Hi, I'm Daniel.

Science rules!

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Education:
B.Sc. in Science from York University, with some focus on Physics. Graduated January 2021 with B+ GPA.

SafeSump Inc.

Founder/CTO of four-year project to design and produce a failure-resistant water pump system. Funded by a $37,500 Ontario Centres of Excellence grant (2017-2020) followed by a $75,000 government contract (2018-2020).

Broad overview of skills gained:

- **Electronics**: Hardware development from in-house prototyping to volume production; design of ultrasonic and capacitive sensors
- **Software and firmware**: Writing and maintaining a 20k SLOC codebase of Python and embedded C and C++ on STM32 and SAM devices. Version control, frontend and backend programming; Linux administration.
- **Soft skills**: Pair programming, management, collaboration

0.1 Personal research projects

Musings on an inexpensive 1500°C silicon carbide furnace

An attempt to make various high-performance ceramic techniques available to a broader audience.
Built on the work of more than 200 scientific papers.

A short report on some parts can be found at 0xdbfb7.com/furnace.html.

Some notes and experiments on the electropermeabilization of viral membranes

A 10-month attempt to follow up experimentally on previous research regarding the dielectric properties of viruses.

Involved a custom, inexpensive synchronous photon-counting fluorescence DNA sampling system and a custom 12 GHz absorption spectrometer.

Broad overview of skills gained:

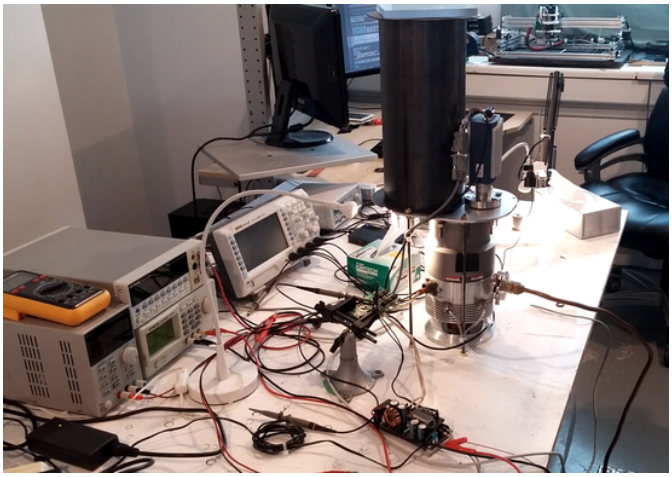
- **Documentation**: LaTeX, Jupyter notebooks, Reference management
- **Software**: Data analysis and automation; Python, C++, Mathematica, with a smattering of Julia and MATLAB.
- **Simulation**: Several dozen toolchains were in use, ranging from modified open-source electromagnetic simulation systems to molecular dynamics with GROMACS.
- **Electronics**: Microwave electronics design, PCB design with KiCAD
- **Fabrication**: Electronics prototyping, CNC mill and lathe operation, micromachining, microfluidics

R&D in vacuum systems

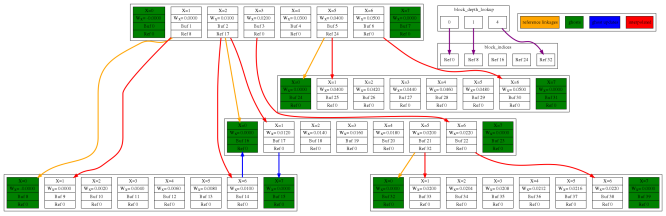
A multi-year attempt to develop a high-current ion beam lithography system, involving vacuum chamber design and fabrication and several custom GPU-accelerated simulation tools written in CUDA/C++.

Personal:
Member of SimCoLab hackerspace for 7 years.
Canadian and German citizenship.

1 Gallery

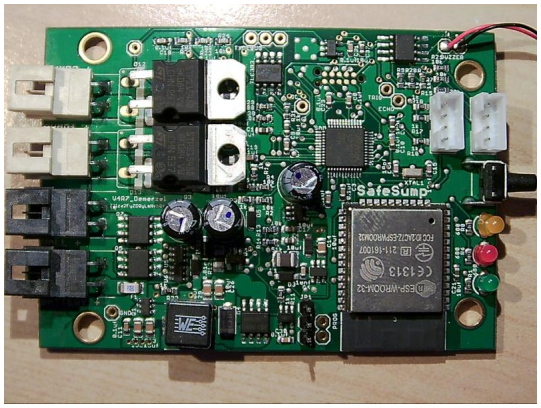


(a)

