Learning Innovation Center, Room 302 | November 15, 2017 | 6 – 7:30 P.M.

Undergraduate Research Opportunities in MIME
Who’s in the room?

• From Oregon
• Engineering Major
• Honors College
• Graduate Student
• Faculty/Staff
What do you want to know about undergraduate research?
MIME Strategic Excellence Initiatives

- Donations through the OSU Foundation to the MIME Excellence Fund provide approx. $100K/year to support our initiatives.
- MIME now has an open Call for Proposals (CFP) process for new projects to advance aspects of our strategic plan.
Funds of up to $5,000 provided to support eight-week REU opportunities in Sp 2018 or Su 2018, giving $3,000 to the student, $1,000 for the student’s travel and $1,000 honorarium for the faculty advising the student.
What is undergraduate research?

Undergraduate research:

An inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to their discipline
What is engineering?

• Definition: “Engineers create solutions serving the welfare of humanity and the needs of society.”

• Value proposition (four words): Creation, Solutions, Humanity and Society

Acknowledgements: Definition by National Academy of Engineering President C. Dan Mote, “Changing the Conversation.” Presented with value proposition by University of Maryland Dean Darryl Hicks.
Undergraduate Summer Research Symposium

We're excited to hear about your research!

Join us for the 2017 Undergraduate Summer Research Symposium

Please join us at the 2017 Summer Undergraduate Research Symposium!

When/Where: Thursday, September 14th

Lightning Talk Session A: 8:00am – 10:00am (ALS 4001)
Poster Session: 10:00am – 12:00pm (LPSC 1st Floor)
Lightning Talk Session B: 1:00pm-3:00pm (ALS 4001)
Justin Casebier  
Mechanical Engineering

Dr. Ravi Balasubramanian  
Robotics and Human Control Systems Lab

**DESIGN OF PASSIVE IMPLANTABLE MECHANISMS FOR TENDON TRANSFER SURGERY**

Casebier, J , You, WS and Balasubramanian, R

**Conclusions**

- Discussion & Future work
  - Implant design that does not cut the tendon
  - Small but mechanically stable
  - Latest implant design connects the implant to the tendon using the bodies natural foreign body response (4).
  - Different variants of the implant will be tested in cadaver and live chicken study later this year.

**Potential Variations**

- Vertical with spikes or pores
- U-pipe with blocks and pores

**New Implant Design for Tendon Transfer Surgery**

Improvement from the previous generation:
- Methods of attaching tendon to implant without puncture the tendon (sutures)
- Low profile with no sharp edges
- Does not obstruct the natural tendon network
- Using the bodies inflammation response (Scar Tissue) to adhere the tendon to the implant

**Stock Implant Design**

- Vertical
- U-pipe (Ellipsoidal) shape 1pc

**Methods of Adherence between Tendon and Implant**

- Ridge Blocks
  - The implantable mechanism has been tested in both cadaver [2] and live chicken foot [3].
  - In live chicken foot, implant and sutures caused foreign body response that prevented movement of implant.

**References**


*This work was supported by NSF CBET 1547319 and DoD CDWR.*
Impact of Affluence

The paper "Population, Affluence and Environmental Impact Across Developments: Evidence from Panel Contingent Valuation" by Brandon Linde, presents various views on urban population and its consumption of energy required. These views are used to develop the Schistosoma Impact by Region, Affluence, and Technology (STIR) model to look at the impact on energy consumption based on the GDP per capita of different populations (urban, rural, poor, rich). The result is that the abundance of cars has a greater impact on energy consumption that urban population as poor and middle countries, how ever affluence does not affect these emissions as much as urban population on rich countries. These results make sense as the addition of another car on the roads does not have as long of an effect on emissions as a high-consumption human being. In conclusion, as a society we should focus on fuel efficient vehicles and increasing fuel efficiency in our efforts to reduced carbon emissions.

