbio, G.*, & Kadem, L. (2018, September). Jet collisions and vortex reversal in the human left ventricle. *Journal of Biomechanics*, **78**, 155–160.

Di Labbio, G., Keshavarz-Motamed, Z., & Kadem, L.* (2017, April). Numerical simulation of flows in a circular pipe transversely subjected to a localized impulsive body force with applications to blunt traumatic aortic rupture. *Fluid Dynamics Research*, **49**(3), 035510.

Amaouche, M., & Di Labbio, G.* (2016, April). Linear and weakly nonlinear global instability of a fluid flow through a collapsible channel. *Physics of Fluids*, **28**(4), 044106.

Keshavarz-Motamed, Z.*, Garcia, J., Gaillard, E., Maftoon, N., Di Labbio, G., Cloutier, G., & Kadem, L. (2014, March). Effect of coarctation of the aorta and bicuspid aortic valve on flow dynamics and turbulence in the aorta using particle image velocimetry. *Experiments in Fluids*, **55**(3), 1696.

Conference Papers

Di Labbio, G.*, & Kadem, L. (2019, February). Toward a classification of the cardiac vortex. *Progress in Canadian Mechanics*, **accepted**. (Accepted conference paper for a podium presentation at the 27th Canadian Congress of Applied Mechanics in Sherbrooke, QC to be held on May 27–30, 2019)

Sargordi, M.*, Chtchetinina,A., Di Labbio, G., Ng, H. D., & Kadem, L. (2019, February). Pulsatile flow downstream of a double orifice configuration. *Progress in Canadian Mechanics*, **accepted**. (Accepted conference paper for a podium presentation at the 27th Canadian Congress of Applied Mechanics in Sherbrooke, QC to be held on May 27–30, 2019)

Darwish, A.*, Saleh, W., Di Labbio, G., & Kadem, L. (2018, May). In vitro investigation of the effect of a dysfunctional bileaflet mechanical aortic valve on flow characteristics in the ascending aorta. *Proceedings of the 2018 Canadian Society for Mechanical Engineering International Congress*, 139. (Published conference paper from a podium presentation at the 2018 Canadian Society for Mechanical Engineering International Congress in Toronto, ON held on May 27–30, 2018)

Di Labbio, G., Kiyanda, C. B., Mi, X. C., Higgins, A. J., Nikiforakis, N., & Ng, H. D.* (2016, June). Investigation of detonation velocity in heterogeneous explosive system using the reactive Burgers' analog. *American Institute of Physics Conference Proceedings*, **1738**, 030011. (Published conference paper from a podium presentation at the 10th International Symposium on Numerical Analysis of Fluid Flow and Heat Transfer – Numerical Fluids in Rhodes, GR held on September 22–28, 2015)

Letters & Responses

Di Labbio, G.*, & Kadem, L. (2019, April). Response to letter to the editor 'Left ventricular flow in the presence of aortic regurgitation'. *Journal of Biomechanics*, **87**, 212–214.

Published Conference Abstracts

Darwish, A.*, Di Labbio, G., Saleh, W., & Kadem, L. (2018, November). Modal decomposition and Lagrangian coherent structures analysis of flow past a dysfunctional mechanical aortic valve. *Bulletin of the American Physical Society*, **63**(13), F18.00004. (Published abstract from a podium presentation at the 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Atlanta, GA held on November 18–20, 2018)

Di Labbio, G.*, Vétel, J., & Kadem, L. (2018, November). Hearts on fire. *Bulletin of the American Physical Society*, **63**(13), P0006. (Published poster from the Gallery of Fluid Motion of the 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Atlanta, GA held on November 18–20, 2018)

Mirvakili, N.*, Saleh, W., Di Labbio, G., & Kadem, L. (2018, November). Blood flow downstream of a dysfunctional mechanical heart valve. *Bulletin of the American Physical Society*, **63**(13), KP1.00033. (Published abstract from a poster presentation at the 71st Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Atlanta, GA held on November 18–20, 2018)

Friend, E.*, El-Sayegh, B., Pressman, G. S., Di Labbio, G., Obasare, E. R., & Kadem, L. (2018, June). Orifice eccentricity accentuates flow disturbance due to severe mitral annular calcification. *Journal of the American Society of Echocardiography*, **31**(6), B50. (Published abstract from a poster presentation at the American Society of Echocardiography's 29th Annual Scientific Sessions in Nashville, TN held on June 22–26, 2018)

