



May Newsletter

Welcome to the end of the year edition of the College of Science, Engineering, and Technology Newsletter!

Department News

Computer Information Science

CADSCOM: Data Science and IT Conference

The College of Science, Engineering and Technology (CSET) partnered with the Twin Cities ACM Chapter to organize the 3rd Annual Colloquium on Analytics, Data Science, and Computing (CADSCOM), which was held virtually on Saturday, March 20, 2021. The Twin Cities Chapter is a professional chapter of the Association of Computing Machinery (ACM). CADSCOM is an annual data science and IT conference, which CSET and MSU, Mankato have supported since its inception. There were 20 peer-reviewed research papers presented during the conference. Faculty and students representing the Computer Information Science (CIS) department had the highest number of papers. The conference participants included students and faculty representing various universities, including international universities, and industry professionals. In addition to the research paper presentations, the conference included several panel discussions on topics such as equity and inclusion in data science and computing, publications and grants, and trends in artificial intelligence. Dr. Aaron Budge, Acting Dean of CSET, provided the welcome remarks and Dr. Sarah Kruse, CIS faculty member, moderated a panel discussion on publications and grants. Dr. Rajeev Bukralia, associate professor in the CIS department, serves as the chair and co-founder of the Twin Cities ACM Chapter and the chair of the CADSCOM committee. Additional information about CADSCOM can be found at <https://twincitiesacm.org/services>.

Microsoft Offers Data Science Training for the DREAM Student Organization

Microsoft offered a virtual, one-day training for students and faculty on April 3. The Microsoft experts provided training on PowerBI and data visualizations. This training complemented the graduate programs in data science, IT, and health informatics. Microsoft has also offered regular trainings on data science and artificial intelligence for students in the DREAM student organization on campus in previous years. *DREAM (Data Resources for Eager and Analytical Minds) is a recognized student organization focused on data science and artificial intelligence and has over 300 student members. DREAM is a recipient of the Outstanding RSO Award. The student members have won several awards at various data science competitions and have produced research papers for scholarly conferences. Dr. Rajeev Bukralia serves as the founder of and faculty advisor to DREAM.*

Two Research Papers from CSET Students Win Top Spots at CADSCOM

Two research papers from students in the Computer Information Science Department were selected as two of the top three peer-reviewed research papers at the 3rd Annual Colloquium on Analytics, Data Science, and Computing (CADSCOM). Their papers have been recommended by CADSCOM for fast-track review for the Journal of Midwest Association of Information Systems.

Paper titles:

- Detecting Online Review Fraud Using Sentiment Analysis by Bryn Caron (Faculty Mentor: Rajeev Bukralia)
- What Does the Twitter Sentiment say about the COVID-19 Vaccine? by Ilma Sheriff (Faculty Mentor: Naseef Mansoor)

Welcome to Dr. Lin Chase!

Dr. Chase is joining Computer Information Science to build the new project-based Computer Science program. She has served as both chief technology officer and chief executive officer of Silicon Valley companies, has been a lead software technology strategist at multiple Fortune 500 companies, and has

produced original research results that have had a significant impact in the commercial world. Dr. Chase has lived and worked in Europe, the UK, India, and South Korea and brings a global industry perspective to our college. She is committed to expanding opportunities for historically underserved students in the field of computer science. Her Ph.D. is from Carnegie Mellon University.

Construction Management



MSU Mankato Construction Management Team placed First in the Pursuit Competition among the nine construction management programs in the Midwest. We have a great team, Hailey Schwieger, Nickolas Saucier, Kyle Mickelsen, and Brock Reese. Dr. Mohamed Diab coached the team who worked so hard to accomplish their goal. We also want to thank Chris Tauscheck PCL for his contribution to this process and the advice he provided. It is a nice end to our spring semester with this accomplishment. Thank you Ryan Companies for sponsoring this competition.

Electrical & Computer Engineering Technology

Student Research Spotlight- Ebrima Marong '21

Senior Research Title: Modeling and Simulation of Multi-Mode Optical Fiber Propagation

Supervisor: Dr.Zhang

Abstract:

Since the beginning of the 21st century, we are entering a digitally connected global society where “bits per second (b/s)” becomes layman’s words. The emergence of 5G wireless networks will enable the so-called Internet of Things (IoT), where communication will not only involve voice, image, and video but also include big data from all sorts of sensors e.g. from drones or autonomous cars. IoT/5G brings a huge demand for the core optical fiber communication network which serves as the backbone for the wireless mobile networks. Multi-mode fiber transmission of data represents a key solution because, in contrast to single-mode fiber, multiple modes can be utilized each carrying an independent data channel, to significantly increase the communication capacity on a single fiber. I believe one important research area is the efficient modeling and simulation of laser signal propagation inside the multimode fiber. There are rigorous but complicated models based on Maxwell’s equations, but the associated simulations take a long time. In this research, I derived simplified signal propagation models with the following two goals.

- 1). to enable much faster simulation of signal propagation in the multimode fiber.
- 2). to facilitate the study of propagation effects such as mode coupling, dispersions, and nonlinearity.



Updates from Dr. Xuanhui Wu, Chair

Thin Film Technology has renewed its contract with ECET. The partnership provides undergraduate students the opportunity to conduct research on high- precision low-value resistors. The Antenna Lab in ECET recently acquired an NSI-MI spherical near field scanner to measure microwave and millimeter-wave antennas.

Electrical Engineering student, Abdelrahman Elkhatib recently received the outstanding performance award at NCUR and URC symposiums for his poster titled: IoT based solution to gather Foot Plantar Pressure for Daily Life Activities.

