Edwin Lee

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OBJECTIVE

To leverage my skills as a proficient programmer, mechanical engineer, and numerical analyst in the field of advanced building and system simulation.

EDUCATION

Doctor of Philosophy, Mechanical Engineering
Oklahoma State University, Stillwater, OK ..... May 2013
THESIS - A Generalized Pipe Heat Transfer Model for Whole Building Simulation Applications
GPA 4.00

Master of Science, Mechanical Engineering
Oklahoma State University, Stillwater, OK ..... May 2008
THESIS - Development, Implementation, and Verification of a Buried Pipe Model in EnergyPlus
GPA 4.00

Bachelor of Science, Mechanical Engineering
Oklahoma State University, Stillwater, OK ..... May 2006
GPA 3.52

ENGINEERING EXPERIENCE

Research Engineer ..... May 2013 – Present
National Renewable Energy Laboratory, Golden, CO

- Contributed to the Technology Performance Exchange (TPEx) via Data Entry Form development, dataset processing, and development of the logic and scripts to convert TPEx datasets into components on the Building Component Library
- Began leading technical development of EnergyPlus, overseeing the technical changes accompanying the translation from FORTRAN to C++, and StarTeam to GitHub

Graduate Assistant ..... January 2006 – May 2013
Oklahoma State University, Stillwater, OK

- A complete re-write of the EnergyPlus central plant simulation, including solution algorithms, pump model re-work, and updating component model design
- Developed a generalized horizontal ground heat exchanger model that includes interaction with a basement zone, specifically for use with foundation heat exchangers
- Performed experimental measurement and modeling of transport delay phenomena in piping systems
- Worked closely with the Center for the Built Environment at University of California, Berkeley, providing simulation support for Underfloor Air Distribution System research with EnergyPlus

Engineering Consultant ..... Fall 2007, Summer 2009
Oak Ridge National Laboratory, Oak Ridge, TN

- Utilized EnergyPlus to investigate wall constructions for residential applications
- Constructions included frame walls, solid wood walls, and phase change materials

Engineering Intern ..... Summer 2005
Specific Systems, Tulsa, OK

- Introduced to design and manufacturing of modular HVAC equipment
- Designed and fabricated parts
- Performed various mechanical and structural analysis on designs
- Aided in the construction of a thermal test chamber

COMPUTER SKILLS

- Proficient with Windows and Linux Operating System Environments
- Scripting Languages: Batch (Windows), Bash (Linux), Python, Ruby
- Programming Languages: FORTRAN, C, C++, VB.Net, VBA, Modelica, (Including Language Interop)
- GUI Development: VB.Net (Windows), Python (Cross-platform)
- Other software tools:
  - Office suites, including LibreOffice and MS Office, Gnumeric
  - Software version control tools, including Borland Starteam, Git, Subversion, and Bazaar
  - Publication tools, including LaTeX and GnuPlot
  - Software Tools, including EES, MathCAD, R, Fluent, AutoCAD, LibreCAD and Octave (Matlab)
  - Virtual machine utilization

ENERGYPLUS DEVELOPMENT

- Generalized buried pipe heat transfer model
- Plant pressure algorithms
- Central plant solver overhaul
- Development of a new testing framework
- Overseeing technical efforts for Fortran to C++ translation and StarTeam to GitHub transition

PUBLICATIONS

Raftery, P., E. Lee, T. Webster, T. Hoyt and F. Bauman. 2014. *Effects of furniture and contents on peak cooling load*. Energy and Buildings: 85:445-457.

Studer, D., K. Fleming, E. Lee and W. Livingood. 2014. *Enabling Detailed Energy Analyses via the Technology Performance Exchange*. Proceedings of the ACEEE Summer Study, Pacific Grove, CA, USA.

Lee, E., D. Fisher and J. Spitler. 2013. *Efficient Horizontal Ground Heat Exchanger Simulation with Zone Heat Balance Integration*. HVAC&R Research: 19(3):307-323.

Lee, E. and D. Studer. 2013. *TIP 287: Reducing Technology Evaluation Costs Through a Technology Performance Exchange. Deliverable 2.5: Draft Data Entry Forms*. NREL Report No. TP-5500-60219.

Xiong, Z., E. Lee and D. Fisher. 2013. *Development of a Horizontal Slinky Ground Heat Exchanger Model*. ASHRAE Transactions: 119(2).