Di Labbio, G.*, Vétel, J., & Kadem, L. (2017, November). Lagrangian coherent structures in the left ventricle in the presence of aortic valve regurgitation. *Bulletin of the American Physical Society*, **62**(14), D4.00006. (Published abstract from a podium presentation at the 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Denver, CO held on November 19–21, 2017)

El Fakhri, M. B.*, Di Labbio, G., Kadem, L., Ng, H. D., & Ait Abderrahmane, H. (2017, November). An analogy between the merger of two black holes and the collision of two point-vortices. *Bulletin of the American Physical Society*, **62**(14), KP1.00114. (Published abstract from a poster presentation at the 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Denver, CO held on November 19–21, 2017)

Mikhail, A.*, Kadem, L., & Di Labbio, G. (2017, November). Proper orthogonal decomposition and dynamic mode decomposition in the right ventricle after repair of tetralogy of Fallot. *Bulletin of the American Physical Society*, **62**(14), KP1.00036. (Published abstract from a poster presentation at the 70th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Denver, CO held on November 19–21, 2017)

Ben-Assa, E.*, Di Labbio, G., Garcia, J., Edelman, E., & Kadem, L. (2017, March). Analysis of diastolic vortex flow as a marker of ventricular deterioration in aortic regurgitation. *Journal of the American College of Cardiology*, **69**(11 Suppl), 1976. (Published abstract from a poster presentation at the American College of Cardiology's 66th Annual Scientific Session & Expo in Washington, DC held on March 17–19, 2017)

Di Labbio, G.*, & Kadem, L. (2016, November). Vortex and energy characteristics of flow in the left ventricle following progressive severities of aortic valve regurgitation. *Bulletin of the American Physical Society*, **61**(20), L15.00002. (Published abstract from a podium presentation at the 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Portland, OR held on November 20–22, 2016)

El-Sayegh, B.*, Kadem, L., Di Labbio, G., Pressman, G. S., & Obasare, E. R. (2016, November). Investigation of the left ventricular flow dynamics in the presence of severe mitral annular calcification. *Bulletin of the American Physical Society*, **61**(20), KP1.00009. (Published abstract from a poster presentation at the 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Portland, OR held on November 20–22, 2016)

Mikhail, A.*, Kadem, L., & Di Labbio, G. (2016, November). Flow topology in the right ventricle after tetralogy of Fallot repair. *Bulletin of the American Physical Society*, **61**(20), KP1.00010. (Published abstract from a poster presentation at the 69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Portland, OR held on November 20–22, 2016)

El-Sayegh, B.*, Di Labbio, G., Pressman, G. S., Obasare, E. R., & Kadem, L. (2016, November). Left ventricular flow dynamics in the presence of severe mitral annular calcification – An in vitro study. *Circulation*, **134**(Suppl 1), A20501. (Published abstract from a poster presentation at the American Heart Association's Scientific Sessions in New Orleans, LA held on November 12–16, 2016)

Di Labbio, G.*, Kiyanda, C. B., Mi, X. C., Higgins, A. J., Nikiforakis, N., & Ng, H. D. (2015, November). Investigation of detonation propagation through an array of random discrete energy sources using the reactive Burgers' analog. *Bulletin of the American Physical Society*, **60**(21), R2.00004. (Published abstract from a podium presentation at the 68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in Boston, MA held on November 22–24, 2015)

Di Labbio, G.*, Keshavarz-Motamed, Z., & Kadem, L. (2015, January). On the evolution of pulsatile flow subject to a transverse impulse body force. In *7th World Congress of Biomechanics (WCB 2014)* (Vol. 5B, p. 677). Red Hook, NY: Curran Associates, Inc. (Published abstract from a poster presentation at the 7th World Congress of Biomechanics in Boston, MA held on July 6–11, 2014)

Di Labbio, G,*, Keshavarz-Motamed, Z., & Kadem, L. (2014, November). On the evolution of pulsatile flow subject to a transverse impulse body force. *Bulletin of the American Physical Society*, **59**(20), F1.00012. (Published abstract from a poster presentation at the 67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics in San Francisco, CA held on November 23–25, 2014)

