SCHOOL OF SCIENCE & ENGINEERING

Engineering and Physics Department

Annual Year End Report

2008-2009

John E. Matsson, PhD
Chairman, Engineering and Physics Department

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Brief Executive Summary

We had a very successful ASME Student Professional Development Conference with eleven students from the ORU Engineering and Physics program in attendance at the University of Texas at Arlington on April 17 – 18, 2009. Sean Estes and Jennifer Luth received the Old Guard Poster Competition first and second place awards, respectively in competition with a number of prestigious universities in the region. This year we have started the process of setting up a student section of Engineers Without Borders at ORU. Dr. Herr and Dr. Leland will be student section advisers. Seven senior engineers graduated with B.S.E. degrees and three students with B.S. degrees.

Executive Bullet Points

- Dr. Halsmer is presenting a paper at the American Society of Engineering Education (ASEE) Annual Conference on June 17 entitled "Function-based Reverse Engineering of Complex Natural Systems". This paper is coauthored with two engineering students Nate Roman and Tyler Todd. Dr. Halsmer has also coauthored another paper with seven engineering students Sean Estes, Nate Fansler, Joshua Glesener, Nicholas Halsmer, Jennifer Luth, Evn Presson and Kevin Stark entitled "Curriculum for Training Missionaries in Basic Energy Concepts" which will be presented by Dr. Halsmer on June 18 at the biannual Christian Engineering Education Conference.

- Dr. Herr received the Outstanding Faculty Member Award in the department. He was also selected as the Outstanding School of Science and Engineering Faculty Member of the Year.

- Dr. Leland submitted a paper entitled "Pair Programming in a CAD Based Engineering Graphics Course" to the ASEE Annual Conference. Dr. Leland also worked with Tulsa Community College and Dr. Mark Hall to develop a list of courses and degree plan sheets for an articulation agreement for students transferring to ORU's engineering program.

- Dr. Ma has been granted tenure at ORU. Dr. Ma was nominated for the 2009 DaVinci Fellows Award and was granted the ORU Alumni Faculty Recognition Award for Outstanding Research. He is continually publishing many technical papers.

- Dr. Matsson has had a book published by Schroff Developent Corporation (SDC) Publication on "An Introduction to COSMOSFloWorks 2008". He also hosted twenty prospective high-school students from the Tulsa Technology Center visiting ORU Engineering and Physics on January 22.

Faculty Accomplishments

Professional Activities: Research, Grants, Publications, Meetings, and Recognition

Mr. Robin Akbar, Assistant Professor

1. Store keeper for Engineering and Physics Labs

Dr. Elena Gregg, Assistant Professor

1. Worked in Radiation Safety Committee.

2. Attended 12 different workshops and seminars at ORU, 2 at "8-th floor',4 web seminars provided by McGraw Hill and Wiley Publishers, one "Get Motivated" business Seminar in Mabee Center.

3. Made presentation at Fall College Weekend.

4. Attended 2 days Governer's Conference on Developmental Disabilities.

5. Collected and sent 3 containers with humanitarian Aid to Ukraine (Kiev Christian Charitable Fund, Simferopol Baptist Church, Donetsk Christian University).

6. Explored in St.Petersburg, Russia possibility for students exchange and Engineering Missions.

7. Volunteered at "Christ for Humanity", YMCA, DVIS.

Dr. Dominic Halsmer, Professor

1. Directed an Honors Research Fellowship (Michael Gewecke, Rachelle Gewecke, Tyler Todd, and Nate Roman) to study the role of God as engineer (Phase II – Reverse Engineering the Human Condition).

2. Served on the Board of the DaVinci Institute, attending several board meetings in OKC

3. Traveled to Anderson, Indiana for joint Wesley Philosophy, Theology, and Psychology Conferences, presenting two papers with honors students Michael Gewecke and Rachelle Gewecke.