Chandrasekharan, R., E. Lee, D. Fisher and P. Deokar. 2013. *An Enhanced Simulation Model for Building Envelopes with Phase Change Materials*. ASHRAE Transactions: 119(2).

Cullin, J., Spitler, J. and E. Lee. 2013. *Preliminary Investigation of the Effect of Horizontal Piping on the Performance of a Vertical Ground Heat Exchanger System*. ASHRAE Transactions: 119(2):302-311.

Webster, T., T. Hoyt, E. Lee, A. Daly, D. Feng, F. Bauman, S. Schiavon, K. Ho Lee, W. Pasut and D. Fisher. 2012. *Influence of Design and Operating Conditions on Underfloor Air Distribution (UFAD) System Performance*. Proceedings of Simbuild 2012, August 1-3, Madison, Wisconsin.

Cullin, J.R., L. Xing, E. Lee, J.D. Spitler and D.E. Fisher. 2012. *Feasibility of Foundation Heat Exchangers In Ground Source Heat Pump Systems In the United States*. ASHRAE Transactions: 118(1):1039-1048.

Kony, J., D. Yarbrough, W. Miller, P. Childs, J. Atchley, S. Shrestha, E. Kossecka, J. B. Smith, T. Fellinger, E. Lee, and M. Bianchi. 2010. *Theoretical and Experimental Thermal Performance Analysis of Building Shell Components Containing Blown Fiberglass Insulation Enhanced with Phase Change Material (PCM)*. Proceedings of ASHRAE THERM XII, Clearwater, FL.

Spitler, J., J. Cullin, M. Bernier, M. Kummert, P. Cui, X. Liu, E. Lee, and D. Fisher. 2009. *Preliminary intermodel comparison of ground heat exchanger simulation models*. Proceedings of 11th International Conference on Thermal Energy Storage; Effstock 2009, Stockholm, Sweden.

Cremaschi, L.,and E. Lee. 2008. *Design and Heat Transfer Analysis of a New Psychrometric Environmental Chamber for Heat Pump and Refrigeration Systems Testing*. ASHRAE Transactions 114(2):619-631.

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Additional Information

MEMBERSHIPS

American Society of Heating, Refrigerating, and Air-Conditioning Engineers
Student Member 2005-2013; Student Branch President 2007-2012; Member 2013-Present

HONORS

Phi Kappa Phi Honor Society ..... Superior Scholarship
A. B. Still Memorial Scholarship ..... Performance in Mechanical Engineering
Two-time ASHRAE Memorial Scholarship ..... Performance and Research Interests
Conoco-Phillips Memorial Scholarship ..... Performance in Graduate Studies
Central Oklahoma ASHRAE Chapter Graduate Fellowship ..... Performance in Graduate Studies

SPECIFIC PROJECT EXAMPLES

EnergyPlus Focus A graphical tool to improve work-flow during development of EnergyPlus

- Ability to modify reporting frequency/contents to any idf without opening the file
- Test suite tool to provide specific testing of particular file types and configurations
- Parametric tool using the EPMacro preprocessor, allows a generic number of parameters
- Direct access to calculate a mathematical difference summary of two EnergyPlus output files
- An IDF analyzer that compares directories of IDFs
- Ability to run an EnergyPlus simulation on any input file with a single click using a compiled EnergyPlus library

Plant Parameter Estimation A tool to regress manufacturer's data into EnergyPlus inputs

- Ability to paste in tabulated and correction factor data
- Creates a graphical report showing the resulting parameter quality
- Modular code allows for easy extension for new model types
- Multithreaded code allows the graphical interface to run while background operations perform the curve fit or parameter estimation

Buried Pipe Heat Transfer Tool A graphical tool for performing buried pipe simulations

- Formal XML input/output program structure
- Utilizes the same model that is implemented in EnergyPlus for buried pipe simulations
- Graphical mesh display and temperature/thermal property distribution

Data Acquisition A graphical Python application for monitoring data acquisition

- Monitors data acquisition from a serial/USB port RS-232 device
- Records raw data signals, converts to an analog, and processes into physical measurements where applicable
- Running graphs on-screen show each measurement status
- Implemented on a Linux machine, portable to other operating systems

IDD/IDF Library Multi-language library for accessing/manipulating idd and idf files

- VB.Net based library parses IDD and IDF with extensive error handling
- VB.Net application includes GUI and file comparison tools
- Python cross platform library is lightweight, simple, with minimal error handling
- Python application allows quick processing of well-formed idfs including multiple file comparisons