Other Conference Proceedings

Darwish, A.*, Di Labbio, G., Saleh, W., & Kadem, L. (2018, September). Modal decomposition analysis of flow downstream of a dysfunctional mechanical aortic valve. *1st Canadian Aortic and Vascular Engineering Symposium*. (Abstract from a podium presentation at the 1st Canadian Aortic and Vascular Engineering Symposium in Montréal, QC held on September 27, 2018)

Friend, E.*, El-Sayegh, B., Pressman, G. S., Di Labbio, G., Obasare, E. R., & Kadem, L. (2018, April). Orifice eccentricity accentuates flow disturbance due to severe mitral annular calcification. *4th Scientific Meeting of the Heart Valve Society*, New York, NY. (Abstract from a poster presentation at the Heart Valve Society's 4th Annual Scientific Meeting in New York, NY held on April 12–14, 2018)

Raymondet, A., Kadem, L., & Di Labbio, G.* (2016, February). Jet-vortex interaction in the left ventricle during diastole in the presence of aortic regurgitation. *8th International Bio-Fluid Symposium*, Pasadena, CA. (Abstract from a poster presentation at the 8th International Bio-Fluid Symposium in Pasadena, CA held on February 12–14, 2016)

Patents

Aoki, C., Chan, M., Abeywickrama, D., Bousmia, L. H., Ghalayini, J., Stoyel, K., Patel, R., Bélanger, A., Di Labbio, G., Kadem, L., Al-Hmouz, I., Akhikian, S., Bonomo, N., Danias, C., Ghandi, K., Jaramillo, T. J., Ber Shuchat, S., Singh, R., & Zoldan, Z. (2017). Apparatus for simulating a cardiovascular system. *WO Patent Application*, WO/2017/165969/A1.

Kadem, L., Akhikian, S., Ber Shuchat, S., Bonomo, N., Danias, C., Ghandi, K., Jaramillo, T. J., Singh, R., Zoldan, Z., & Di Labbio, G. (2017). An innovative module for experimental induction of valvular heart disease. *PCT Application*, PCT/CA2017/050385. (Merged to "Apparatus for simulating a cardiovascular

system")

Abeywickrama, D., Aoki, C., Bousmia, L., Chan, M., Ghalayini, J., Patel, R., Stoyel, K., Al-Hmouz, I., Di Labbio, G., Bélanger, A., & Kadem, L. (2016). A high-fidelity simulation model for cardiovascular disease diagnosis and treatment. *US Provisional Application*, US/2016/62314532. (Merged to "Apparatus for simulating a cardiovascular system")

Younes, S., Di Labbio, G., & Kadem, L. (2016). A transcatheter bicuspid mitral valve with in-stent artificial chordae. *Declaration of Invention*.

Achievements & Awards

	Total Award Value Accepted/Declined	$	**484,448**
2019	Concordia University Accelerator Award	$	5,000
2018–19	Concordia Council on Student Life Special Projects Fund (with MIAE GSC)	$	500
2018–19	Graduate Community Building Fund (with MIAE GSC)	$	5,000
2018	Concordia University Conference and Exposition Award (for APS DFD 2018)	$	1,000
2018	CIBPA Meritorious Bursary	$	1,000
2018	Concordia Stand-Out Graduate Research Award	$	1,000
2018	Ph.D. Seminar Presentation Award	$	500
2018	Ph.D. Poster Presentation Award	$	200
2017–18	Concordia Council on Student Life Special Projects Fund (with MIAE GSC)	$	2,000
2017–18	Graduate Community Building Fund (with MIAE GSC)	$	5,000
2017	CIBPA Meritorious Bursary	$	1,000
2017	Concordia University Conference and Exposition Award (for APS DFD 2017)	$	1,000
2016–19	FRQNT Bourse de 3^{e} Cycle Universitaire (Doctorat), Ranked 2nd – Declined	$	60,000
2016–19	Vanier Canada Graduate Scholarship (NSERC), Ranked 30th	$	150,000
2016–19	NSERC Alexander Graham Bell CGS (Doctoral) – Declined	$	105,000
2016–17	Graduate Community Building Fund (with MIAE GSC)	$	2,700
2016	F. A. Gerard M.A.Sc. Dissertation Prize		–
2016	Concordia University Conference and Exposition Award (for APS DFD 2016)	$	1,000
2016	Concordia University Conference and Exposition Award (for IBFS 2016)	$	1,000
2015–18	Frederick Lowy Scholars Fellowship	$	45,000
2015–16	Graduate Student Support Program (Doctoral), Advisor Top-Up – Superseded	$	7,500
2015–16	Graduate Student Support Program Bursary (Doctoral) – Superseded	$	10,000
2015	Concordia University Conference and Exposition Award (for APS DFD 2015)	$	1,000
2014–15	Graduate Student Support Program Bursary (Master)	$	5,000
2014–15	NSERC Alexander Graham Bell CGS (Master)	$	17,500
2014–15	John W. O'Brien Graduate Fellowship – In Name Only	$	12,000
2014	Concordia University Conference and Exposition Award (for WCB 2014)	$	873
2014	Concordia University Special Entrance Award	$	6,000
2014	MIE Capstone Design Award for Mechanical Engineering – 2nd Prize		250
2013–14	Dean's List of Excellence – Tier I	$	1,000
2013	NSERC Undergraduate Summer Research Award in Universities	$	6,125
2013	Silas Katz Memorial Scholarship	$	1,500
2012–13	Dean's List of Excellence – Tier I	$	800
2011–12	Dean's List of Excellence – Tier I	$	1,000
2010–11	Dean's List of Excellence – Tier I	$	1,000
2010–14	Bourse d'études Hydro-Québec de l'Université Concordia	$	20,000
2010	Faculty Distinguished CEGEP Entrance Scholarship in Engineering – Superseded	$	5,000