4. Coauthored a paper with two engineering students (Nate Roman and Tyler Todd) entitled, "Function-based Reverse Engineering of Complex Natural Systems," to be presented by

myself at the Annual ASEE (American Society for Engineering Education) Conference in Arlington, TX on June 17rd

5. Coauthored a paper with seven engineering students (Sean Estes, Nate Fansler, Joshua Glesenere, Nic Halsmer, Jennifer Luth, Evn Presson, and Kevin Stark) entitled "Curriculum for Training Missionaries in Basic Energy Concepts," to be presented by myself at the biannual Christian Engineering Education Conference at Baylor University on June 18th

6. Authored a presentation entitled, "Application of the 'Engineering Mindset' for Worldview Evaluation," which was presented by myself at the ASEE Midwest Section Meeting at TU on Sept. 19th.

7. Accompanied seven students to the Oklahoma Academy of Sciences Meeting in OKC where we made 3 presentations on the potential of reverse engineering techniques for science.

Dr. Roger Hartman, Professor

1. Directed and Advised 2 Physics Major s' Senior Research and Design project 08-09

2. Hosted group of Student Advisees for dinner spring 2009

3. Served on the University Radiation Safety Committee 08-09

4. Served as University Radiation Safety Officer for fiscal 2009, 2010

5. Attended 8 ORU Faculty Development presentations 08-09

6. Served on Interview Committee to select "Whole Person" scholars Spring 2009

Dr. Steve Herr, Professor

1. Corrected AP Environmental Science exams at Lincoln, NE along with 200 high school and college teachers.

2. Served as acting chairman of Engineering/Physics Department during Fall 2008.

3. Served as chairman of promotion committee for Full Professor in School of Science and Engineering.

4. Named as chairman of newly created committee for environmental sustainability on campus. Created a website (recycle.oru.edu) to provide a continuing list of environmental initiatives on campus and also to list where various items could be recycled on campus.

5. Served as faculty advisor for ORU Environmental Stewardship Club. Brought in speakers from Metropolitan Environmental Trust and Oklahoma Nature Conservancy.

6. Served as co-advisor to the newly formed chapter of Engineers without Borders.

7. Served as president of the School of Science and Engineering Faculty Senate.

8. Named Outstanding Faculty Member for Department of Engineering/Physics and also for the School of Science and Engineering.

Dr. Robert Leland, Associate Professor

1. Served as Associate Editor for Multidimensional Systems and Signal Processing, a refereed journal.

2. Served as a reviewer for the following refereed journals:
   IEEE Transactions on Industrial Electronics
   IEEE Sensors Journal
   IEEE Transactions on Automatic Control
   Journal of Systems and Control Engineering

3. Presented a paper at the IEEE Multiconference on Systems and Control, San Antonio, TX: R. Leland, Adaptive Control of a MEMS Resonator Thermometer,

4. Submitted paper to the ASEE Annual Conference and Exposition, which was accepted. Will present in June 2009, Austin, TX: R. Leland, Pair Programming in a CAD Based Engineering Graphics Course.

5. Submitted paper to the refereed journal IEEE Transactions on Control Systems Technology as second author: R. Samples, R. Leland, Stability Analysis of Flocking in a Swarm of Wheeled Mobile Robots.

6. Worked with Tulsa Community College and Mark Hall to develop a list of courses and degree plan sheets for an articulation agreement for students transferring to ORU's engineering program.

7. Revised PowerPoint presentation for College Weekend. Made presentation at College Weekend in Fall 2008 and Spring 2009.

8. Served on the University Retention Committee.

Dr. Sophie Liu, Associate Professor

1. Advised one senior project "3D Face Recognition" for David Kobilnyk and Vyacheslav Tokarev.

2. Submitted a paper with students Amsa Mangga and Joy Ndackson, " Child sentinel safety seat" to American Scientific Affiliation 64th Annual Meeting. Waco, Texas. July 31-August 3, 2009.

3. Made presentation for potential students at college weekend. Spring 2009.

4. Attended 5 ORU workshops 11/19, 12/2 2008, 2/18, 3/27, 4/1 2009.

5. Attended 3 "Eighth Floor" workshops on 2/9, 2/23 and 4/21 2009.

6. To host a fellowship party at my home for Engineering students whom I taught in 2008 and 2009 on 4/24/2009.

Dr. Xiaomin Ma, Associate Professor

Published Papers

1. Xiaomin Ma, and Xianbo Chen, Performance and reliability of DSRC vehicular broadcast ad hoc networks for highway safety applications, EURASIP Journal on Wireless Communications and Networking, Special Issue on Wireless Access in Vehicular Environments, Feb. 2009.

