

Eric Charles Mai

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Profile

Seeking a position where I can use my interdisciplinary education and work experience to improve mobility by implementing creative, technology-based solutions to modern transportation / planning problems.

Education

University of California, Berkeley, Berkeley CA

M.S. in Civil Engineering, Civil Systems Program. Focus on Intelligent Transportation Systems, urban design.

December 2009. GPA (weighted): 3.72.

Relevant courses completed: Operation of Transit Facilities, Systems Analysis in Transportation, Transportation and Land Use, Sustainable Transportation, Civil Systems: Control and Information Management, Sensors and Signal Interpretation, Optimal Control of PDEs, Tangible User Interface Design

University of Oklahoma, Norman, OK

B.S. in Civil Engineering, *Summa Cum Laude*. May 2007.

Minors in Mathematics and Religious Studies.

Overall GPA: 3.95. Major GPA: 3.98. Hours completed: 190. EIT certified.

Relevant courses completed: Rigid Body Mechanics, Mechanics of Materials, Structural Analysis, Concrete I, Continuum Mechanics, Materials, Measurements, Mass Balance and Fate Process, Fluid Mechanics, Water Resources Engineering, Water Treatment Design, Soil Mechanics, Transportation Engineering, Calculus I-IV, Ordinary Differential Equations, Linear Algebra, Applied Statistical Methods I & II, Modern Geometry, Public Speaking, Professional Practice, Design Capstone.

Francis Tuttle Technology Center, Oklahoma City, OK

Relevant courses completed: Residential Framing I (Fall 2007).

Research Experience

Grad. Research Assistant / Research Associate *PATH, UC, Berkeley. Feb 2009 – Present*

Under Professor Raja Sengupta. Berkeley, CA.

- Develop and maintain web and iPhone-based applications for internal and public use (e.g., BayTripper, with over 700 downloads)
- Involved in fund-seeking, leadership, planning, and development on team-based projects concerning real-time transit trip planning, smartphone-based driver safety, and passive indoor mapping.
- Build database-level communication between servers for web-based display of transportation information.
- Seek out and resolve security issues in a web-based transportation safety application.

Research Assistant *University of Oklahoma, School of CEES. April 2005 – January 2008*

Under Dr. Jin-Song Pei. Norman, OK.

Analytical / Numerical Work:

- Constructed target data sets, checked research hypotheses by training neural networks. Helped to develop an innovative neural network initialization procedure based on training results and mathematical insights. Helped to create a graphical illustration of this procedure.

- Wrote and edited Matlab M-Files to plot neural network training performances and results and to extract Jacobian matrices and condition numbers from neural networks during training.
- Processed and performed preliminary analysis on data from a series of large scale U.C. Berkeley shake table tests. Reviewed literature and composed a technical report.

Technical Presentations:

- Assisted in preparation of conference presentations. Particularly, designing and creating Flash animations to illustrate neural network initialization procedures and training results.
- Co-Authored conference papers (eleven) and journal papers (three; two on initialization schemes for modeling nonlinear functions using neural networks, and one on using a wireless sensor network for pavement monitoring).
- Presented research at conferences (main presenter at 2006 4WCSCM, co-presenter at 2006 IMAC) and OU events (Undergraduate Research Day, Research Day at the Capital, Graduate Student Research and Creative Endeavors Poster Session).

Leadership Development:

- Performed managerial, administrative, and organizational tasks as inaugural leader of *Civil Data Studio*, a team of multidisciplinary and multi-institutional undergraduate and graduate research students. Monitored and assisted in progress of all research projects.
- Edited and proofread proposals, white papers, and reports in a wide range of domains.
- Developed video and photograph archives of a wide range of research and educational activities within the team.
- Conducted all website design, construction, and maintenance (civildatastudio.ou.edu).

Visiting Research Assistant *Columbia University, CEEM Dept. June 2006 – August 2006*

Under Professors Andrew W. Smyth and Raimondo Betti. New York, NY.

- Aided PhD students in running and collecting data from shaking table tests, including strong and weak-axis impact tests, earthquake excitations, and random noise excitations on both damaged and undamaged structures. Observed modal behavior.
- Worked to understand a theoretical multi-degree of freedom hybrid sensing system ID problem.

Independent Study Pupil *Weidlinger Associates, Inc. June 2006 – August 2006*

Under Professor Joseph P. Wright. New York, NY.

- Developed a method for finding the Jacobian matrix and influence numbers of neural networks at various stages of training.
- Learned numerical methods.

Industry Experience

Engineering Intern *Oklahoma Department of Transportation. May 2005 – August 2005*

Edmond, OK.

- Mediated discussion between the state, city, design engineers, and contractors, ensuring that roadways and structures were built according to plan and conformed to official standards.
- Oversaw the process and complications of transforming construction plans into actual roads and structures.
- Coordinated on-site concrete and nuclear soil density tests according to AASHTO specifications.
- Prepared weekly environmental reports, as well as spreadsheets, calculations, and progressive payment estimates.

