

Kale J. Franz, PhD

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Passionate about conquering hard problems for a better future. Leveraging hardware, software, and non-technical skill sets in a knowledge-accelerating world.

Education

Princeton University 2009
PhD in Electrical Engineering

- ▶ Wallace Fellow (top 24 recognition within PhD cohort)
- ▶ Wu Prize for Excellence

Princeton University 2006
MA in Electrical Engineering

- ▶ With coursework through the Woodrow Wilson School of Public & International Affairs
- ▶ National Science Foundation Graduate Research Fellowship

Colorado School of Mines 2004
BS in Physics

- ▶ Minors: Electrical Engineering, Public Affairs
- ▶ GPA 4.00/4.00 (1st in class)
- ▶ Dean's Service Award
- ▶ Member, Board of Trustees

Software Skills

Core Language Proficiencies: Python, Java, Bash, C
Substantial Language Experience: JavaScript, Go, Scala, R, LaTeX, LabVIEW, MATLAB, Mathematica
NoSQL Databases: MongoDB, OrientDB, Cassandra
Distributed Data Grids & Caching: Redis, Memcached, Terracotta, Hazelcast
Relational Databases: MySQL, SQLite
Message & Task Queues: RabbitMQ, AWS SQS, Celery
Application & Web Servers: nginx, Apache, uWSGI, Tomcat, Jetty, ejabberd
Cloud-Based Infrastructure: Amazon Web Services, Google Cloud Platform, Digital Ocean
VMs & Containers: Docker, Vagrant, Packer, VirtualBox, VMWare Fusion
Linux Distros: CentOS, Ubuntu
Packaging & Package Managers: RPM, pip, conda, Pants, npm, bower, Maven
Continuous Integration & Automation: Ansible, Fabric, Jenkins, TravisCI
Load Testing Frameworks: JMeter, Grinder, Tsung
TDD & BDD: JUnit, pytest, nose
E2E Testing: Selenium, SauceLabs
Frameworks: Django, AngularJS, jQuery, Foundation, Twitter Bootstrap, Qt, Swing, JavaFX
Protocols: HTTP, XMPP, Thrift
Design Patterns
Algorithm Design and Development
RESTful APIs
Web and Network Security Best Practices (OWASP Member)
Agile / Scrum / Jira

Experience

23andMe, Inc 2013–present
Senior Software Engineer Mountain View, CA
▶ Performance and Security Group

BioDiscovery, Inc 2013
Senior Software Engineer El Segundo, CA
▶ Implemented numerically-efficient versions of several published algorithms for analyzing DNA microarray and Next Generation Sequencing data.
▶ Architected and initiated development on a secure and flexible license management system.
▶ Introduced and implemented modern software development practices, including a code and architecture documentation strategy, a transition from Subversion to Git version control, and a peer code review process.

Grindr LLC & Blendr LLC 2012–2013
Core Software Engineer Hollywood, CA
▶ Developed proprietary location algorithm at the heart of the company's location-based technology offering. The algorithm eliminated the use of 3000 Google App Engine instances, which were replaced with a single AWS EC2 m1.large instance capable of handling production-scale traffic. The new algorithm resulted in a savings to the company of \$1.4 million per year.
▶ Architected scaling and redundancy strategies for multiple proprietary technologies.
▶ Authored 78% of server-side code for completely revamped technology platform.

NASA Jet Propulsion Laboratory 2010–2012
Microdevices Engineer Pasadena, CA
▶ Principal Investigator for JPL award "Low power consumption lasers".
▶ Developed ErwinJr software package for quantum cascade laser simulation; NTR #48342; released publicly as open source. Written in a combination of Python and C++.
▶ Demonstrated first near-room temperature continuous wave quantum cascade laser fabricated within NASA for AEMC (Advanced Environmental Monitoring and Control) project.
▶ Designed, fabricated, and tested 4.x μm quantum cascade lasers for CO detection.
▶ Demonstrated high power (>100 mW) room temperature continuous wave 2.05 μm single spatial mode lasers for CO₂ lidar.
▶ Demonstrated world's first high power (>70 mW) room temperature continuous wave 2.05 μm distributed feedback lasers for NASA ASCENDS (Active Sensing of CO₂ Emissions over Nights, Days, and Seasons) deliverable.
▶ Developed advanced packaging techniques and procedures for high reliability laser operation.
▶ Mentored multiple graduate student interns.

Princeton University 2009–2010
Postdoc Research Engineer Princeton, NJ
▶ Developed traditional heterodyne detection systems for trace gas sensing.
▶ Researched non-traditional heterodyne techniques.
▶ Designed and built opto-electronic systems from off-the-shelf and research-grade components.
▶ Authored detection and analysis algorithms in MATLAB.

