Ben Wiener

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Skills

Computing	Machine Learning, Distributed Computing, Discrete Optimization, Computer Vision
Languages	Python, JavaScript, C/C++, Haskell
Packages	PySpark, PyTorch, OpenCV, TensorFlow, Z3, Gurobi
Software	Unix, Git, Docker, AWS, Solidworks/OnShape, Illustrator, LaTeX
Laboratory	Digital Electronics, Microcontroller Programming, Microfabrication, Electron Microscopy

Experience

2020 – **Data Scientist**, *Vectra AI*.
Wrote production code for detecting malicious activity in network metadata and public cloud logs using PySpark and PyTorch. Developed methods for tracing the identities of users in cloud logs. Built tools to simplify workflows for myself and my teammates.

2012 – 2019 **Postdoctoral Research Associate and PhD Researcher**, *Brown University*.
Performed the first measurement of ion motion in a nanofluidic channel driven by a liquid viscosity gradient using Python and Mathematica to collect the data, process it, and compared it with a physical model. Wrote Python/OpenCV software for tracking faint quantum dots in microscope videos and estimating local viscosity. Designed and built central pieces of a new machine for analyzing and sequencing proteins and other biopolymers using mass spectrometry.

2018 – 2020 **Technical Consultant and Co-Founder**, *Perciplex, LLC*.
Developed a new protocol for data collection in mesh networks using C++ and Omnet++ simulations, showing that significant throughput gains were possible Co-authored a (pending) patent based on the results of the above simulations. Used machine learning to optimize power grid trading strategies.

2011 – 2012 **Research Technician**, *CERN/Brandeis University*, Geneva, Switzerland.
Developed autonomous control software for the ATLAS Long Guide Tube, a robotic system designed to replace the ATLAS beam pipe and enable higher resolution measurements.

Education

2012 – 2019 **Brown University**, *PhD in Physics*.
Performed the first measurement of ionic motion in a liquid viscosity gradient.
Helped develop a new electrospray mass spectrometer with the goal of analyzing and sequencing proteins and other biopolymers.
Thesis: *Electrokinetic current driven by a viscosity gradient*
Adviser: Prof. Derek Stein

2007 – 2011 **Brandeis University**, *BS in Physics*.
Experimental particle physics: Worked on the alignment system for the ATLAS end cap muon detectors.
Thesis: *Determining the ATLAS muon momentum resolution from Z and high mass Drell-Yan events.*
Adviser: Prof. Craig Blocker

Independent Projects

RaaS: Reality as a Service Built a free hosted robotics platform. Our system implements the OpenAI Gym interface to allow users to control physical robots. Built a fleet of four driven pendulums designed to match the Pendulum-v0 environment. See blog post for more info.

Flappy Bird MPC Wrote a model predictive controller for the video game Flappy Bird. Phrased game dynamics and constraints as a mixed integer linear program, solved with Gurobi and CVXPY. See blog post for more info.

Cart-Pole Designed and built a robotic cart-pole/inverted pendulum system using Onshape, 3D printing, and microcontrollers for control theory and reinforcement learning experiments. Used OpenCV to optically determine the state of the system. Write swing-up and inverted balancing controller using Python.

Portrait Drawing Robot Designed and built a robotic 2D pen plotter using OnShape, 3D printing, and microcontrollers. Wrote software using OpenCV to capture a photo of a person and convert it to a line drawing for plotting.

Battle Bot Designed and built an electronically controlled, pneumatically powered, axe wielding battle bot.

Patents, Publications, and Presentations

2019 J. Weiss, M. King, D. Oller, P. Zucker, & B. Wiener. **Wireless mesh data network with increased transmission capacity.** US Patent 10517092B1.

2016 W. Maulbetsch, B. Wiener, W. Poole, J. Bush, & D. Stein (2016). **Preserving the sequence of a biopolymer's monomers as they enter an electrospray mass spectrometer.** Physical Review Applied, 6(5), 054006.

2017 Bush, J., Maulbetsch, W., Lepoitevin, M., Wiener, B., Mihovilovic Skanata, M., Moon, W., ... & Stein, D. (2017). **The nanopore mass spectrometer.** Review of Scientific Instruments, 88(11), 113307.

2018 Wiener, B., & Stein, D. (2018). **Noise-Driven Drift in a Viscosity Gradient.** arXiv preprint arXiv:1807.09106.

2015 **Noise and Ionic Conductivity in Glass Nanochannels** *APS March Meeting*

2017 **Brownian Motion in a Viscosity Gradient** *Flow17 Conference*

2018 **Electrokinetic Current Driven by a Viscosity Gradient** *APS March Meeting*

2019 **Development of a Mass Spectrometer for Sequencing Single Proteins** *APS March Meeting*

Interests/Projects

Woodworking *Furniture, boats, trebuchet*

Backpacking *VT Long Trail, Pemi Loop, AT section hikes, Presidential Range*

Electronics *Projects and experiments with microcontrollers and radio (KC1EVW)*