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### *Objective*

To enthusiastically apply data science and engineering disciplines in a mission-driven team environment.

### *Education*

|                                   |  |
|-----------------------------------|--|
| Galvanize                         | Data Science certification, April 2016 |
| University of Colorado – Boulder  | Civil Engineering, Ph.D., 2011         |
| University of Wisconsin – Madison | Mechanical Engineering, M.S., 2004     |
| Stanford University               | Mechanical Engineering, B.S., 1995     |
|                                   | Biology, B.S., 1995                    |

### *Data science experience*

Student, Galvanize - Denver Platte Campus, Denver, CO. Feb.- Apr. 2016

- > Presently completing the Data Science immersive program. Class exercises utilize python, SQL, statistics, machine learning, natural language processing, neural nets, Spark, and AWS.
- > My capstone project models UAV package delivery for the Denver metro area under various assumptions. Graphical analysis determines best routes and aerial "highway" locations while a random forest classifier identifies home delivery landing zones from aerial images.

### *Engineering experience*

Manager Research & Development, Abengoa Research, Lakewood, CO. 2012-2015

- > Responsible for strategic vision and R&D budgets. Authored and awarded \$3 million solar collector research proposal.
- > Designed, prototyped, tested, and patented novel low-cost heliostat. Managed staff of 6 to meet design specifications and Dept. of Energy (DOE) deliverables. Deployed heliostat prototypes at test sites in Aurora, CO and Sanlúcar La Mayor, Spain in preparation for commercialization.
- > Programmed progressively learning heliostat beam aiming algorithm to bring the centroid of the reflected beam to an RMS deviation of 1 m from the aimpoint when heliostat was 1 km away.

Engineer IV, National Renewable Energy Lab (NREL), Golden, CO. 2006-2012

- > Ph.D. research determined inert-gas (Argon and Xenon) concentrations necessary to mitigate heat conduction caused by hydrogen permeation into the annuli of parabolic trough receivers.
- > Used Monte-Carlo simulation aided by Latin Hypercube Sampling to simulate gas heat conduction resulting from gas molecule motions and collisions in the receiver annulus. Employed differential and Monte Carlo methods to quantify physical test and simulation uncertainties.
- > Employed convolution and the central limit theorem to analyze solar optics.

### *Teaching experience*

Teaching Fellow, National Science Foundation, Univ. of Colorado - Boulder. 2005-2006

- > Taught Civil and Mechanical Engineering to high school students at Centaurus High School.
- > Authored lesson plans for elementary, jr. high, and high school students that are available on [www.teachengineering.org](http://www.teachengineering.org).

High School Teacher, Peace Corps Volunteer, Namibia, Southern Africa. 2000-2002

- > Taught math and science to Namibian students and helped secure school improvement funds.
- > Lived in a rural homestead with a Namibian family and communicated in Oshiwambo.

### *Technical competencies*

|        |                 |          |                                  |
|--------|-----------------|----------|----------------------------------|
| C++    | Matlab & Octave | FORTTRAN | MS Word/Excel/PowerPoint/Project |
| Python | SQL and Mongo   | Linux    | Google Maps and Wikipedia APIs   |

...and I am up for learning what's needed to get the job done.

### *Awards*

2015    Awarded \$3 million DOE contract to develop a low-cost solar collector at Abengoa Solar  
2009    R&D 100 Award for development of the Skyfuel SkyTrough Solar Concentrating Collector  
2007    American Society of Mechanical Engineers - Outstanding Graduate Student Award in Solar Energy  
2005    Solar Decathlon Winner – CU-Boulder won this international event; I was engineering team lead.  
2003    Swiss Federal Institute of Technology (ETH) - Energy Conversion Winner, for research titled  
          Building Energy Load and Colorimetry Analysis of a Hybrid Lighting System (my master's thesis)

### *Publications*

- > “Baseload Nitrate Salt Central Receiver Power Plant Design,” Department of Energy Award Number DE-EE0003596, Recipient: Abengoa Solar LLC, Project Manager: Drake Tilley, Technical Lead: Bruce Kelly, Heliostat lead: Frank Burkholder, Project Period 9/1/10-9/30/14.
- > Burkholder, F., C. Kutscher, M. Brandemuehl, E. Wolfrum, “The Test and Prediction of Argon-Hydrogen and Xenon-Hydrogen Heat Conduction in Parabolic Trough Receivers,” Proceedings of SolarPaces 2011 – Concentrating Solar Power and Chemical Energy Systems Conference, Granada, Spain, Sept. 20-23, 2011.
- > Kutscher, C., F. Burkholder, K. Stynes, “Generation of a Parabolic Trough Collector Efficiency Curve from Separate Measurements of Outdoor Optical Efficiency and Indoor Receiver Heat Loss,” Journal of Solar Energy Engineering (Vol. 134, Iss. 1), 2011.
- > G. Jorgensen, F. Burkholder, A. Gray, T. Wendelin, “Assess the Efficacy of an Aerial Distant Observer Tool Capable of Rapid Analysis of Large Sections of Collector Fields,” National Renewable Energy Lab Technical Report NREL/MP-550-44332, 2009.  
Available electronically at <http://www.nrel.gov/docs/fy09osti/44332.pdf>
- > Burkholder, F., C. Kutscher, “Heat Loss Testing of Schott’s 2008 PTR70 Parabolic Trough Receiver,” National Renewable Energy Lab Technical Report NREL/TP-550-45633, 2009.  
Available electronically at <http://www.nrel.gov/csp/troughnet/pdfs/45633.pdf>

### *Hobbies*

|        |          |                       |       |           |
|--------|----------|-----------------------|-------|-----------|
| tennis | painting | working on my spanish | chess | code wars |
|--------|----------|-----------------------|-------|-----------|

*Transcripts and references available upon request.*