Kiera van der Sande

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Education

- **University of Colorado Boulder** — Boulder, CO
  Ph.D. in Applied Math — *Expected Graduation May 2022*
- **University of Colorado Boulder** — Boulder, CO
  M.S. in Applied Math; GPA: 4.0 — *Graduated Dec 2020*
- **University of British Columbia** — Vancouver, BC
  B.A.Sc. in Engineering Physics; GPA: 91.3% — *Graduated Dec. 2017*

Experience

- **University of Colorado Boulder** — Boulder, CO
  Graduate Researcher, Applied Math — *Sept 2018 - Present*
  - **Current research**: Machine learning of parameters for numerical differential equation solvers. Mesh-free modeling of cyclone interaction.
  - **Nonlinear waves**: Developed theory for interaction between solitary waves and large scale flows and verified using numerical models.
  - **Node generation**: For meshless partial differential equation solvers. (Git repository.)

  Lead Teaching Assistant, Applied Math — *May 2019 - May 2020*
  - **Teaching Excellence Seminar**: Ran a weekly seminar for first year graduate students in the department to discuss teaching practices, with an emphasis on active learning.

  Teaching Assistant, Applied Math — *Aug 2018 - Present*
  - **Recitations and office hours**: Calculus I and II, Differential Equations, Fourier Series.
- **University of British Columbia** — Vancouver, BC
  Research Assistant, Math Department — *Jul 2017 - Aug 2019*
  - **Grid generation**: Implemented a Winslow variable diffusion mesh generator as a novel application of the closest point method for solving PDEs on surfaces.

  Research Assistant, Sustainability Solutions Applied Physics Lab — *May 2017 - Aug 2017*
  - **Thermal modelling**: Developed thermal models in COMSOL to validate new greenhouse insulation.
  - **Physical experiments**: Designed and ran lab experiments to choose materials, test structural designs, optimize manufacturing, and support thermal models.
- **New Leaf Management Ltd.** — Vancouver, BC
  Instrumentation Engineer — *May 2016 - Aug 2016*
  - **Wind speed estimation**: Increased data resolution on wind speed measurements by 1000% by implementing an improved estimation algorithm in Python and C++ on a Linux based microprocessor.
  - **Sensor characterization**: Conducted tests in a wind tunnel and in the field to compare wind sensors.
  - **Mechanical design**: Reduced costs by 50% on a $4000 wind tower by designing, sourcing, and ordering parts.
- **ETH Zurich Institute for Dynamic Systems and Control** — Zurich, Switzerland
  Research Intern — *May 2015 - Dec 2015*
  - **Prototyping**: Designed a vertical take-off and landing vehicle including SolidWorks modelling, sourcing components, and mechanical assembly. Worked on 3 drone designs that demoed at a TED 2016 talk on "Dazzling flying machines of the future".
  - **Software**: Programmed onboard flight control for prototype in C++. Wrote firmware for new motor controllers and a GUI for a flight demo.
- **Beeyond Agricultural Venture** — Vancouver, BC
  Co-Founder — *Nov 2015 - Aug 2017*
  - **Design and experiments**: Developed a novel mechanical pollination method as an alternative to commercial bees in agriculture and verified its efficacy through experiments on greenhouse tomatoes.

- **Funding**: Obtained $20,000 in start-up capital by developing a strong pitch and persuading an investor to finance engineering work and market research for a summer.
- **Market research**: Determined market viability and value proposition for local blueberry farmers through interviews with over 25 industry contacts.

- **University of Ottawa** Ottawa, ON
  Research Assistant, Quantum Photonics Lab *Jan 2014 - Apr 2014*
  - **Optical experiment**: Disproved existing theory on a property of light in optical fibers through rigorous debugging and implementing changes to an experimental set-up.

Projects

- **Solar Irradiance Forecasting**: Achieved 5-15% improvement over standard persistence models for short term solar power predictions using probabilistic machine learning methods.
- **Battery Management System**: Implemented algorithms in C++ to estimate state of charge and state of health of Lithium-ion batteries for Electra Motor Corp. .
- **Autonomous Driving Robot**: Electrical system lead for a robot designed to navigate an obstacle course and retrieve objects. Achieved 1st place in course competition.

Community

- **Association for Women in Math** Boulder, CO
  President, Community and Recruitment Coordinator *May 2020 - Present*
  - **Community Building**: Piloted an annual retreat for graduate students. Organized member lunch and coffee hours. Led informal discussions on topics like imposter syndrome.
  - **Previous roles**: Vice president, Community and Recruitment Coordinator

- **Engineers Without Borders Canada** Vancouver, BC
  Co-President, Advocacy Lead *Apr 2013 - May 2017*
  - **Co-President (2016-17)**: Brought in new programming including a global engineering certificate and an app to reduce food waste by coaching the executive team, and managing over 60 members and a $20,000 budget. Ran team retreats, weekly discussions, and acted as liaison with faculty and external organizations.
  - **Fundraising**: Raised over $4600 in sponsorship and developed 5 new corporate relationships as part of a fundraising effort that culminated in an inaugural gala.
  - **Advocacy**: Influenced Canada's implementation of a Development Finance Institute by organizing meetings with 4 local Members of Parliament and running 2 public events as part of an organization-wide campaign.

- **Western Engineering Competition** Vancouver, BC
  Planning Committee, Director of Re-Engineering Competition *Apr 2016 - Apr 2017*
  - **Composter redesign**: Led a case competition for 20 teams to redesign composters by developing the case study, coordinating judges, and coaching teams through the 2-day event.

Technical Skills

- **Languages**: Python, MATLAB, C++
- **Tools/Environments**: Git/SVN, Jupyter, Linux

Publications and Talks

- K. van der Sande, G. El, M. Hoefer. 'Soliton-Nonconvex mean flow interaction'. *In preparation.*
- K. van der Sande, B. Fornberg. 'Fast variable density 3-D node generation'. *SIAM J. Sci. Comput.* Accepted Sept 2020.
- 'Mesh Generation using Closest Point Method'. 15th Annual SIAM Front Range Applied Mathematics Student Conference. March 2019.

Awards

- **Sheryl R. Young Fellowship**: 2020
- **Graduate Dean's Fellowship**: 2018
- **Applied Mathematics Entrance Fellowship**: 2018
- **Trek Scholarship**: 2014, 2015, 2016
- **Engineering Physics 50th Anniversary Award**: 2014
- **APEGBC Scholarship**: 2013