Mark Edward Redd

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Experience

PhD Researcher

Brigham Young University, Provo, UT, USA | Advisor: Dr. W. V. Wilding | Jul 2016 – Present

- Research in autoignition temperatures (AIT) of pure compounds for AIChE's DIPPR 801 Database
- Improved the reliability of AIT values in the 801 Database through evaluation of data from 600+ sources
- Designed and constructed an experimental apparatus at ~ 10% of the expected capital cost
- Increased reliability and throughput of AIT measurements by automating aspects of the experimental process
- Wrote custom software to automate data acquisition and analysis using Python and C/C++
- Brokered the release of a previously closed-source AIT prediction method for publication
- Improved the method by relaxing assumptions, improving regression data quality, and expanding applicability
- Mentored 20+ undergraduates focusing on safety and relevant laboratory skills
- Teaching assistant for undergraduate courses on "Chemical Plant Design" and "Numerical Methods"

Engineering Intern

Sustainable Energy Solutions LLC, Orem, UT, USA | May 2014 – Aug 2015

- Worked with a team of engineers to build an experimental reactor
- Designed and began fabrication of a novel CO_2 separation process
- Designed parts and assemblies with Autodesk Inventor CAD software
- Personally fabricated multiple components through various welding and machining processes

Chemical Engineering Laboratory Assistant

Brigham Young University, Provo, UT, USA | Jun 2012 – May 2014

- Aided development of biomass gasification kinetic models by collecting data on more than 70 reactions
- Managed and carried out all aspects of laboratory work in an independent and unsupervised setting
- Improved experimental efficiency by automating data analysis with Microsoft VBA
- Trained 2 new employees in safety regulations and standard operating procedures

Full-Time Volunteer Missionary

The Church of Jesus Christ of Latter-day Saints, Salta, Argentina | Sep 2009 – Sep 2011

- Trained and mentored 2 new missionaries
- Conversed with 100+ people on the street and in homes explaining concepts in Spanish
- Participated in regular community service in 5 cities. Projects included cleaning a community park, street waste disposal and hospital visits

Biology Laboratory Assistant

Utah State University, Logan, UT, USA | Apr 2009 – Aug 2009

- Assisted a PhD candidate with experiments on Arabidopsis thaliana to find patterns in gene expression from the removal of Saccharide-9 from the plant genome
- Collected data from over 100 specimens by making synthetic growth media, planting and observing growth patterns

Education

Brigham Young University

Doctor of Philosophy, Chemical Engineering | Jul 2016 – 2021

Brigham Young University

Bachelor of Science, Chemical Engineering | Sep 2008 – Apr 2016

Skills & Accomplishments

Programming

- Experience with C / C++, C#, FORTRAN, Java, JavaScript / HTML / CSS, MATLAB, Python, SQL, Microsoft VBA
- Implemented and published the open-source Leapfrogging Algorithm with library wrappers for C, C++ and Python
- Wrote an open-source introductory book on Python and computer science

Software / Platforms

- Experience with Arduino, Autodesk Inventor, GCC and GNU Build Tools, Git, Linux, MathCAD, MATLAB / Simulink, Microsoft Office, Raspberry Pi, SQLite, Microsoft SQL Server
- Built custom data acquisition and analysis hardware and corresponding software using Arduino and other open-source platforms

Industrial

- Automotive repair and maintenance
- Electronics soldering and wiring
- Machining processes (i.e. end milling, turning etc.)
- Welding (SMAW, GMAW, Oxy-acetylene welding and brazing, GTAW)

Publications

- Joseph C. Bloxham, Mark E. Redd, Neil F. Giles, Thomas A. Knotts, and W. Vincent Wilding, *Proper Use of the DIPPR 801 Database for Creation of Models, Methods, and Processes*, Journal of Chemical & Engineering Data **2021** *66* (1), 3-10. DOI: 10.1021/acs.jced.0c00641

Presentations

- Mark E. Redd, Glenn Seaton, Thomas A. Knotts IV, Neil F. Giles, and W. Vincent Wilding. "An Improved Method for Predicting Autoignition Temperatures Based on First Principles", Properties and Phase Equilibria for Fuels and Petrochemicals: Model Development, AIChE Fall Meeting, November 16, 2020, Virtual Meeting, (https://youtu.be/v3WRcLRLV_M)
- Mark E. Redd, Thomas A. Knotts, Neil F. Giles, and W. Vincent Wilding. "A Study of Unexpected Autoignition Temperature Trends for Pure *n*-Alkanes", Presentation 480e, Presentation Session 480: Properties and Phase Equilibria for Fuels and Petrochemicals I, AIChE Annual Meeting, November 13, 2019. Orlando, FL.