UHC / COE Student-Faculty Matching Reception

January 14, 2013
Dr. Richard H. Cuenca
School of Biological & Ecological
AirMOSS hardware is primarily based on UAVSAR heritage. Existing UAVSAR design made accommodations to add the P-band capability.

- Antenna frame was sized to fit the GeoSAR P-band antenna
- Space in the nose cone was reserved for P-band transmitter

UAVSAR pod layout showing modularity of the electronic assemblies; assemblies in red are new build while all others are shared with UAVSAR
Teaching
- Hydrology
- Instrumentation
- Stochastic processes
- Senior design

Research
Hydrological processes: John Day, Walla Walla River
Chilean Hydrology: Runoff processes of cracking soil
African Hydrology: install 20,000 weather stations
Instrument development: 10,000x better resolution
Optical tracing flow with fluorescent nano-particles

Thesis Topic Ideas/Opportunities
- Improve African meteorological data by cross-comparison between stations and measurements
- Fiber Optic Sensors to improve understanding of environmental processes
- Evaluate effectiveness of river restoration in the John Day river system (field and modeling)
David S. Hurwitz
Assistant Professor
School of Civil & Construction Engineering
Owen 305
541-737-9242
david.hurwitz@oregonstate.edu

Thesis Topic Ideas/Opportunities
- Determine the effectiveness of innovative traffic control devices (signs, signals, pavement markings)
- Assess transportation User behavior (glance patterns, perception reaction times, comprehension)
- Determine the contributing causes of a particular type of traffic crash (right hook crashes at signalized intersections)
- Identify commonly held student misconceptions regarding an aspect of transportation engineering (signalized intersection design)

Research
- The consideration of user behavior (drivers, cyclists, and pedestrians) in the design and innovation of transportation infrastructure.
- Improved transportation engineering education though development of curriculum and assessment techniques resulting in superior student learning outcomes.
Thesis Topic Ideas/Opportunities

- Tsunami impact loads on coastal bridges
- High-speed surface effect ship operations in open ocean, coastal shallow water and beach zones
- Extreme wave loads on wave energy conversion devices

Teaching
- Fluid-Structure Interaction
- Finite Element Methods
- Wave Forces on Structures
- Ocean Structural Dynamics

Research
The application of computational and experimental methods and high-performance computing to model and analyze complex fluid-structure interaction systems including civil, naval and renewable energy research.

Interested in modeling and analyzing tsunami impact on coastal bridges, wave slamming on high-speed naval ships and wave energy conversion devices.

Solomon C. Yim
School of Civil and Construction Engineering; Owen 350
541-737-6894
solomon.yim@oregonstate.edu
Teaching
- Power System Analysis
- Power System Protection
- Smart Grid

Research
The vulnerability of electrical infrastructure, in particular, the study of cascading outages. Interrelated areas of interest include nonlinear dynamics, chaos, complex systems, smart grid, big data.

Thesis Topic Ideas/Opportunities
- Impact of renewable energy sources for power grid stability assessment
- Multi-objective partitioning of power grids
- Interaction between protective relaying and PMU (synchrophasor) placement
Dr. Pallavi Dhagat
School of Electrical Engineering &
Computer Science
MACHINE LEARNING FOR COMPUTATIONAL SUSTAINABILITY

Mentors

• Thomas G. Dietterich
  Thomas G. Dietterich
  Professor
  School of EECS
  KEC 2067
  tgd@oregonstate.edu

• Rebecca A. Hutchinson
  Rebecca A. Hutchinson
  Postdoctoral Fellow
  School of EECS
  KEC 2069
  rah@eecs.orst.edu

Honors Project

• Species distribution modeling: estimating the geographic distribution of a species from survey data and environmental variables

• Challenge 1: many variables with complex relationships to species
  – Machine learning can help!

• Challenge 2: TRUTH about species presence is unknown
  – Latent variable modeling

• Can we address both challenges simultaneously?
Venture Intern Pgm

- Entrepreneurial Basics
- Intellectual Property Tools Patents, Licenses, Business agreements
- Earn $$$ & Degree Credits

Opportunities

- Primarily evaluating OSU technologies, prior art searching, exploring business applications.
- Protection, Marketing, Licensing, Startups
- Work/Learn from professional Faculty & Staff
  - 10 hours per week maximum during session
  - summer 40 hrs/week

VIP’s

Undergraduate or Grad Students with an interest in technology commercialization. The ideal student intern would have general knowledge in a technical science (Chemistry, Biology, Engineering) and/or business management. You will learn the tools of business & technology commercialization.
Flapping Smart-Wing Test Rig
- **Components design and fast prototyping**
- **Client:** USAF Office of Scientific Research
- **Project 1 description:** Design and fabrication of multi DOF smart flapping-wing components
- **Project 2 description:** Computer controlled rail system for wind tunnel
- **Functions involved:** CAD, components design and prototyping, computer interface software