Teaching Experience

2017 **Lecturer**
Concordia University Montréal, QC
Lectured the Applied Ordinary Differential Equations (ENGR 213) course as part of the engineering curriculum to 100 students. My teaching performance and student evaluations were recognized by the MIAE Department Chair, Prof. Martin Pugh.

2014–16 **Teaching Assistant**
Concordia University Montréal, QC
Prepared materials for tutorial sessions for Thermodynamics I (x2) & II (x2) and Applied Ordinary Differential Equations (x1), including a review of course material and the solution of assigned problems. I was also invited by Prof. Lyes Kadem to prepare and teach a full lecture for Thermodynamics I & II each semester (4 lectures total) to classes of 100 and 220 students respectively, covering the first law of thermodynamics for open systems, the Otto cycle, the classical Brayton cycle and the regenerative Brayton cycle.

2014 **GradProSkills: Teaching Assistant Training**
Concordia University Montréal, QC
I participated in five courses as part of the teaching assistant training modules, namely 1) Grading, marking, and giving feedback, 2) Making the most out of discussions, 3) Basic teaching skills, 4) Principles of course design and 5) Health and safety workshop.

2006–14 **Private Tutor in Engineering, Science, and Mathematics (Volunteer)**
Self-Employed, Montréal/Laval, QC
Offered free private tutoring for students in science, mathematics and engineering courses. These included senior high school, college and university courses. I tutored students during my last two years of high school, my two years of college and my four years of undergraduate studies. The work entailed assessing a student's difficulties with a subject as well as his/her preferred method of learning. The main challenge in this work is in presenting the material in a clear and concise manner while also generating the student's interest in the subject and help them develop a good understanding of the topic. In these eight years, I have tutored over 50 students, many of which have graduated from university-level studies in business, science and engineering.

Supervisory Experience

2017–18 **Max Lavigne** – 2× NSERC USRA Student
Concordia University Montréal, QC
Co-supervised the improvement of a complete heart simulator for the testing of pathologies and medical training as a continuation of the previous year's patented capstone work. Max is currently pursuing a Master's of Applied Science in Mechanical Engineering.

2017–18 **Nasibeh Mirvakili** – 2× NSERC USRA Student
Concordia University Montréal, QC
Co-supervised the experimental investigation of left ventricular flow dynamics in the presence of leaflet restriction for a mechanical bileaflet valve in the anti-anatomical mitral position. This work was presented at the 71st Annual Meeting of the APS Division of Fluid Dynamics in 2018 (poster). Nasibeh is currently in her final year pursuing a Bachelor's of Engineering (Mechanical).

2017 **Maria Barbara El Fakhri** – Student Volunteer Intern
Concordia University Montréal, QC
Co-supervised the development of a working analogy between the merger of two black holes and the collision of two point-vortices. This work was presented at the 70th Annual Meeting of the APS Division of Fluid Dynamics in 2017 (poster).