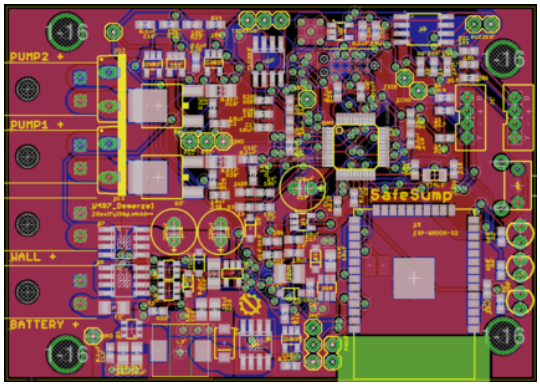


(b)

Bespoke high vacuum system. GPU-accelerated multigrid data structure and electrostatics solver for particle-in-cell ion beam simulation.

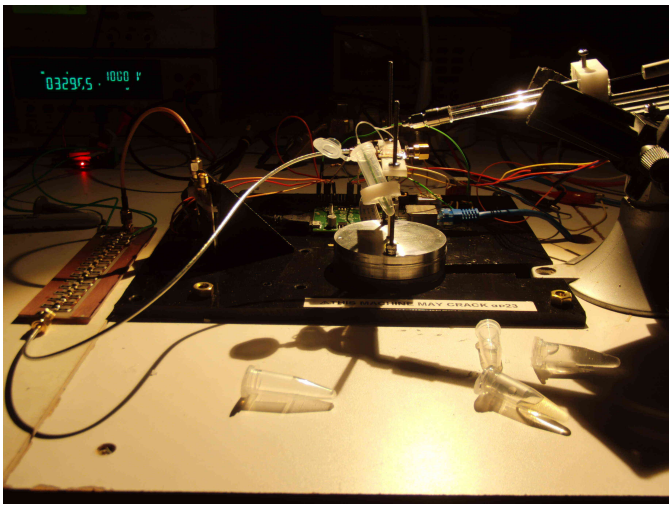


(c)

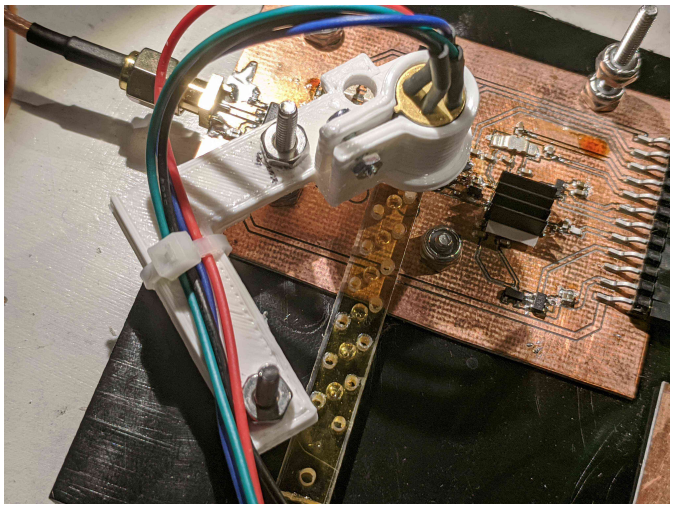


(d)

Redundant controller with a 120 Mhz Atmel ARM processor, running ~10k lines of high-reliability firmware.

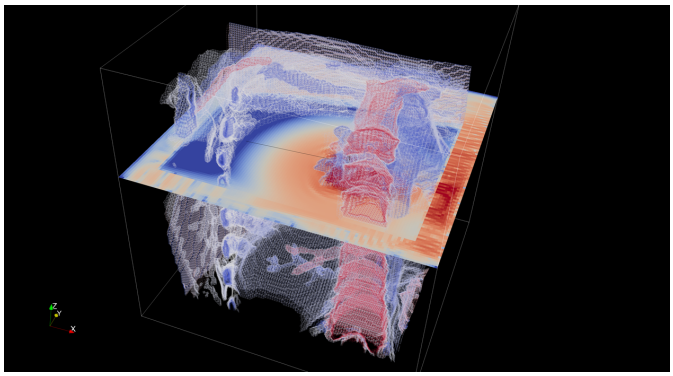


(e)



(f)

(g)



(h)

(a) A sub-nanosecond kilovolt pulse exposure cell (based on an off-the-shelf avalanche transistor pulser design).
(b) A 12 GHz microwave absorption spectrometer.
(c) The very pretty opalescent blue culture caused by E. coli B trying to metabolize lactose in an indicator for the enzyme β-galactosidase.
(d) An FDTD simulation of electromagnetic interaction with tissue.