Deep-Water Ocean Lander
- **Low-density composite structural material for deep-water autonomous vehicle**
- **Client:** OSU College of Earth, Ocean and Atmospheric Sciences
- **Project description:** Design an alternative for deep-water buoyancy composite material for EXISTING vehicle
- **Functions involved:** CAD, mechanics, FEA analysis of materials

Off-Shore Wind Energy
- **Wireless micro-cameras and microphone for installation on wind turbine blades**
- **Clients:** US Department of Energy, National Renewable Energy Lab (NREL)
- **Project description:** Lab tests and data acquisition of wireless micro-camera & microphone integrated system
- **Functions involved:** CAD, computer interface software, lab testing

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Roberto Albertani
School of Mechanical, Industrial and Manufacturing Engineering; Rogers 412
roberto.albertani@oregonstate.edu

**Teaching**
- Applied Elasticity
- Composite Materials Manufacturing
- Composite Materials
- Intro to Instrumentation and Meas. Systems
- Intermediate Dynamics
Teaching
- Robotics
- Biomechanics/Neural Systems
- Controls, Dynamics

Research
R obotic manipulation, mobile robotics, Human-robot interaction
H uman hand biomechanics, motor learning

Currently 7 undergrads working in the lab
1 already submitted a paper based on the last 8 months of work

Thesis Topic Ideas/Opportunities
- Robotic hand design
- Control of mobile robots
- Robotic games
- Biomechanical simulations
- Electromyography studies of hand muscles
Teaching

- Engineering Management
- Lean Manufacturing Systems Engineering

Chinweike I. Eseonu
School of Mechanical, Industrial, and Manufacturing Engineering; Rogers 406
541-737-0024
eseonuc@engr.orst.edu

Research

Performance improvement across organizational layers (organization-wide through to the individual) and using engineering principles to manage social systems. Applications in healthcare, manufacturing, project management, etc.

Interested in community driven technology innovation and non-traditional STEM student retention.

Thesis Topic Ideas/Opportunities

- Applying engineering and physical principles to understand and manage social systems
- Development and testing of decision making tools.
  - Change & performance management
  - Technical policy evaluation
- Community driven technology innovation
Teaching
- Production Engineering
- Computer-Aided Design and Manufacturing
- Sustainable Engineering Analysis

Research
Development of methods and tools that assist companies in making sustainability-based decisions during design and manufacturing.
Assessment of products, processes, and systems to compare economic and environmental performance (including nanomanufacturing and alternative energy technologies) using various methods.

Karl R. Haapala
School of Mechanical, Industrial, and Manufacturing Engineering; Rogers 312
541-737-3122
Karl.Haapala@oregonstate.edu

Thesis Topic Ideas/Opportunities
- Completed: A Method to Effectively Measure Sustainability in Non-Profit Organizations (Mary Beth Vanlue, 2010)
- Environmental life cycle assessment of alternative energy in the Pacific Northwest
- Process model development to assist sustainable design and manufacturing
- Evaluation of machining and toxicological performance of metalworking nanofluids
Teaching
- Robotics
- Actuator Dynamics
- Sensors and Measurement

Jonathan Hurst
School of Mechanical, Industrial, and Manufacturing Engineering; Rogers 422
jonathan.hurst@oregonstate.edu
mime.oregonstate.edu/research/drl/

Dynamic Robotics Laboratory
- Legged Locomotion
- Robotic Actuation and Control

ATRIAS 2.1

Thesis Opportunities
- Mechanical Design
  - Robot Components
  - Support Devices
- Electronics and Software Development
- Component Modeling
- Simulation
- Control System Design
Teaching
- ME332 Heat Transfer (Honors)
- ME452 TFS Lab (Honors lab)
- ME552 TFS Grad Lab
- ME546 Convective Heat Transfer
- ME549 Special Topics in Heat Transfer

Research
- Heat transfer enhancement using microstructures – Terrestrial and Microgravity (Sponsor: NASA/NSF)
- Solar Thermal & Solar Fuels – use of microchannels to increase efficiency (Sponsor: Department of Energy)

Thesis Topic Opportunities
- Heat transfer using microstructured surfaces (NASA project)
- Solar Fuels research
- Solar thermal research

Vinod Narayanan
School of Mechanical, Industrial, and Manufacturing Engineering, Rogers 410
541-737-7012
vinod.narayanan@oregonstate.edu

Current Honors students
Inside the “Vomit Comet”
Teaching
- Capstone Design
- Solid Mechanics
- Component Design
- Mechanical Mechanisms

