Andrew Hill

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Education

University of Washington, Seattle
Ph.D. in Genome Sciences (entering class of 2014)

University of Washington, Seattle
B.S. in Bioengineering with College Honors (2012)
3.79 Departmental GPA; 3.69 Overall GPA

Research Experience

10X Genomics 9/2016 – 1/2017
Consultant
– Software development for single-cell VDJ product.

10X Genomics 6/2016 – 9/2016
Computational Biology Intern
– Research and development to enable co-assay for single-cell measurement of both gene expression profiles and VDJ sequences (T-cell and B-cell receptor sequences).
– Software developer for production and customer facing versions of CellRanger 1.2, a Python and Rust based distributed computing pipeline for 10X single-cell RNA-seq and VDJ datasets.
– Co-developed and deployed secondary analysis toolkit for 10X single-cell RNA-seq datasets in R.

Shendure Lab of University of Washington Department of Genome Sciences 9/2014 – Present
Ph.D. Candidate
– Computational and molecular biology methods development for:
  • Simultaneous measurement of multiple data types from single-cell genomics datasets.
  • Developing novel forward genetics paradigms.
  • Examining regulation during cell-fate decisions using single-cell approaches.
– Contributed to development of a novel method for determining which cell types are contributing to cell-free DNA in blood plasma samples from cancer patients using changes in inferred nucleosome positioning.
– One of two main developers of an interactive data visualization tool utilizing D3.js and jQuery to explore spatiotemporal measurement of gene expression in developing *C. Elegans* embryos (EPICViz).

MacArthur Lab of Massachusetts General Hospital/Broad Institute of MIT and Harvard 9/2013 – 9/2015
Research Assistant
– Developed python API and scripts to extract/refine data from Leiden Open Variation Databases.
  • Performed extensive automated validation of variants mapped from HGVS to VCF format.
– Developed methods for automating detection of misannotated protein coding exons in GENCODE using metrics for evolutionary conservation, constraint in a large reference panel, and tissue expression levels.
– Wrote software to detect and analyze multi-nucleotide polymorphisms derived from ~65K exome sequencing samples that change variant interpretation compared to individual variants.

Tekscan, Inc. 9/2012 – 1/2014
Applications Engineer
– Conducted engineering research projects for new applications of force and pressure sensors.
  • Implemented algorithms to estimate shoe-size from noisy pressure sensor data.
  • Signal processing and data analysis for IMU position/angle tracking of human gait.
  • Improved algorithms for gait-analysis from Tekscan pressure sensor data.
– Developed automated test fixtures and data-analysis scripts with MATLAB and LabVIEW.
– Provided engineering support and/or training to customers and all internal departments.

UW Biorobotics Lab (Professors Blake Hannaford and Howard Chizeck) *1/2010 – 6/2012*
Undergraduate Research Assistant

- Thesis: Online Modeling of the *In Vivo* Mechanical Properties of Soft Tissue for Robotic Surgery
  - Designed, built, and programmed electromechanical device to quantify in vivo tissue dynamics.
  - Developed Unscented Kalman Filter/signal processing using MATLAB/C++.
- Co-developed hardware and microcontroller code for haptic-enabled glove.
- Developed hardware and microcontroller code to detect peg-contact in FLS block-transfer task.

Professor Joan Sanders Lab 8/2009 – 1/2010

Undergraduate Research Assistant

- Collected/analyzed data to calibrate tri-axis piezoelectric force sensor for amputee gait analysis.
- Designed and built Plexiglas housing for patient-mounted electronics.

Selected Awards and Honors

- National Science Foundation Graduate Research Fellowship (5 year fellowship, 3 years funding)
- Mary Gates Research Scholarship
- USA Gymnastics Men's Program Scholarship
- Friends of Gymnastics Scholarship