Trends in Coal Usage

The amount of coal consumed is increasing significantly over the years. This is mainly due to the low price of natural gas. The percentage of coal based electricity generation has increased from 33% in 2010 to 2015 to 2016. Due to the new emissions regulation meant to focus on near-term sustainability, natural gas will overtake coal by 2018.

Hawaii Boriyo
Mechanical Engineering

Dr. Bryony DuPont
Design Engineering Lab

Internship at Portland General Electric

This summer, I was thrilled to have the opportunity to be a Data Analytics Engineering intern at Portland General Electric. I got to learn about lots of different things, including how energy is generated, SMART grid connectivity and electric vehicles. The best part of this internship was that it clarified a lot of the research that I did at Dr. DuPont's Lab. Things like the SMART grid, and load diagram finally clicked when I got to see it in action. First hand.

Load Diagrams

Electricity must be generated at the same rate it is consumed, so we use different sources of energy to fill up the load diagram. The Base Load, is made up of appliances that are always using energy, a mostly fired by coal plants, which take a long time to fire up, and stay on for a long time and produce a lot of energy. Intermediate load, such as lights in a building, is fueled by simple cycle natural gas plants. Peak load, is fueled by simple cycle natural gas or other sources that can be fired up quickly.

Many states are passing legislation to move away from renewable energy and move towards replaceable energy sources such as wind or tidal energy. The problem with these sources is that there is not enough energy supplied during the peak load times. For example, we get the most energy from the sun between 11am and 5pm. However, our peak load in the summer is from 4 to 9pm. During these times there is very little solar energy that can be used up quickly, so the impact on the environment.
Student Benefits of Undergraduate Research

- Engages and empowers students in hands-on learning
- Enhances the student learning experience through mentoring relationships with faculty
- Provides effective career preparation
- Promotes interest in graduate education
- Develops critical thinking, creativity, problem solving, self confidence, and intellectual independence

Source: Council on Undergraduate Research. Dr. Nancy Hensel, Executive Officer
Faculty Benefits of Undergraduate Research

- Invigorates intellect and increases enthusiasm
- Enhances teaching effectiveness and job satisfaction
- Promotes advancements in research program
- Increases access to grant funding
- Encourages faculty to remain current in their field

Source: Council on Undergraduate Research. Dr. Nancy Hensel, Executive Officer
College/School Benefits of Undergraduate Research

• Increases retention in the engineering discipline
• Promotes an innovation-oriented culture
• Attracts and prepares students for graduate school
• Promotes greater engagement among students and colleagues
• Strengthens the community of scholars

Source: Council on Undergraduate Research. Dr. Nancy Hensel, Executive Officer
1900
Undergraduate Students

340
Graduate Students

7,496
Alumni

54
T/TT Faculty

$13.1M
Research Expenditures
(2016)

11
NSF CAREER and
ONR YIP awards

115
Invention disclosures

ME, IE, MfgE,
Energy Systems,
Materials Science and
Robotics

Aerospace Engr
Humanitarian Engr
Materials Science Engr

Minors

Engineering Management
Ecampus MS
Research Areas and Faculty Affiliations

**Advanced Manufacturing**
- Karl Haapala
- Zaoyan (Andy) Fan
- Brian Paul
- Somayeh Pasebani
- Burak Sencer

**Design Engineering**
- Matt Campbell
- Onan Demirel
- Bryony DuPont
- Chris Hoyle
- Bob Paasch
- Rob Stone
- Irem Tumer

**Next-Generation Materials & Devices**
- Roberto Albertani
- Brian Bay
- David Cann
- Brady Gibbons
- John Parmigiani
- Melissa Santala
- Julie Tucker

**Production, Service, & Human Systems**
- Javier Calvo-Amodio
- Toni Doolen
- Chinweike Eseonu
- Ken Funk
- David Kim
- Logen Logendran
- David Nembhard
- Harriet Nembhard
- Ean Ng
- David Porter
- Hector Vergara
- Xinhui Zhu