Teaching Experience

Private Tutor *Jenkins-Smith Family. March 2008 – May 2008*

Norman, OK

- Sole instructor of one student for high school level Modern Physical Science course.
- Taught concepts, assigned and graded homework, prepared quizzes.

REU Research Mentor *University of Oklahoma, School of CEES. June 2007 – August 2007*

Norman, OK

- Led two REU students in a study on obtaining and visualizing nonlinearities using small timber models.
- Conducted shake table and free vibration tests on home-made models, analyzed and interpreted data.
- Authored a conference paper detailing methods and results (to be submitted to IMAC XXVI October 2007).
- Made schedules, assigned tasks, encouraged good research habits, facilitated interdisciplinary teamwork.

Research Assistant *University of Oklahoma, School of CEES. August 2006 – December 2006*

Norman, OK

- Contacted graduate students and arranged hour-long meeting times to tutor them in the LaTeX document preparation system and the WinEdt and Ghostview programs. Fielded questions and led the students through tutorials.

Guest Lecturer *University of Oklahoma, School of CEES. January 2006 – May 2006*

Norman, OK

- Stood in several times as a substitute lecturer for CE 3403: Materials, a 50 minute class of 41 students in Spring 2006 on topics such as aggregates, concrete mix design, and masonry.
- Printed and distributed handouts and fielded questions from students.

Entrepreneurial / Creative Experience

Lead Graphic Designer *Mustache Rodeo. September 2009 - Present*

Berkeley, CA.

- Carry out all graphic design of visual media (digital and merchandise).

Professional Musician *Mighty Quinn Walker. June 2009 - Present*

Berkeley, CA.

- Play bass guitar live in touring band.
- Record bass on selected tracks.

Professional Musician *The Neighborhood. May 2003 – January 2009*

Norman, OK.

- Co-wrote and professionally recorded, produced, and distributed The Beginnings and Endings EP in March 2005.
- Co-wrote and professionally recorded, produced, and distributed Our Voices Choked With Fireworks LP in September 2007. Designed album artwork and matching website.
- Regularly performed approximately 26 original songs.
- Scheduled regional performances (average attendance: 40-70 people), rented facilities, handled payments, coordinated events, tracked sales and attendance, etc. several times each month.

- Utilized mass emails, internet bulletins, and word of mouth to promote events. Regularly designed, printed, and distributed handbills, flyers, and posters.
- Conducted all website design, construction, and maintenance (www.theneighborhoodlovesyou.com [defunct], www.myspace.com/theneighborhoodband).

Publications

Journal Papers (In Publication):

1. “Constructing multilayer feedforward neural networks to approximate nonlinear functions in engineering mechanics applications”, Pei, J.S., and Mai, E.C., *ASME Journal of Applied Mechanics* (JAM-06-1201)
2. “An Experimental Investigation of Applying Mica2 Motes in Pavement Condition Monitoring”, Pei, J.S., Ivey, Richard A., Lin, Hung Jr., Landrum, Aaron R., Sandburg, Colby J., Ferzli, Nadim, King, Timothy, Musharraf M. Zaman, Rafei, Hazem H., Mai, Eric C., *Journal of Intelligent Material Systems and Structures*

Journal Papers (Under Review):

1. “Mapping Some Functions and Four Arithmetic Operations to Multilayer Feedforward Neural Networks”, Pei, J.S., Mai, E.C., and Wright, J.P. *Computer Methods in Applied Mechanics and Engineering* (submitted in January 2008).

Journal Papers (In Preparation):

1. “Initialization of multilayer feedforward neural networks using prototypes in function approximation”, Pei, J.S., and Mai, E.C., *Neurocomputing*.

Conference Papers:

1. “Neural network initialization for modeling nonlinear functions in engineering mechanics”, Pei, J.S., and Mai, E.C., The 24th International Modal Analysis Conference (IMAC XXIV). St. Louis MO, January 30 – February 2, 2006.
2. “A heuristic neural network initialization scheme for modeling nonlinear functions in engineering mechanics”, Pei, J.S., and Mai, E.C., SPIE International Symposia Smart Structures & Materials/NDE. San Diego CA, February 15 – 17, 2006.
3. “Constructing multilayer feedforward neural networks to model nonlinear functions in engineering mechanics applications”, Pei, J.S., and Mai, E.C., The 15th U.S. National Congress on Theoretical and Applied Mechanics (USNCTAM). Boulder CO, June 25 – 30, 2006.
4. “Multilayer Feedforward Neural Network Initialization Methodology for Modeling Nonlinear Restoring Forces and Beyond”, Pei, J.S., Mai, E.C., and Piyawat, K., The 4th World Conference on Structural Control and Monitoring (4WCSCM), Paper No. 306. San Diego CA, July 11 – 13, 2006. [Presenter].
5. “Constructing multilayer feedforward neural networks to approximate nonlinear functions - examples and justifications”, Pei, J.S., and Mai, E.C., IMAC-XXV: A Conference & Exposition on Structural Dynamics, Orlando, FL, February 19 – 22, 2007. [Co-Presenter].
6. “A Heuristic Neural Network Initialization Scheme for Modeling Nonlinear Restoring Forces – Continuous Development”, Pei, J.S., and Mai, E.C. SPIE International Symposia Smart Structures & Materials/NDE. San Diego CA, March 18 – 22, 2007.
7. “Monitoring pavement condition using “Smart Dust” under surge time synchronization”, Pei, J.S., Ivey, R.A., Lin, H., Landrum, A., Sandburg, C.J., King, T., Zaman, M.M., Refai, H.H., Mai, E.C., Oshlake, O., Heriba, A., Hurt, E., SPIE International Symposia Smart Structures & Materials/NDE. San Diego CA, March 18 – 22, 2007.