2017 **Pietro Rossi** – Student Intern
Concordia University Montréal, QC
Co-supervised the experimental investigation of natural convection of a viscous fluid in a rectangular container with a temperature difference induced between two side walls using two Peltier thermoelectric heaters/coolers. This work was accepted for a podium presentation at the 70th Annual Meeting of the APS Division of Fluid Dynamics in 2017.

2016–18 **Amanda Mikhail** – 3× NSERC USRA Student
Concordia University Montréal, QC
Co-supervised the experimental investigation of the flow topology in the right ventricle after tetralogy of Fallot repair. This work was presented at the 69th & 70th Annual Meetings of the APS Division of Fluid Dynamics in 2016 & 2017 respectively (posters). Amanda is currently pursuing a Master's of Applied Science in Mechanical Engineering.

2016–17 **Batoul El-Sayegh** – M.A.Sc. Student
Concordia University Montréal, QC
Co-supervised the experimental investigation of left ventricular flow dynamics in the presence of severe mitral annular calcification. This work was presented at the AHA's Scientific Sessions and the 69th Annual Meeting of the APS Division of Fluid Dynamics in 2016 as well as the ASE's Scientific Sessions and the HVS's Annual Meeting in 2018 (all posters).

2016–17 **MIE Capstone Team** – 8 Undergraduate Students
Concordia University Montréal, QC
Co-supervised the development of a complete heart simulator for the testing of pathologies and medical training as an expansion of the previous year's capstone work. This work resulted in a patent application and a capstone design award. Students: Sebouh Akhikian, Sholom Ber Shuchat, Nicholas Bonomo, Constantinos Danias, Kevin Ghandi, Tabitha Jaramillo, Ramit Singh, Zachary Zoldan.

2016 **Damian Glowacki** – NSERC USRA Student
Concordia University Montréal, QC
Co-supervised the experimental investigation of the flow dynamics in the aorta following a severe automotive impact. Damian is currently a Performance Improvement Consultant at EY.

2016 **Sholom Ber Shuchat** – Co-op Student Intern
Concordia University Montréal, QC
Co-supervised the experimental investigation of the flow behavior in the left ventricle subject to varying grades of mechanical mitral valve obstruction. Sholom is currently pursuing a Ph.D. in Mechanical Engineering at Technion – Israel Institute of Technology.

2015–16 **MIE Capstone Team** – 7 Undergraduate Students
Concordia University Montréal, QC
Co-supervised the development of a left heart simulator for the testing of left heart pathologies and medical training. This work resulted in a patent application (combined with the following year's capstone work) and they competed in the Génie en Affaires Competition in September 2016. Students: Dilani Abeywickrama, Christophe Aoki, L'Hocine Bousmia, Mabel Chan, Jana Ghalayini, Rocky Patel, Kyle Stoyel.

2015–16 **Yves-Christian Tchatchouang** – Honor's Research Student (ENGR 412) & Volunteer Intern
Concordia University Montréal, QC
Co-supervised the experimental investigation of the flow behavior in a heart with the tetralogy of Fallot disease and the improvement of the left heart duplicator developed in the LCFD as part of my own undergraduate capstone project. Yves-Christian is currently the Process Engineer at TASK Micro-Electronics Inc.

2015 **Agathe Raymondet** – International Student Intern
ENSTA ParisTech, France
Co-supervised the experimental investigation of the jet-vortex interaction in the left ventricle of the heart during diastole in the presence of aortic regurgitation. This work was presented at the 8th International Bio-Fluid Symposium at Caltech in 2016 (poster). Agathe is currently the Deputy Contract Manager at Actemium Oil & Gas Maintenance.

2015 **Elsa Chetboun** – International Student Intern
Polytech Marseille, France
Co-supervised the experimental investigation of the flow behavior in a heart with the tetralogy of Fallot disease. Elsa is currently a Medical Device Consultant Engineer at Efor Healthcare.

Certification & Training

2018–21 **WHMIS 2015 (GHS) for Laboratory Personnel Training Online**
Concordia University Montréal, QC
Provided by Yoann Chabre.

2018–21 **Laser Safety Training**
Concordia University Montréal, QC
Provided by Gurnam Manku.

2016–19 **Hazardous Waste Disposal Training for Laboratory Personnel**
Concordia University Montréal, QC
Provided by Daniel Pagé.

