SCHOOL OF ENGINEERING AND COMPUTER SCIENCE
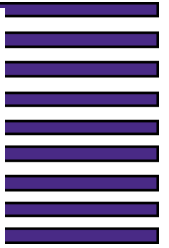
Bits & BYTES

Looking forward to UEclipse, Pep &Vim, and more this month

Festivities abound this April on University of Evansville's main campus. It all kicked of with activities surrounding the Total Solar Eclipse and will culminate with Reunion Weekend. While these activities are not specifically School of Engineering and Computer Science activities, we encourage our students, alumni, and partners to participate as much as you are able.

It all started Sunday, April 7 with Keynote speaker, Maria Weber '08, PhD. Her presentation, *From Eclipse to Magnetism: The Secret Life of the Sun*, was be held in Eykamp Hall (2nd floor of Ridgway University Center) at 2:00 pm (CDT). Dr Weber holds bachelors degrees in Physics and Philosophy from UE and earned her PhD in Physics from Colorado State University. This presentation is brought to us by the Dr. Guy Banta Distinguished Lecture Series in the Natural Sciences and Mathematics. It was free and open to the public

On April 8, Eclipse Day, kicked off at 11:00 am (CDT). UE had activities throughout the day leading up to the total eclipse. Visitors enjoyed performances by the UE Pep Band, the UE Theatre, and the UE Dance Company. Corn Hole, sand volleyball, and basketball courts were available from 11:00 am to 2:00 pm. A Game Zone was set up inside Ridgway University Center. Seating was available in the Soccer stadium. Other viewing areas included the East Terrace, the Front Lawn, and open areas near the center of campus. The partial phase of the eclipse began at 12:45 p.m. with totality beginning at 2:02 p.m. The partial phase of the eclipse ended at 3:20 p.m. Dr. Jeffrey Braun and Dr. Maria Weber provided narration on what to expect as totality approached at the Ridgway Center East Terrace and the Soccer Stadium. Learn more about UEclipse at evansville.edu/ueclipse.

April 11, the 2nd Annual Pep & Vim Kickball tournament takes place. Students, Faculty, Staff, and Alumni are encouraged to form teams and join the fun. Teams must register in advance. The tournament starts at 4:30 pm (CDT) in Cooper Stadium.

April 12 is Pep & Vim Day—UE's Annual Day of Giving. Watch UE Social media for giving challenges throughout the day. SECS will have options for giving support directly to our department and programs. Alumni and Friends of SECS are encouraged to give what you can to support our students.

Pep & Vim kicks off reunion weekend, with a variety of events and activities for alumni to re-engage with the campus. Among those events is the Annual Alumni Awards Dinner, where students will be joining alumni to recognize the award recipients. Several SES students were sent invitations to attend the dinner. Brunch Sunday morning closes out the weekend festivities. To learn more about Reunion Weekend and the events you can participate in, check out the alumni website at: Alumni Weekend 2024

PEP and VIM Giving to SECS

On Friday, April 12, 2024, UE's Annual Day of Giving, donors will be able to direct their funds to support the School of Engineering and Computer Science. Two area of SECS support will be available:

Student Projects Fund—Provides direct support to the hands-on projects students complete as a part of their coursework in Engineering and Computer Science.

The Gerhardt Legacy Fund—Provides resources for UE Leaders to directly empower students the Way Dr. Phillip Gerhardt did for over 40 years.

To Give to either of these funds, go to our Day of Giving page:
https://www.uealumnionline.com/s/1096/17cf/interior.aspx?sid=1096&gid=1&pgid=3253

Associate Dean's Corner

Dear Members of the School of Engineering and Computer Science (SECS) Community,

Welcome to the April edition of our newsletter! April is usually the busiest month in an academic year. Our students are busy working on their projects, written assignments, participating in competitions, and getting ready for their finals in a couple of weeks. Our seniors have less than a month to finish their academic journey and start their professional career or work towards getting an advanced degree.

For most of our students, their academic journey at UE was possible through the generous contribution of our donors and supporters in the form of scholarships and other financial support. I would like to personally invite each of you to join us in embracing the spirit of generosity and philanthropy by participating in our Annual Day of Giving on April 12.

Your continued support and contributions make it possible for us to attract qualified students, provide high-quality education, and support our students as they pursue their academic and professional goals here.