2. Xiaomin Ma and Xianbo Chen, Performance analysis of IEEE 802.11 broadcast scheme in ad hoc wireless LANs, IEEE Transactions on Vehicular Technology, 57(6), 3757-3768, Nov. 2008.

3. N. Jiang, Z. Zhang, Xiaomin Ma, The lower bound on the number of hidden neurons in multi-valued multi-threshold neural networks, IEEE International Symposium on Intelligent Information Technology Application (IITA 2008), December 21-22 Shanghai, 2008.

4. Xiaomin Ma, Xianbo Chen, and Hazem Refai, On the broadcast packet reception rates in one-dimensional MANETs, IEEE GLOBECOM, Nov. 30-Dec. 4, New Orleans, 2008.

5. Nan Jiang, Yixian Yang, Xiaomin Ma, Zhaozhi Zhang, Analysis of nonseparable property of multi-valued multi-threshold neuron, IEEE World Congress on Computational Intelligence, Hong Kong, June 1-6, 2008.

6. Xianbo Chen, Hazem Refai, and Xiaomin Ma, SDMA: On the suitability for VANET, IEEE 3rd International Conference on Information and Communication Technologies, Damascus, Syria, April 7-11, 2008.

Accepted Papers

7. Xianbo Chen, Hazem Refai, and Xiaomin Ma, On the enhancements to IEEE 802.11 MAC and their suitability for safety-critical applications in VANET, Submitted to Wireless Communications and Mobile Computing, July 2008.

8. Xiaomin Ma, H. Refai, and S. Yang, Analysis of Sliding Frame R-ALOHA Protocol for Inter-Vehicle Communications. Accepted to ACM/Baltzer Wireless Networks, Jan. 2008.

9. N. Jiang, Z. Zhang, Jian Wang, Xiaomin Ma, The upper bound on the number of hidden neurons in multi-valued multi-threshold neural networks, 2009 International workshop on Intelligent Systems and Applications (ISA-09), accepted.

Submitted Papers

10. Xiaomin Ma, On the reliability and performance of one-dimensional real-time broadcast MANETs, IEEE Transactions on Wireless Communications, Revised, Nov. 2008

11. Xiaomin Ma, On the Broadcast Packet Reception Rates in Two-Dimensional MANETs, IEEE GLOBECOM 09.

Dr. John Matsson, Associate Professor

1. I published the textbook "An Introduction to COSMOSFloWorks 2008", SDC Publications.

2. I served on Science and Engineering Curriculum Committee.

3. I gave departmental tours to many prospective students.

4. I have served as the chair for the ASME (American Society for Mechanical Engineers) Mid-Continent Section during 2008 – 2009. I have also been the ORU ASME Student Section Advisor during 2008 – 2009.

5. I hosted an Engineering Student, Alumni and Industry Advisory Board meeting during Homecoming.

6. I helped the ORU ASME Student Section to host the Third Annual Lego Robotics Competition on April 25.

7. I brought eleven students to the ASME SPDC Conference in Arlington, TX on April 17 - 18.

8. On February 21, the Experimental Methods class flew a high-altitude balloon together with instructors from Taylor University.

Dr. Nate Meleen, Professor

1. With John Korstad and Trevor Grizzle, planned and led the Faculty Chapel service.

2. Presented a special lecture to the Engineering seminar on "Energy Efficient Housing," using our experience at Flint Ridge.

3. Presented a special lecture to the Honors Science and Philosophy class on age-of-the-earth issues.

4. Served as Director of the Willard Elsing Museum of Crystals and Gems.
   a. Organized and led 17 group tours for all age groups.
   b. Helped Roger Bush with special exhibits at the Tulsa biannual rock and mineral show at the Fairgrounds.

5. Served as President of Petra Field Camps and hosted a number of ORU groups at our Majestic Pines campus in Flint Ridge, Kansas OK. Continued development work on our campus, with much help from emeritus biology professor, Duane Thurman.