Primis Technologies LLC 2006–2009
Founding Partner & Senior Engineer Princeton, NJ
▶ Founded a startup company leveraging graduate research in mid-infrared laser and systems technology.
▶ Authored funding proposals for spectroscopic sensor systems and laser development.
▶ Developed core intellectual property, including

- advanced quantum cascade laser design software
- novel quantum cascade laser designs and strategies
- mid-infrared spectroscopic sensing systems

Non-Technical Strengths

Mentoring and teaching
Analytical writing
Interpersonal effectiveness
Public affairs and business foundation
Conflict resolution
Diversity of perspective through rural/farming youth
Political campaigning and public policy
Research and self-learning
Strategic and first-principles problem solving
Acute attention to detail

Hardware Specialization

Quantum cascade lasers
Compound semiconductor device fabrication
Opto-electronic packaging
Mid-infrared laser sources
Sensors and sensing applications
Analytical instrumentation

Awards

Jet Propulsion Laboratory Team Award	2011
Princeton University Wallace Fellow (signifying top 24 recognition within PhD cohort)	2008
Princeton University Wu Prize for Excellence	2008
Sigma Xi	2008
IEEE Indium Phosphide and Related Materials Conference Best Student Paper Award	2006
National Science Foundation Graduate Research Fellowship	2004
Colorado School of Mines Highest Scholastic (first in class) Honors	2004
Colorado School of Mines McBride Honors Program Philipose Senior Award	2004
Colorado School of Mines Physics Faculty Distinguished Graduate Award	2004
Colorado School of Mines Dean’s Service Award	2004
Tau Beta Pi	2002
American FFA Degree	2000

Activities & Volunteer Service

Princeton University IEEE Student Chapter Executive Board	2007–2009
Princeton University Graduate Engineering Ambassadors	2005–2009
National Science Bowl and National Middle School Science Bowl Moderator	2003–2008
National Science Bowl and National Middle School Science Bowl Question Author	2005–2008
Princeton University Graduate Engineering Council	2006–2007
Princeton University Electrical Engineering Graduate Student Council	2005–2006
Colorado School of Mines Board of Trustees Student Trustee	2003–2004
Colorado School of Mines Society of Physics Students	2002–2004
Colorado School of Mines College Republicans Chairman	2002–2004
Colorado School of Mines McBride Honors Program	2000–2004
Colorado School of Mines Tau Beta Pi Treasurer	2003–2004
Colorado School of Mines Student Body Secretary	2002–2003

Experience (continued)

Princeton University Research Assistant	2004–2009 Princeton, NJ
<ul style="list-style-type: none">▶ Researched and developed infrared lasers for applications in medical diagnostics, explosives sensors, and infrared countermeasures.▶ Invented new mechanism for achieving lasing in quantum cascade lasers through "high k-space lasing"; U.S.Patent Application 11744508.▶ Invented "short injector" quantum cascade lasers that led to lowered threshold current and deeper understanding of QC laser physics.▶ Invented ultra-strong coupling quantum cascade laser designs that led to world record 50% wall-plug efficiencies; U.S. Patent Application 12795954.▶ Demonstrated world’s first intersubband emission from II-VI quantum cascade structures.▶ Experience includes<ul style="list-style-type: none">▪ Molecular beam epitaxy of III-V and II-VI materials and devices, including quantum cascade lasers▪ III-V and II-VI compound semiconductor micro- and nanofabrication tools and techniques▪ Optoelectronics production packaging▪ C++, MATLAB, and finite element programming and optimization for operational analysis▪ Commercial and self-coded software for electromagnetic, optical, and thermal modeling and simulation▪ Mid-infrared optoelectronic device characterization and analysis for sensing and communication systems▪ Spectroscopic analysis techniques	
AdTech Optics, Inc. Technical Consultant	2007 City of Industry, CA
<ul style="list-style-type: none">▶ Collaborated on DARPA-funded quantum cascade laser design and development contract for infrared countermeasures.▶ Developed instrumentation for automated quantum cascade laser test and analysis systems.▶ Authored and performed test procedures for quality assurance of mission critical components.▶ Advised on production flow improvements based on broad process knowledge.	
National Renewable Energy Laboratory Research Intern	2003–2004 Golden, CO
<ul style="list-style-type: none">▶ Researched novel approaches to arc-discharge carbon nanotube synthesis.▶ Constructed an automated prototype nanotube growth system.▶ Synthesized carbon nanotubes through a laser vaporization process.▶ Used Raman spectroscopy, transmission electron microscopy, and thermogravimetric analysis characterization techniques.	
Colorado State House of Representatives Legislative Intern	2002 Denver, CO
<ul style="list-style-type: none">▶ Aid to Representative Brad Young, Chairman of the Joint Budget Committee▶ Drafted responses to constituent mail▶ Assisted in analysis of TaBOR effects on state budget	
U.S. Department of Energy, Office of Science Intern	2001–2002 Washington, D.C.
<ul style="list-style-type: none">▶ Traveled to DOE National Labs assisting University of Washington Center for Workforce Development in internship program review and evaluation, examining program value and customer (intern) satisfaction.▶ Advised on strategic direction for individual programs and department mission.▶ Editor and contributing author for first and second volumes of DOE Office of Science Journal of Undergraduate Research.▶ Worked directly under an Office of Science director in policy-related matters, including program management and Congressional budget proposals.	