Raphael Kay
Toronto, Canada
raphael.kay@mail.utoronto.ca
www.raphaelkay.com

Education

2020/22 **University of Toronto**
M.A.Sc., Mechanical Engineering, expected
Advisor: Prof. Benjamin Hatton (Materials Science and Engineering)

2016/20 **University of Toronto**
B.A. (Honours), Architecture, Technology
3.95/4.00, High Distinction, Dean's List Scholar, University of Toronto Scholar
Governor General's Silver Medal Nominee
Top Graduate, Faculty of Architecture (Graduating rank: 1 of 250)
Thesis: *Bio-inspired fluid cell growth for adaptive optical transmission in buildings*

Special Circumstance

2020/20 **Harvard University**
M.Des., Technology, offer accepted, enrolled, did not attend due to circumstances related to COVID-19

Formal Research Group Affiliations

2020/20 **Functional and Adaptive Surfaces Group, Materials Science and Engineering**
NSERC Undergraduate Student Research Award, University of Toronto, Prof. Benjamin Hatton
Conceived and led project using instabilities between fluids to create conditions for reversible fluid pocket growth within building skins to regulate heat and light transmission

2019/20 **Sustainable Built Environment Performance Assessment Group, School of the Environment**
Undergraduate Researcher, University of Toronto, Prof. John Robinson
Led project addressing the discrepancy between perceived indoor air quality and measured indoor air quality, and set best practices for alleviating this discrepancy

2019/20 **Functional and Adaptive Surfaces Group, Materials Science and Engineering**
NSERC Undergraduate Student Research Award, University of Toronto, Prof. Benjamin Hatton
Led project designing, prototyping, and testing micro-fluidic window system, based on biological capillary temperature regulation

2018/19 **Siegel Group, Indoor Air Quality, Civil and Mineral Engineering**
NSERC Undergraduate Student Research Award, University of Toronto, Prof. Jeffery Siegel
Led project comparing microbial research within lab setting to microbial growth in field setting. Conducted experiments investigating particulate matter emissions from indoor sources, and filter forensics experiments studying new means of collecting indoor air quality data

Informal Research and Project Work Undertaken

2019/20 **Self-Propelling Autonomous Robotic Locomotion**
University of Waterloo, University of Toronto, Prof. David Correa
Co-designed and fabricated (w/ Kevin Nitièma) self-propelling hygroscopic robot with capability to crawl without active energy

2019/19 **Sustainable Design Team, Net Positive Data Centre**
Living Lab of Sustainability, University of Toronto, Prof. John Robinson
Provided design suggestions to the Managing Director of University of Toronto Planning for one of the first net-energy positive buildings in Toronto (course code: ENV461)

Employment

2019/19 **School of the Environment, University of Toronto,** Toronto, Ontario
Studied and quantified effect of psychosocial influences on indoor air quality measurement

2017/18 **Founder, TAP Parking,** Toronto, Ontario
Co-founded a startup concept that connects drivers with empty driveways in areas where parking opportunities are scarce and expensive. Eventually met with leading competitor, Rover, to discuss ways to work together to solve ultimate goal of alleviating parking stress

2017/17 **Remote Intern, Public Architecture,** San Francisco, California
Worked with leader in social-impact environmental design, specifically facilitating the connection between non-profit organizations and pro bono design work

International Collaboration

2019 **Delft University of Technology**, Certificate, Planning and Design with Water for Sustainability
Chosen as one of three students to represent Canada in multinational water management program. Collaborated with students from 52 countries to engineer flood-protection solutions along coastlines

International Conference Presentations

2020 **38th eCAADe Conference, TU Berlin** (virtual)
From pinecones to robots, in *Cognizant Architecture - What if Buildings Could Think?*

Peer-Reviewed Publications

2021 Kay, R, Nitièma, K, Katrycz, C, Hatton, B, **Scaling up biological surface fluidics for adaptive building skins**, working manuscript for submission to *Science.*

2021 Kay, R, Katrycz, C, Hatton, B, **Biologically inspired multilayered optofluidics for adaptive multifunctional building skins**, working manuscript for submission to *PNAS.*

2021 Kay, R, Katrycz, C, Hatton, B, **Reversible and shape-programmable fluidic apertures for tunable light transmission in large-area synthetic membranes**, working manuscript.

2021 Kay, R, Mattacchione, A, Katrycz, C, Hatton, B, **Self-organizing *Physarum polycephalum* networks as a basis for circulatory systems in architecture**, working manuscript.

2020 Kay, R, Nitièma, K, Correa, D, **The bio-inspired design of a self-propelling robot driven by changes in humidity**, *eCAADe* 38. http://papers.cumincad.org/cgi-bin/works/Show?ecaade2020_195.

Academic Recognition and Interviews

2020 **Research chosen and featured in University-wide showcase**
https://researchrevealed.utoronto.ca/

2020 **Check out the work of the Daniels Faculty's first-ever undergraduate thesis students**.
https://www.daniels.utoronto.ca/news/2020/05/11/check-out-work-daniels-facultys-first-ever-undergraduate-thesis-students/

2019 **A Graduate of the University of Toronto Faculty of Architecture Receives Soprema's Leaders of Tomorrow Award**. https://www.soprema.ca/graduate-university-toronto-faculty-architecture-receives-sopremas-leaders-tomorrow-award/

Academic Awards, Distinctions, and Honours

2020 **Governor General's Silver Medal Nominee** (among the top graduates at the University of Toronto)
2020 **Top Graduating Student, Faculty of Architecture** (graduating rank: 1 of 250)
2020 **University of Toronto Academic Merit Award** ($500)
2020 **NSERC Undergraduate Student Research Award** (Materials Engineering) ($6500)
2020 **University of Toronto Dean's List Scholar**
2019 **Oxford Rhodes Scholarship Finalist** (one of 13 finalists from 100 000 students, with two chosen)
2019 **Oxford Rhodes Scholarship Nominee** (selected as one of 3 university-wide finalists of 15 000)
2019 **Leaders of Tomorrow Award** (awarded by SOPREMA) ($2500)
2019 **University of Toronto Scholar** (awarded to top student(s) in faculty) ($1500)
2019 **University of Toronto Dean's List Scholar**
2019 **NSERC Undergraduate Student Research Award** (Materials Engineering) ($6500)
2018 **University of Toronto Dean's List Scholar**
2018 **NSERC Undergraduate Student Research Award** (Civil Engineering) ($6500)
2017 **University of Toronto Dean's List Scholar**
2017 **Cansbridge Fellowship Finalist** (selected as one of 30 finalists from 360 applicants)
2016 **DECA Top 10 Provincial Placement** (Distributive Education Clubs of America)
2016 **Lynn MacGillivray Memorial Scholarship** ($300)
2016 **Rob Crombie Memorial Scholarship** ($2000)

Notable Non-Academic Achievements

2018/20 **Intramural Basketball, Dodgeball Captain**, University of Toronto
2019/19 **Orientation Leader**, University of Toronto Faculty of Architecture
2017/18 **Head of Recruitment,** Alpha Epsilon Pi, Tau Omega Chapter
2008/16 **Provincial Club Basketball Player,** Ontario Basketball Association (team ranked 3rd in province, 2014)
2016/16 **Culture Club President**, North Toronto Collegiate Institute
2016/16 **Volunteer House League Basketball Head Coach**, North Toronto Basketball Association
2015/17 **Senior Basketball Camp Coach and Counsellor,** Upper Canada College Summer Camps
2015/16 **Co-captain,** North Toronto Collegiate Institute senior basketball team
2013/14 **Captain, Most Valuable Player,** North Toronto Collegiate Institute junior basketball team