I am deeply grateful for your ongoing support and encourage you to continue to invest in the future of our students and the thriving programs at SECS. Thank you for your continued support and generosity. Together, we can make a lasting impact on our university, our community, and the many students who call SECS their home.

Sincerely,

Suresh Immanuel, Ph.D., P.E.
Associate Dean and Professor
School of Engineering and Computer Science

2023-24 Senior Design Projects

CE 495 SENIOR DESIGN TEAM

The UE Civil Engineering Design team's work on Granted's House of Hope (HOH) project will come to an end on April 26 when they attend a HOH ground-breaking ceremony in the morning and make a final presentation to the project sponsor and the Civil Engineering Advisory Council (CEAC) in the afternoon. The team has completed the site design, including layouts for the HOH, pavilion, playground, parking lot, and support facilities. The team designed a drainage system, water and sewer service, and other site utilities for the HOH and pavilion. The team created an architectural floor plan that was sent to the project architect and several local contractors to complete the mechanical, plumbing, electrical, lighting, and foundation design.

Since February, the team's primary task has been to coordinate the development of permit applications for construction. Once permits are obtained the project sponsor hopes to begin construction in May 2024 with a June 2025 completion date.

The House of Hope project has been both challenging and rewarding; it has provided the UE civil engineering seniors with experience that cannot be obtained in the classroom

UE RACING TEAM

The UE Baja team has recently completed the fabrication and assembly of the vehicle. The team conducted spring testing validation events where the car was put through multiple rounds of testing including suspension impact, frame torsion, acceleration, cornering, and braking. Moving forward, the team will begin the teardown of the vehicle and prepare for the painting stages. In addition to this, the final reports and presentations are underway as the team prepares for the final stretch where we will present to the Mechanical Engineering Advisory Council (MEAC) and faculty on April 18th. We would like to once again thank all of those who have helped us get to this point.

THERMOSIPHON TEAM

The Thermosiphon team Research has been completed. The team will be represented at NCUR 2024 with a poster presentation summarizing the research. On the modification side of things, the system has been drained, allowing for the water and tubing to be cleaned. Also, the instrumentation upgrades can now begin.

IMPORTANT DATES

April

1	Classes resume
5	Last Day to Withdraw with a "W"
7-8	UEclipse activities
12	Pep & Vim
13-14	Reunion Weekend
15	FASFA Deadline
18	MEAC Meeting
19	Purple Visit Day
25	Reading Study Day
26	CEAC Meeting
26	Final Exams Begin

May

2	Last Day of Final Exams
4	Baccalaureate and Commencement
13	Summer Session I begins

Attention Engineering Alumni
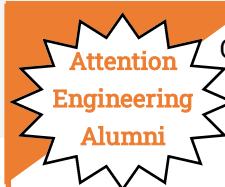
The School of Engineering and Computer Science is seeking Alumni to assist in various areas in support of the school:

- Guest Lectures
- Recruitment
- Adjunct Professors
- Serve on Advisory Councils

If you are interested in supporting SECS in any of the areas listed, please contact Dr. Suresh Immanuel via e-mail (ss476@evansville.edu).

Two Computer Science Students Have Papers Accepted

Two Computer Science Students, Alejandro Malla and Andrew Thompson have submitted papers for the IEEE International Conference on Electro Information Technology. Details of their papers are below. They will be travelling with Faculty to present their papers at the conference May 30-June1. Congratulations to these students on this accomplishment!

Title: Text Extraction and Classification for Automated Balance Sheet Data Entry from Form 1120

Authors: Andrew S. Thompson, Maxwell M. Omwenga & Benjamin W. Johnson

Abstract: Data entry is a routine task requiring minimal skill and excess time for professionals in financial fields. Auditors, accountants, and others lose time entering data that could be better utilized performing financial analysis. In an effort to reduce this obstacle, tools for automated classification of financial data were tested. These tools extract financial data, classify, and insert the data into a spreadsheet. The specific scope of this research paper is classifying Form 1120 balance sheet items into current and noncurrent assets and liabilities. This small-scale approach can be expanded to automate the process of extracting all data from balance sheet schedules and sorting it into a spreadsheet. Previous research in classification has rarely been applied to this domain. In order to develop a method with accuracy, multiple classifiers were tested. A logistic regression model, linear support vector machine, and polynomial support vector machine were all found to be the most accurate tools for determining classification. The immediate implications of these tests are that time spent on balance sheet data entry can be greatly reduced through automation with accurate results. Future work would be necessary to build an application that utilizes this classification to its fullest potential. Results show that our proposed classification models had an average maximum prediction rate of 97.6\%, which with a larger training dataset, would better generalize to many possible categories from a balance sheet schedule, and displays the effective nature of this research for classifying terms from balance sheet schedules.