Research
Computational (e.g. FEA) modeling, typically with experimental validation, of mechanical and material systems. Design, fabrication, and testing of technically interesting and relevant mechanical devices

Current project topics include chainsaw cutting mechanics, marine mammal tracking tags, carbon-fiber composites fracture, and electrochemical machining

Thesis Topic Ideas/Opportunities
- Acquisition and material property determination of whale blubber
- Determination of mechanical cutting parameters of a variety of materials
- Mechanical design
- Mechanical vibration sensitivity of laboratory animals
Bill Smart
School of MIME
219A Dearborn Hall
bill.smart@oregonstate.edu

Robotics
  Human-Robot Interaction
  Shared Autonomy
  Software for Robotics

Machine Learning
  Learning to Control Physical Systems
  Reinforcement Learning
Research Opportunities

- Autonomous elements for mobile robots
- Human-robot interfaces
- Human-robot interaction studies
- Open-source software for robotics

Useful Skills

- Computer programming (Python / C++)
- Artificial Intelligence
- Computer Vision
- Mathematics/Probability
- Social Psychology

bill.smart@oregonstate.edu
Heart development

Research:
• Understand how shape influences heart development

Projects:
• Analyze/visualize geometric change
• Improve segmentation

Skills:
• Introductory programming (MATLAB/Java/C/C++)
• Basic calculus

3D Sketching

Research:
• Develop interfaces for sketching in 3D
• Novel algorithms for 3D inference from 2D

Projects:
• 3D from cross sections
• User studies on interface
• User studies on “nice” curves

Skills:
• (Interface) Programming (C++)
• User study skills (surveys, Mechanical Turk)

Pollen identification

Research:
• Develop novel algorithms for finding, and identifying, pollen grains on electronic slides

Projects:
• Large 2.5 image throughput
• Pollen “cut out” tools
• Web-based interaction

Skills:
• Introductory programming (MATLAB/Java/C/C++/Python)
• Basic algorithm design

Cindy Grimm
School of Mechanical, Industrial, and Manufacturing Engineering; Dearborn 218
cindy.grimm@oregonstate.edu
Teaching
- Solar Energy Technologies
- Catalysis
- Electronic Materials Processing
- Instrumentation

Research
The development of sustainable materials with specific functional properties for technologies ranging from devices, catalysts, sensing, and nanodimensional patterning.

Detailed characterization of materials to obtain a better fundamental understanding of structure/property relationships.

Apply materials and processes to commercially relevant applications to promote technology transfer between OSU and industry.

Thesis Topic Ideas/Opportunities
- Carbon Dioxide reduction through microwave-enhanced heterogeneous catalysis
- Printing functional materials for in-situ glucose sensors
- Development of earth abundant materials for low-cost solar cells
- Sustainable materials chemistries for next generation photoresists
Thesis Topic Areas

- **Software Development**
  - programming educational technology

- **Student Learning**
  - in Virtual Laboratories through student-faculty interactions, model development, etc.
  - in Concept-based Instruction
  - What can we learn from experts?

- **Diffusion of Educational Technology**
  - What are ways we can get people in other places to use our educational innovations?

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**Research – Engineering Education**

Integrating technology into effective educational practices and promoting the use of higher-level cognitive skills in engineering problem solving.
Teaching
- Introduction to CBEE
- Polymer Science and Engineering
- Transport Phenomena
- UHC Colloquia – Plastics for Poets and Energy IQ

Research
Anything related to POLYMERS!
- Biomaterials
- Environmental Sustainability
- Engineering Education
- K-12 Outreach

Thesis Topic Ideas/Opportunities
- Plastics Recycling for Green Building
- Mushrooms and Microbes for Bioremediation
- Energy IQ – Energy Education materials
- Synovial Fluid Characterization
- Spinal Disc Replacement
- Biodegradable films filled with biomass for agricultural applications
- In-Situ repair of PE natural gas pipes – gel patch
...or anything that might interest ME and YOU!
Thesis Topic Ideas/Opportunities

- Identification of driving systemic archetypes in project failures
- Development of best practices to start and/or manage knowledge transfer in student chapters (SAE, AIAA, Robotics)
- Development/testing of learning activities to teach systemic principles to K-12 students
- Development of simulation model to assess effects of growth and feed factors into poultry yield

Teaching

- **Capstone Senior Design**
- **Applied Systems Thinking**
- **Engineering Economics**
- **Operations Management**

Research

The application of systems thinking methodologies in conjunction with industrial engineering and engineering management tools for system identification, design, modeling and improvement. Interested in exploring transition-phases in systems; in healthcare systems, lean systems, six sigma projects, animal sciences, and STEM education.

Javier Calvo-Amodio

*School of Mechanical, Industrial, and Manufacturing Engineering; Rogers 410*

541-737-0696

Javier.Calvo@oregonstate.edu