Publications

- Xiaojie Qiu, **Andrew Hill**, Jonathan Packer, Dejun Lin, Yian Ma, Cole Trapnell. Single-cell mRNA quantification and differential analysis with Census. **In Press, Nature Methods.**
- Exome Aggregation Consortium, Monkol Lek, Konrad J Karczewski*, Eric V Minikel*, Kaitlin E Samocha*, Eric Banks, Timothy Fennell, Anne H O'Donnell Luria, James S Ware, **Andrew J Hill**, Beryl B Cummings, Taru Tukiainen, Daniel P Birnbaum, Jack A Kosmicki, Laramie Duncan, Karol Estrada, Fengmei Zhao, James Zou, ***[54 additional authors],*** Mark J Daly, Daniel G MacArthur. Combined analysis of protein-coding genetic variation in 60,706 humans. **August 2016**. **Nature** 536,285–291.
- Matthew W Snyder*, Martin Kircher*, **Andrew J Hill**, Riza Daza, and Jay Shendure. Cell-free DNA Comprises an *In Vivo* Nucleosome Footprint that Informs Its Tissues-Of-Origin. **January 2016**. ***Cell***, *164*(1-2), 57–68.
- Xinxian Deng, Wenxiu Ma, Vijay Ramani, **Andrew Hill**, Fan Yang, Ferhat Ay, Joel B. Berletch, Carl Anthony Blau, Jay Shendure, Zhijun Duan, William S. Noble, and Christine M. Disteche. Bipartite structure of the inactive mouse X chromosome. **August 2015**. **Genome Biology**, 16:152.

Invited Talks

- **Andrew Hill**, Beryl Cummings, Konrad Karczewski, Monkol Lek, and Daniel MacArthur. "Phased annotation of protein-coding variants across 60,706 human exomes." Presented at the 65th Annual Meeting of The American Society of Human Genetics, **October, 2015** in Baltimore, MD.
- **Andrew Hill**, Xiaojie Qiu, and Cole Trapnell. "Pseudotemporal ordering of cells undergoing immune stimulation and perturbations to cell-cell signaling." Genome Training Grant Symposium invited trainee speaker. **July, 2015**.
- **Andrew Hill**. "Calibration and Synchronized Data Acquisition for High-Speed Applications." Tekscan North American Distributor Meeting. Boston, MA. **April, 2013**.
- **Andrew Hill**, Sina Kosari, Blake Hannaford, and Howard Chizeck. "Online Modeling of the *In Vivo* Mechanical Properties of Soft Tissue for Robotic Surgery." University of Washington Mary Gates Undergraduate Research Symposium. Seattle, WA. **May 2012**.

Selected Coursework

Data Visualization (CSE 512) Applied Biostatistics I/II (BIOSTAT 514/517) Linear algebra/Diff. Equations
Embedded Microcomputer Systems (EE 472) Digital Signal Processing Computational Molecular Biology

Independent Coursework

- Machine Learning — Coursera (Stanford)
- Algorithms Design and Analysis – Part 1 — Coursera (Stanford)
- Circuits and Electronics — MIT Open Courseware
- Manual Machining and Layout (Mill and Lathe) — Artisan's Asylum

Skills

- **Computing:** Python, R, bash, Java, C#, MATLAB, LabVIEW
- **Web Development:** HTML, CSS, JavaScript, D3.js, React.js, jQuery
- **Operating Systems:** Mac OSX, Linux, Windows
- **Embedded Systems:** ARM and Arduino embedded system programming
- **Machining:** CNC mill, lathe, band-saw, drill-press, various hand tools

Coaching and Teaching Experience

Genome Sciences 361: Fundamentals of Genetics and Genomics — Autumn 2016
Teaching Assistant

iD Tech Camps — Summer 2012
Summer Camp Instructor: Programming in Java and Adventures in Robotics

UW Bioengineering Department Circuitry Workshops — Winter 2012
Volunteer Instructor

UW Bioengineering Outreach Program — 12/2011 – 6/2012
Ultrasound Education Module Co-Developer and Instructor

United States Gymnastics Training Camps — Summers 2005 – 2010
Counselor and Coach

Leadership Experience and Activities

Dana-Farber Cancer Institute, Brigham and Women's Hospital — 9/2012 – 4/2013
Volunteer – Kraft Family Blood Donor Center

UW Biomedical Engineering Society — 6/2011 – 6/2012
Vice President and Webmaster

UW Honors Department — 9/2008 – 9/2009
Peer Mentor

Washington Men's Gymnastics Team — 8/2008 – 10/2009
Team Member

Study Abroad

- Creative Travel Writing and Sustainability in Ecuador — Summer 2010