Dr. Daobin Zhang, Associate Professor

1. Joined the UFA Research committee and participated its activities

2. Participate activities of Tulsa Engineering Foundation (TEF)
   7/17/2008 TEF annual meeting
   9/18/2008 TEF Board Meeting
   10/16/2008 TEF Quarterly Meeting
   1/15/2009 TEF Quarterly Meeting
   3/26/2009 TEF Quarterly Meeting

3. Propose and arrange project show at Tulsa Engineering Challenge 4/17/2009

4. Proctor at Tulsa Math Count on 2/7/2009

5. 9/9/2008 Faculty Governance Brown bag
   9/23/2008, SLLE Brown Bag, UFA Curriculum Proposals for discussion
   10/3/2008, Faculty Governance Brown bag
   2/6/2009, Brown Bag Lunch, Scientific Confirmation of a Christian Worldview.

Student Accomplishments

- Ten engineering seniors graduated, five summa cum laude and one magna cum laude.
- Nate Roman was selected as Outstanding Student for the Engineering, Physics and Physical Science Department.
- Nathan Marth was selected as Outstanding Engineering Student – Computer Concentration.
- Jennifer Luth was selected as Outstanding Engineering Student – Mechanical Concentration.
- Tyler Todd was selected as Outstanding Engineering Physics Student.
- The senior paper of Sean Estes, Joshua Glesener and Evn Presson (Dr. John Matsson as advisor) was selected as Outstanding Senior Project.

Future Strategies

1. Continue to increase faculty/student interaction and mentoring. Encourage faculty to pursue funded research projects that involve engineering students.

   Goal #1: Students engage in good works that glorify God.

   Current Progress:

   - The team consisting of Sean Estes, Joshua Glesener, and Evn Presson received the Outstanding Research/Design Project Award, with a project entitled "The Development of a Small-Scale Vertical Axis Wind Turbine". They also received 1st place for their poster at the ASME Student Professional Development Conference.
   - The senior project "Remote-Controlled Robot with Ramp for Rock Retrieval", conducted by Nicholas Halsmer, Jennifer Luth and Nathan Marth, received 2nd place in the ASME Student Professional Development Conference.
   - Sean Estes received an ASME Scholarship award in April for his faithful service to the ORU Student Section of ASME.

2. Encourage students to engage in good works that glorify God, such as continued attendance at the SHPE Annual Student Conference, IEEE student conference, and participation in IEEE design competitions, as well as ASME conferences and competitions.

   Goal #2: Alumni engage in good works that glorify God.

   Current Progress: Nate Roman received a very generous job offer from Boeing in Saint Louis, MO, which he has accepted. Douglas Lee, Vijay Karlsson and Damon Bennett returned for Homecoming. All of them participated in the Alumni and Industry Advisory Board Meeting.

3. Improve relations and communications with alumni by sending out a regular departmental newsletter.

   Goal #3: Make wise purchases of equipment and supplies to enhance science and engineering instruction.

   Current Progress: Lab fee and restricted accounts along with alumni donations currently provide inadequate funds for purchasing equipment and teaching supplies. An annual newsletter is sent out to alumni and requests are made for alumni to donate towards engineering labs, projects and student sections.

4. Continue to make wise use of funds to provide students with the best possible laboratory experiences.

   Goal #4: Maintain ABET accreditation for the engineering degree and pursue accreditation for the other degrees when appropriate.

   Current Progress: ABET accreditation site visit in fall of 2005 was very successful. No weaknesses, concerns, or deficiencies were found. Accreditation of the engineering degree was extended for another six years. Our machine shop needs more space and a proposal has been submitted to the administration at ORU to use the garage on the first floor. This space is perfect for a machine shop as it is a large open area with easy access through the garage door.

5. Continue to establish good relationships with local high schools.

   Goal #5: Better prepare our graduates to serve effectively in the role of missionary to scientists and engineers.

   Current Progress: We are starting a student section of Engineers Without Borders headed by Kevin Stark. We had twenty students from Tulsa Technology Center that visited ORU Engineering and Physics in January. We hosted our third annual Lego robotics competition with Metro Christian Academy and Union as participating schools.