PERSONAL INFORMATION

Ruiheng Su

📍 5960 Student Union Blvd., Vancouver, BC, Canada

✉ raysu@student.ubc.ca

⊙ www.github.com/sillyPhotons

EDUCATION

Graduation: May 2023

Third year,
Dean's Honour list

Bachelor of Applied Science, Engineering Physics
The University of British Columbia (UBC), Canada

RESEARCH EXPERIENCE

September 2020 – Present

UHV,
Python,
Power electronics,
Web-based GUI design

Commissioning a Zeeman effect molecular decelerator
Prof. Takamasa Momose, Momose Lab, UBC, Canada

- Accelerated the commissioning process by closely collaborating with electrical and mechanical technicians to assembly of ultra-high vacuum and power electrical components of a Zeeman effect decelerator
- Contributed to rapid troubleshooting of decelerator electronics and parameter tuning by designing a custom web-based waveform viewer and analyzer in Python

March 2020 – May 2020

Python,
Data visualization,
Statistical modelling

Mathematical modelling of patient radiotherapy treatment response
Prof. Geordi Pang, Sunnybrook Health Science Center, Toronto, Canada

- Successfully implemented a mathematical model to predict radiotherapy treatment response of non-small cell lung cancer patients, reproducing the results of the original publication well
- This involved:
  • figuring out how to fit a 16 parameter model using patient survival curves
  • using parallelism to speed up computations

January 2020 – March 2020

Geant4, ROOT, C++,
Radiotherapy physics,
Monte-Carlo simulations

Simulating particle-matter interactions
Prof. Geordi Pang, Sunnybrook Health Science Center, Toronto, Canada

- Used the Geant4 and ROOT toolkit to predict the scattering to primary ratio of a high quantum efficiency MeV X-ray detector
- Developed a cargo imaging simulation from scratch. This involved defining that involved scoring energy deposition of gammas rays and neutrons, and calculation of muon scattering angles

May 2019 – August 2019

Python,
Lasers,
Optimization,
Serial/GPIB interface

Designing a graphical UI for sillicon photonics measurements
Prof. Jeff Young, Photonics and Nanostructures Laboratory, UBC, Canada

- Conceptualized a scalable web-based testing interface for photonic device measurements to replace a closed sourced system
- Automated photonic device measurement by:
  • writing custom Python scripts to control a piezoelectric stage
  • mapping coordinates of photonic devices from design files to third physical coordinates on the stage
- Implemented optical fiber array to device closed-loop fine alignment using a modified gradient descent algorithm

CERTIFICATES

July 2020 – December 2020

"Finite Element Method for Problems in Physics"
University of Michigan, 13-week online course

deal.ii,
FEniCS,
ParaView,
Finite Element
Numerical analysis

– Learned the theory behind finite element solutions to linear elleptic, parabolic, hyperbolic partial differential equations for scalar and vector unknowns
– Introduced to convergence, consistency, and stability analysis of Euler and Newmark family algorithms as applied to semi-discrete finite element methods
– Implemented and visualized solutions to static and time dependent equations in two and three dimensions using deal.ii (in C++), FEniCS (in Python), and Paraview
– Typeset more than 185 pages of <u>course notes</u> in LaTeX

May 2020 – June 2020

"Writing in the Sciences"
Stanford University, 8-week online course

Academic writing

– Learned techniques to clearly and effectively communicate scientific ideas with focus on the process of pre-writing, drafting, revising, and publishing academic papers
– Introduced to other areas of academic writing: review articles; grant applications

OTHER PROJECT EXPERIENCE

September 2020 – December 2020

Simulating an automous vehicle
Engineering Physics 353, UBC, Canada

Course Project

Linux,
Computer vision,
Machine Learning

– Developed a robust scheme involving classical and machine learning methods to enable a vehicle to autonomously navigate a competition area while performing identification tasks and avoiding obstacles
– Trained imitation neural networks to output vehicle control commands using 10000+ custom captured images

August 2020

Developing an undergraduate physics lab course
Prof. Sarah Burke, UBC, Canada

LaTeX, Arduino,
Processing language,
Instructional documents

– Implemented measurement cursors, and data acquisition features in an Arduino oscilloscope graphical UI to be used by hundreds of new students
– Created schematics and instructional documents in anticipation for the online delivery of a lab course in January 2021

May 2020 – August 2020

Building an autonomous recycling robot
Engineering Physics 480, UBC, Canada

Course Project

Soldering,
Prototyping,
CAD, STM32,
Microcontrollers

– Prototyped, constructed, and programmed a fully autonomous robot which detects, retrieves and returns scattered soda cans to a 12-in tall recycling bin
– Gained experience in: designing noise-tolerant electromechanical systems; circuit troubleshooting; state-machine programming

SOFTWARE

Ubuntu Linux

C/C++; Julia; Java; LaTeX; MATLAB; Python; Processing; Shell Script; VHDL

INTERESTS

Scientific

I always look to gain hands-on experience in different fields of physics. I am interested in:

– Quantum devices;
– Metrology;
– Numerical analysis

Personal

I enjoy cooking and playing the bagpipes