JOHANN DRAYNE

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EXPERIENCE

Graduate Research Assistant
September 2021 – July 2024

Quantum Devices Group @ Stewart Blusson Quantum Matter Institute
Vancouver, Canada

- Led the **full research cycle** on **nanoscale semiconductor quantum dots**, including design, fabrication, measurement, analysis and communication through meetings, presentations and scientific papers (Link to Master's Thesis).
- Conducted **low-temperature** ($10\,\mathrm{mK}$) electrical measurements using **voltage sources**, **current meters** and **lock-in amplifiers** to characterise charge transport in quantum dots.
- Co-developed updated data collection processes using **IGOR**, enhancing instrument communication and data management. Actively contributed to a large codebase through **Git** version control. Created a custom **Python** parser to visualise function dependencies in the **IGOR** repository, facilitating onboarding for new team members.
- Leveraged **Python** for data preprocessing and analysis, including **downsampling** and **outlier removal** due to the $10\,\mathrm{GB}$ of nightly data, streamlining the analysis process. Employed **simultaneous fitting** techniques to validate data against theoretical models.
- Consistent execution in high-stakes device fabrication within a cleanroom, managing gas systems, cryogenics, and electrical components with precision under pressure.
- Mentored undergraduate and graduate students in data analysis techniques and instrument operation, fostering independence and enhancing lab productivity.
- Presented research findings at international conferences, including Quantropy 2022, 2024, and March Meeting in Las Vegas 2023, communicating complex concepts to diverse audiences.

Research Assistant
January 2021 – August 2021

Weber Lab @ BC Children's Hospital Research Institute
Vancouver, Canada

- Developed a preprocessing pipeline in **Bash** for fMRI brain scans, enabling streamlined data handling. Utilised **R** for data cleaning and modelling, employing **linear mixed effects** models to analyse changes in **fractal dimension** across subject categories. Repository: WeberLab/LRTC_PLOSComplex. Published paper: PLOS Complex Systems.

R&D Engineer & Project Lead
April 2020 – December 2020

Jans Composites
Antrim, Northern Ireland

- Lead the end-to-end development of a touchless hand washing station, delivering a market-ready product through R&D, strategic supplier sourcing, efficient production management, targeted sales and marketing efforts.

PROJECTS

- **Dash app** that takes .DXF files and computes quantum properties to streamline device design. johann997/2deg_yodels
- Utilised a temperature sensor and **Arduino Uno WiFi** to transmit sensor data to a **PostgreSQL** database. I used **SQL** in **Grafana** to visualise the data for real-time and remote monitoring.

EDUCATION

University of British Columbia — **M.Sc. Physics** — May 2022 – July 2024

University of British Columbia — **B.Sc. Honours Physics (with Distinction)** — September 2017 – May 2022

SKILLS

Languages	Python, SQL, Bash, R, MATLAB, Arduino, IGOR, PHP, HTML, C
Technologies	Tableau, git, conda, Jupyter, Excel, LaTeX, Docker, Fusion 360, Klayout, KiCad
Libraries	scikit-learn, pandas, plotly, dash
Hardware	Lock-in amplifier, DAC, ADC, dilution refridgerator, EBL, photolithography, evaporator, SEM, AFM
Core	Curious, Collaboration, Problem Solving, Adaptability, Storytelling, Initiative, Enthusiasm

AWARDS

International Tuition Award	2022, 2023
Dean's Honour List	2018, 2019, 2021, 2022
Rosemary Stewart and Ioan James Scholarship	2022

COURSES

- Quantum Mechanics (Graduate UBC)
- Theory of Measurement (Graduate UBC)
- Condensed Matter Physics (Graduate UBC)
- Nanoscale Modelling and Simulation (Graduate UBC)
- IBM Data Science (Coursera)
- Tableau for Data Scientists (LinkedIn)