**Renewable Energy & Energy Sustainability**
- Sourabh Apte
- Belinda Batten
- David Blunck
- Brian Fronk
- Joshua Gess
- Chris Hagen
- James Liburdy
- Nordica MacCarty
- Kyle Niemeyer
- Deborah Pence
- Kendra Sharp
- Hailei Wan

**Robotics**
- Julie Adams (w EECS)
- Ravi Balasubramanian
- Cindy Grimm
- Ross Hatton
- Geoff Hollinger
- Jonathan Hurst
- Heather Knight (w EECS)
- Yigit Menguc (on Leave)
- Bill Smart
- Kagan Tumer

© Early Career Awardees – NSF or YIP

Manufacturing USA Institutes

**$330M Federal and Industry-Sponsored Funding**

**Manufacturing USA Institutes**

- Manufacturing Institute
- AIM
- Smart Manufacturing Innovation Institute
- DMDII
- RAPID

**Rapid Advancement in Process Intensification Deployment**

Industrial sectors include AEROSPACE, AUTOMOTIVE, CHEMICAL PROCESSING, COMPOSITES, ELECTRONICS, LOGISTICS, METALS, TEXTILES, ...
Creating Opportunities

Dear Prof. Birge:

[A] I’m in your xyz class and particularly interested in the topic of abc...

[B] I saw your work on xyz in *Forefront, Creating the Future*...

[C] I saw your work on xyz on Twitter, Facebook, LinkedIn,…

[D] I read the article on your webpage entitled xyz...

Dr. Nembhard shared an opportunity to apply for the MIME Research Experience for Undergraduates program.

Please let me know if you would be willing to meet with me to discuss how I could contribute to your research team through this program.
Logendra also recently joined Oklahoma State University's School of Industrial Engineering and Management's "Cowboy Academy," which recognizes the accomplishments of that school's alumni.
Faculty Webpage

Nordica MacCarty

Assistant Professor of Mechanical Engineering
Thermal-Fluid Sciences

Office: 312 Rogers Hall
Phone: 541.737.5927
Email: nordica.maccarty@oregonstate.edu

PhD, Mechanical Engineering, Iowa State University, 2015
MS, Mechanical Engineering, Iowa State University, 2013
BS, Mechanical Engineering, minor in Business Administration, Iowa State University, 2000

At Oregon State since 2015.

Research Interests:
Nordica MacCarty's research interests lie in understanding the relationships between energy, society and the environment through integrated complex systems modeling, thermal fluid sciences, and engineering design. Much of her work focuses on the application of these and other interdisciplinary tools to the design and implementation of energy systems for households in developing countries, based in part on her extensive background in design of biomass cookstoves prior to graduate school.

In addition to numerous technical and journal publications, Dr. MacCarty has been an invited speaker around the globe to present her research. She received her PhD in mechanical engineering from Iowa State University in 2015, where she studied under a graduate research fellowship from the National Science Foundation.

maccarty_cv_may_2017.pdf
• Why do embers generate?
Coming Soon – UG Research Webpage Updates

• REU funding opportunity announcement
• Faculty REU projects
• Proposal submission portal
Final Thoughts: The Game within the Game
THANK YOU FOR LISTENING

Q&A
Undergraduate Research Opportunities in MIME

MIME students are invited to attend an information session about undergraduate research opportunities. Learn about the top 5 reasons to get involved in undergraduate research, examples of past research projects, as well as news and future directions of research in our school.

This event will be held in collaboration with the Honors College. In addition, a new initiative to provide funding for both students and faculty advisors in undergraduate research projects will be announced.

Wednesday, Nov. 15
6 - 7:30 P.M.
Learning Innovation Center, Room 302

FREE and open to the public
Accommodations for disabilities may be made by contacting 541-737-3764 or info-mime@oregonstate.edu.