2016–19 **WHMIS 1988 for Laboratory Personnel Training**
Concordia University Montréal, QC
Provided by Daniel Pagé.

2016 **CIHR Media Training**
Communications and Public Outreach, Canadian Institutes of Health Research
Provided by the CIHR (David Coulombe, Cara Tannenbaum and Emmanuelle Provost) for Vanier scholars and Banting fellows.

2015–19 **Safe Serve Program Certified (formerly Server Intervention Program)**
Concordia University Montréal, QC
Provided by the Dean of Students Office for the safe serving of alcohol to the public.

2015–18 **Laser Safety Training**
Concordia University Montréal, QC
Provided by Gurnam Manku.

2015–18 **WHMIS 2015 (GHS) for Laboratory Personnel Training**
Concordia University Montréal, QC
Provided by Daniel Pagé.

2013–16 **WHMIS 1988 for Laboratory Personnel Training**
Concordia University Montréal, QC
Provided by Homan Allami.

Work Experience

2017 **Scientist, Product Development & Testing, for 3RCardio**
Three Rivers Cardiovascular System Inc., Toronto, ON
Researched and experimented on the company's pressure wire prototypes for product development and feasibility (6-month part-time contract). My work concluded upon successful animal testing at AccelLAB Inc.

2013 **NSERC Undergraduate Summer Research**
Laboratory of Cardiovascular Fluid Dynamics, Concordia University Montréal, QC
Performed computational fluid dynamic simulations in order to understand the mechanism of blunt traumatic aortic rupture. This internship sparked my career in research, formed the basis of my Master's degree and led me to self-learn advanced topics in fluid dynamics and turbulence.

Academic Projects

2013–14 **Mechanical Engineering Capstone Design Project**
Concordia University Montréal, QC
Elected as leader, I led a team of 8 students to successfully design and manufacture a complete heart duplicator, which is currently being used for research in the Laboratory of Cardiovascular Fluid Dynamics at Concordia University. Throughout this project, I maintained an organized and effective team while we conducted research, analysis and testing using the knowledge developed throughout our undergraduate studies. This one simulator has been used in the development and testing of prototypes from 3RCardio (pressure wire) and Siemens Healthcare (real-time three-dimensional volume color-flow Doppler echocardiography), was the basis for two following capstone projects (for which a combined patent application ensued) and has been the basis of many student thesis and internship works.

Other Experience, Volunteer Work & Activities

2019 **Concordia University Open House (Volunteer)**
Concordia University Montréal, QC
Invited by the MIAE Department chair, Prof. Martin Pugh, and the Ph.D. Graduate Program Director, Prof. Ali Dolatabadi, to present my doctoral work, the influence of aortic regurgitation on left ventricular flow, to the general public and prospective students.

2018 **Prioritizing Future Challenges for Canada**
Future Challenges, Social Sciences and Humanities Research Council of Canada
Consulted by the SSHRC's Associate Vice-President of Future Challenges, Ursula Gobel, to take part in prioritizing which future challenges should be considered most important for Canada.

2018 **Invited Panelist for MIAE Graduate Student Recruitment Seminar**
Concordia University Montréal, QC
Invited by the Student Recruitment Officer, Martine Fachena, to answer questions from students thinking of pursuing higher education in the MIAE Department.

2017 **Invited Student for ENCS Accreditation TA Interview**
Concordia University Montréal, QC
Invited by the Chair of the MIAE Department, Prof. Martin Pugh, to be part of a group of students to answer questions from the Canadian Engineering Accreditation Board (CEAB) regarding teaching assistantships at Concordia University.

2017 **1-Day Lean Canvas Development Workshop**
Aligo, Montréal, QC
Learned and developed multiple lean canvas models for the patented heart simulator of the Laboratory of Cardiovascular Fluid Dynamics. Workshop provided by Sovita Chanders, Go-to-Market Strategist.

2017 **Testing of Siemens Healthcare New 3D Color Doppler System**
Laboratory of Cardiovascular Fluid Dynamics, Concordia University Montréal, QC
Validated some measurements obtained from Siemens' real-time three-dimensional volume color-flow Doppler echocardiography system (prototype) using the left heart duplicator developed in the LCFD as part of my undergraduate capstone project. Collaboration with the University of Montréal Hospital Research Centre.