Title: Exploring Image Similarity through Generative Language Models: A Comparative Study of GPT-4 with Word Embeddings and Traditional Approaches

Authors: Alejandro Malla, Maxwell M. Omwenga

Abstract: In this article, we propose a novel approach for determining image similarity, leveraging advancements in generative artificial intelligence. At the heart of our method is the use of OpenAI's GPT-4 large language model for generating image captions, combined with the Ada v2 word embedding model for semantic analysis. This technique involves creating textual descriptions of images via GPT-4 and subsequently computing cosine similarity of these descriptions using Ada v2 word embeddings. We compare this innovative approach with traditional image similarity methods, with a particular focus on the VGG16 neural network approach, employing the DISC21 dataset for our analysis. Preliminary results demonstrate the promising potential of this method in the field of image similarity assessment. The paper delves into both the advantages and current limitations of our approach, including constraints like rate limits in experimentation and the rapidly evolving capabilities of language models in vision tasks. Our findings indicate a trajectory towards improved outcomes as these models continue to advance, underscoring the growing intersection of language and vision models in artificial intelligence for applications like image similarity evaluation.

Student Organizations

ASCE

We have successfully created a second concrete cornhole board to participate in the 2024 ASCE Student Symposium at Purdue Northwest! Members are also working on another "mini competition" requiring the creation of concrete disc golf putters. We are very excited to travel up to Purdue Northwest and meet other ASCE student chapters and compete with our concrete projects! Wrapping up the end of the school year we are also planning on hosting an engineering picnic with ASME to celebrate the completion of the Spring 2024 Semester!.

ASME

With the semester coming to a close and student project deadlines approaching, we were unable to hold a monthly meeting for March. However, we have been working with our ASCE section to plan an end-of-year SECS cookout open to all students. The cookout is set for April 23rd from 4:00-6:00pm and is free for all students. More information will be provided in the upcoming weeks. If you have any questions or are interested in joining our ASME section, please contact Nate Bingham (nb214), Brendan Ulewicz (bu21) or Chris Martin (cm527) for more information.

acm

ACM continues their efforts to re-establish a student chapter here at UE. Any Computer Science major/minor or Computer Engineering major is welcome to join. Students interested in being a part of ACM should speak to Dr. Mabis.

swe

Society of Women Engineers Student Chapter has not been very busy this month. If you are interested in getting involved, please talk to one of the SWE leaders: Jillian Tretter, Ashlyn Koutsos, Astrid Miranda, and Baylee Essert!

SENIOR SPOTLIGHT

Samantha Elkins
Civil Engineering, Class of 2024
Hometown: Evansville, IN

Why I Chose UE: *.I chose UE because the financial aid package I received made it an affordable option.*

Clubs or Organizations Involved in At UE: *ASCE, Venturing Crew, Archery, Pep Band, and SWE .*

Internships or Co-op Experience: *.I spent the Summer of 2023 working with the City of Evansville Engineering Department. I also worked pat-time for them throughout my Senior Year.*

Favorite UE memory: *. .I will always remember the time I spent hanging out with friends and going on trips with the UE Venturing*

Where do you go from here?

I am going to stay in Evansville and continue working full-time with the City Engineering Department.

School of Engineering and Computer Science
2024 Summer Course Offerings

The School of Engineering and Computer Science will be offering the following courses during the 2024 Summer Sessions I & II. Students are encouraged to talk with your academic advisor about the potential benefits of taking these courses during the summer sessions.

Summer Session I   (May 13 thru June 14)

CS-101 Introduction to Computer Science (3 hours), Dr. Omwenga, Online-Asynchronous

CS-210 Fundamentals of Programming (3 hours), Dr. Omwenga, Online-Asynchronous

ENGR-213 Dynamics (3 hours), Dr. Fulcher, MTuWTh, 10:00 am-12:00 pm, KC133

ENGR-232 Mechanics of Materials (3 hours), Dr. Layer, M-F 8:00-9:30 am, Online-Synchronous

ENGR-366 Fluid Mechanics (3 hours), Dr. Lofton, Online-Asynchronous

ENGR-390 Applied Engineering Mathematics (3 hours), Dr. Lofton, Online-Asynchronous