8. "Initialization of multilayer feedforward neural networks to approximate nonlinear functions in engineering mechanics applications", Pei, J.S., and Mai, E.C. World Forum on Smart Materials and Smart Structures Technology (SMSST). Chongqing & Nanjing, China, May 22 – 27, 2007.
9. "Neural network initialization with prototypes – function approximation in engineering mechanics applications", Pei, J.S., Mai, E.C., Wright, J. P., and Smyth, A.W., International Joint Conference on Neural Networks (IJCNN). Orlando FL, August 12 – 17, 2007.
10. "Mapping elementary functions and a numerical method to neural networks", Wright, J.P., Pei, J.S., and Mai, E.C., The 26th International Modal Analysis Conference (IMAC XXVI). Orlando FL, February 4 – 7, 2008.
11. "Design and testing of small timber models to demonstrate nonlinear dynamics", Mai, E.C., Sugeng, Y.P., Pei, J.S., Piyawat, K., Zimmermann, S.M., Borchard, C.V., and Li, Y., The 26th International Modal Analysis Conference (IMAC XXVI). Orlando FL, February 4 – 7, 2008.

Musical Compositions:

1. The Neighborhood. "The Beginnings and Endings EP". Norman: Self-released, 2005.
2. The Neighborhood. "Our Voices Choked With Fireworks". Norman: Crystal Lake, 2007.
3. Hundredsomethings. "Getwell". Norman: Self-released, 2008.

Patent Disclosure

Applied for a patent disclosure for neural network initialization procedure, May 2007.

Presentations

- Co-Delivered 15 minute presentation on neural networks to approximately 25 people at the 25th International Modal Analysis Conference (IMAC XXV) (February 2007)
- Delivered 15 minute presentation on neural networks to approximately 50 people at the 4th World Conference on Structural Control and Monitoring (4WCSCM) (July 2006)
- Presented research at Oklahoma Undergraduate Research Day (April 2006)
- One of two students invited by the Vice President of Research at OU to represent the University of Oklahoma and present neural networks research at the state capital for Oklahoma Research Day at the Capital. Interviewed by College Connection radio program about the event. (March 2006)
- Invited to present research at the University of Oklahoma Graduate Student Research and Creative Endeavors Poster Session (March 2006)

Awards and Scholarships

National:

- National Merit Scholarship (2003)
- AP Merit Scholar Award (2003)
- National Honor Society (2002, 2003)
- Semifinalist Award in Ayn Rand Institute The Fountainhead essay contest (2002)

Regional:

- Oklahoma State Regents for Higher Education Scholarship (2003)

University:

- UROP Grant (2005, 2006)
- OU President's Honor Roll (Fall 2003, Spring 2004, Fall 2004, Spring 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007)

Department:

- UC Berkeley CE Departmental Block Grant (2008)

- Ted A. Kritikos Professorship of Civil Engineering (2006)
- Oklahoma Department of Transportation / Poe Civil Engineering Scholarship (2005)
- Owensby Family Civil Engineering Scholarship (2005)

Professional Memberships

- Member of Chi Epsilon (Civil Engineering honor fraternity)
- Member of ASCE
- Member and Chairman of KYX (Christian fraternity)
- Member of SoCAPS (Society of Christian Apologists and Philosophers)

Hobbies and Activities

- Website design (www.hundredsomethings.com, www.ericmai.com)
- Collecting and arraigning natural sounds into artificial soundscapes
- Graphic design
- DIY electronics and hardware fabrication
- 2007 Hurricane Katrina relief volunteer
- 2005 A Week of Love volunteer
- 2005 Big Event volunteer

Computer Skills

Matlab, SimuLink, LaTeX, HCS2000, AutoCAD, WaterCAD, WatPro, FlowMaster, PHP, MySQL, XML, XHTML, CSS, JavaScript, Objective-C, Flash, Photoshop, Illustrator, Microsoft Office Suite, Lotus Notes, ProTools LE, Reason 3.0.

References

Graduate Research Advisor:

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