2016 **FRQNT & NSERC CGS D Scholarship Application Coach (Volunteer)**
Concordia University Montréal, QC
Provided coaching and mentoring for one Ph.D. student after being offered all three major doctoral awards obtainable in Québec. Ali Saberi, my mentee, was shortlisted for the NSERC CGS D scholarship and was successfully awarded the FRQNT doctoral scholarship.

2016 **Concordia University Exhibitor at ICTAM 2016 (Volunteer)**
International Conference of Theoretical & Applied Mechanics 2016, Montréal, QC
Provided information and guidance for Ph.D. students, post-docs and researchers interested in enrolling at, applying to or collaborating with Concordia University.

2015–17 **Consultant for Three Rivers Cardiovascular Systems Inc. (3RCardio)**
Laboratory of Cardiovascular Fluid Dynamics, Concordia University Montréal, QC
Acted as a consultant for Three Rivers Cardiovascular Systems Inc. Provided the company with valuable testing and feedback to evaluate and improve the effectiveness of their pressure wire prototypes. The prototypes and accompanying software were tested in the left heart simulator developed in the LCFD as part of my undergraduate capstone project. The accuracy of the pressure and flow rate (via thermodilution) recordings were examined and the software was tested for bugs during operation and for the correctness of the reported parameters. Based on the quality of the feedback, 3RCardio later hired me on contract (part-time) for 6 months to help bring their pressure wire prototype to the animal testing stage.

2015 **Concordia University Open House (Volunteer)**
Concordia University Montréal, QC
I presented my undergraduate capstone project, a complete heart duplicator, to the general public and prospective students.

Features

2018 **There is important fluid dynamics happening inside you every moment of every day, esp inside your heart**
FY! Fluid Dynamics, Denver, CO
This featured my Gallery of Fluid Motion entry from the 71st Annual Meeting of the APS Division of Fluid Dynamics on the popular FY! Fluid Dynamics blog. The work was tweeted and posted by Nicole Sharp.

2018 **Prize-winning PhD candidates examine Fascist cinema in Ethiopia and heart valve diseases**
Concordia University Montréal, QC
This featured my doctoral work, then recently published in the Journal of Biomechanics (September 2018), in Concordia University News after being awarded the Concordia University Stand-Out Graduate Research Award.

2017 **'Wouldn't it be cool to build a heart simulator?'**
Concordia University Montréal, QC
This featured the 2016–17 capstone design project in Concordia University News. I co-supervised this project in the Laboratory of Cardiovascular Fluid Dynamics which was largely based on my own capstone design project from the 2013–14 academic year.

2017 **STEM SIGHTS: The Concordia grad student who investigates broken hearts**
Concordia University Montréal, QC
This featured Batoul El-Sayegh, a Master's student I co-supervised in the Laboratory of Cardiovascular Fluid Dynamics, in Concordia University News as well as the heart simulator constructed as part of my undergraduate capstone project. This was also featured in French here.

2016 **Holiday book list: 19 great reads**
Concordia University Montréal, QC
This featured my holiday reading suggestion in Concordia University News which I was asked to provide as featured Vanier Scholar.

2016 **CAPSTONE: Meet Concordia's New Vanier Scholars**
Concordia University Montréal, QC
This article featured Concordia's two new Vanier scholars, including myself, from the 2015-16 competition in Concordia University's CAPSTONE journal (pp. 10–11).

2016 **Trudeau and Vanier Award Recipients: Giuseppe Di Labbio**
Concordia University Montréal, QC
This featured a description of my profile and research on Concordia's School of Graduate Studies Website as part of their initiative to promote their Trudeau and Vanier Scholars.

2016 **Meet Concordia's 2 new Vanier scholars**
Concordia University Montréal, QC
This was the first announcement of Concordia's two new Vanier scholars, including myself, from the 2015-16 competition in Concordia University News.

2016 **Intellectual exchange: Concordia offers up to $5,000 for student-led projects**
Concordia University Montréal, QC
This featured the launch of the Graduate Community Building Fund by the School of Graduate Studies in Concordia University News, for which the MIAE Graduate Student Committee was endorsed as the inspiration for the fund.

2014 **Faculty Accolades, May 2014**
Concordia University Montréal, QC
This featured results of the 2013-14 capstone design projects for which our complete heart simulator won second prize.