ME-344 Design of Machine Elements (3 hours), Dr. Layer, M-F 10:00-11:30 am, Online-Synchronous

ME-368 Heat Transfer (3 hours), Dr. Lofton, Online-Asynchronous

Summer Session II (June 17 thru July 19)

ME-345 Computer Aided Mechanical Design (3 hours), Dr. Layer, M-F 8:00-9:30 am, KC 270

ENGR-409 Engineering Economy & Decision Making (3 hours), Dr. Layer, M-F 10:00-11:30 am, Online-Synchronous

TIPS FOR ACADEMIC SUCCESS

Apply Now for Summer Internships/Research

Every SECS Student is encouraged to participate in an Internship, Research, or Co-op Experience each summer prior to graduation. These experiences provide hands-on learning experiences and enhance the classroom experience.

Benefits of Internship/Research:

1. Gain valuable work experience. *Interns/researchers have the opportunity to apply acquired knowledge to real work experiences, witnessing firsthand the day-to-day job duties they can expect to encounter in their chosen field*

2. Explore a career path. *Taking on an internship while in college allows students to work in their desired field, helping them decide if the field is right for them. Doing Research in your field while in college allows for deeper exploration of specific topics in the field.*

3. Give yourself an edge in the job. *Internship/research experience makes a college grad more marketable as they usually require less training and can handle more responsibilities*

4. Develop and refine skills : *You can learn a lot about your strengths and weaknesses during an internship/research experience. Both allow for feedback from supervisors and others who are established in the field, and offer a unique learning opportunity that you may not have again as a working adult.*

5. Receive financial compensation. *Many internships and research opportunities are paid which means you can gain valuable work experience and make money at the same time. A paid internship/research experience could provide money to fund your college tuition and expenses.*

6. Network with professionals in the field. *Internships /research opportunities provide an opportunity to learn from the people around you, ask questions, and impress. The professionals you encounter during an internship /research experience could be your future colleagues or a connection to your first job. .*

7. Gain confidence. *Internships/research experiences provide an opportunity to apply what you have learned in a safe environment where mistakes are expected.*

Learn more about Internships and Research options available by contact the Center for Career Development. You can make an appointment in Handshake or by sending an e-mail requesting an appointment to career@evansville.edu. The Center for Career Development is located in Room 234. Ridgway University Center.

SUMMER RESEARCH OPPORTUNITY

NSF Research Experiences for Undergraduates (REU) CyberAI: Cybersecurity Soutions Leveraging Artificial Intelligence for Smart Systems

May 20 -July 26, 2024

This Summer Research Experience for Undergraduates (REU) site, funded by NSF Division of Computer and Network Systems, focuses on cybersecurity challenges in future smart systems such as smart power grid, smart healthcare, internet of things (IoT), etc. at Tennessee Tech University

Project Objectives:
- Opportunities to conduct cybersecurity-related research and gain valuable experience in topics of national interest.
- Allow interns to self-assess their interest in cybersecurity and graduate studies.
- Learn advanced subjects such as machine learning, cryptography, deep learning, federated and reinforcement learning, graph-based anomaly detection and hardware attack countermeasures.

Topic Areas:
- Secure AI-assisted Medical Diagnosis for Smart Healthcare Systems
- Secure Communication Schemes for Smart Power Grid
- Hardware Intrinsic Security Threats in IoTs
- Security Vulnerabilities in Machine Learning Models
- Anomaly Detection Using Graph Streams to Protect Cyber Networks
- Leveraging the Power of Data to Analyze and Detect Cyberattacks on IoT Systems
-

Activities:
- Cybersecurity-related research and short courses
- Short course on Deep Learning Deployment in
- Hardware
- Preparation of research papers and posters
- Hands-on training with real equipment

Application Process:
- Transcripts
- Two recommendation letters
- Personal statement
- Resume

All qualified applicants are encouraged to apply, including minorities, women, veterans and individuals with disabilities.

- GRE and NSF GRFP preparation

Other
- Applications Available Online: https://etap.nsf.gov/award/6635/opportunity/9077
- Screening will begin immediately and continue until all slots are filled.
- Announcement of Awards: April 20, 2024

Award information:
- $7,000 stipend for 10 weeks
- On-campus housing included
- Food allowance
- Round-trip travel expenses up to $600
- The total is approximately $10,500

Contact:
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