Integrated Engineering

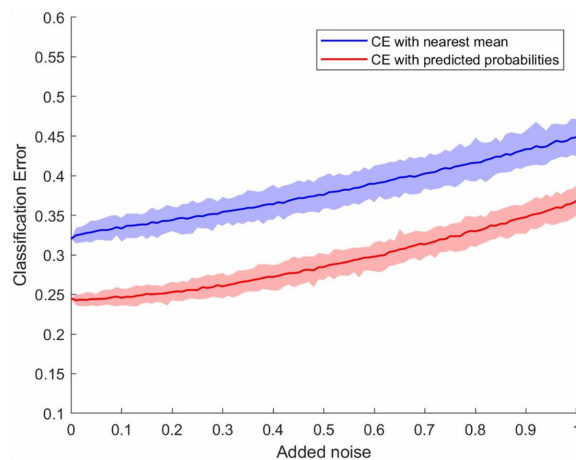
Dr. Michelle Soledad is joining Integrated Engineering to work with the Bell Program in August of 2021. She brings significant industry and leadership experience in electrical and software engineering, including work in industry and academia in the Philippines. Dr. Soledad completed her Ph.D. in Engineering Education at Virginia Tech and joins us after a year at the Ohio State University. Her past experience and research have prepared her for scholarship and research-to-practice activities that focus on facilitating opportunities for students to develop cultural competence and a global mindset alongside their engineering technical skill sets.

Darcie Christensen is joining Integrated Engineering to work with the Bell Program this fall. She comes from Utah State University where she is finishing her Ph.D. in Engineering Education, funded through a National Science Foundation Graduate Research Fellowship. Her dissertation looks at the impact of peer mentorship initiatives on student experiences. Her future research is targeted at further examining the efficacy of mentoring relationships, specifically in regard to programmatic efforts and student self-efficacy and integrity. This work aligns strongly with the project-based and co-op-based engineering programs in the department.

The Department of Integrated Engineering also welcomes **Arynn Lorentz, Luke Nyberg, and Neil Schroeder** as Bell Program facilitators. Facilitators serve as learning coaches to our students and build relationships with community college and industry partners to provide clear pathways into the program and support students in their upper-division co-op experiences.

Mathematics and Statistics

Mathematics professor, Galkande Iresha Premarathna's published research on mathematical and statistical methods, creating a model to classify protein binding sites.



A mathematical representation of protein binding sites using structural dispersion of atoms from principal axes for classification of binding ligands

Many researchers have studied the relationship between the biological functions of proteins and the structures of both their overall backbones of amino acids and their binding sites. A large amount of the work has focused on summarizing structural features of binding sites as scalar quantities, which can result in a great deal of information loss since the structures are three-dimensional. Additionally, a common way of comparing binding sites is via aligning their atoms, which is a computationally intensive procedure that substantially limits the types of analysis and modeling that can be done. In this work, we develop a novel encoding of binding sites as covariance matrices of the distances of atoms to the principal axes of the structures. This representation is invariant to the chosen coordinate system for the atoms in the binding sites, which removes the need to align the sites to a common coordinate system, is computationally efficient, and permits the development of probability models. These can then be used to both better understand groups of binding sites that bind to the same ligand and perform classification for these ligand groups. We demonstrate the utility of our method for discrimination of binding ligand through classification studies with two benchmark datasets using nearest mean and polytomous logistic

Mechanical and Civil Engineering



Congratulations to our Minnesota State University, Mankato team that placed with their "Snow Roomba" at the 2021 Autonomous Snowplow Competition early this April.

Our results from this year's Autonomous Snowplow Competition:

- 3rd place out of 10 in the Preliminary Design Review
- 2nd place out of 10 in the individual portion of the Collaborative Design Review

See the full list of award results from the competition at http://www.autosnowplow.com/2021_Event_and_Results.html

Physics and Astronomy

Dr. Yanil Dall'Asén and Dr. Jorge Méndez were awarded a Presidential Teaching Scholar Grant for Summer 2021.

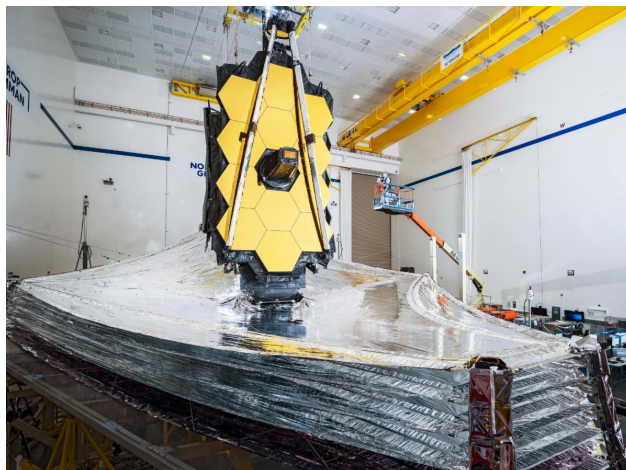
Project title: Expanding Physics Advance Laboratory to Enhance Experimental and Analytical Skills

Dr. Michael Rutkowski awarded Co-Investigatorship on JWST Cycle 1 Program

Minnesota State-Mankato's Research Month started early for Professor Michael Rutkowski in Astronomy with the announcement by the Space Telescope Science Institute that targets of interest within his research would be considered as part of the first round of public observations to be made when the James Webb Space Telescope launches on 30 October 2021.

Rutkowski is a member of a consortium which was awarded nearly 600 hours (~24 days) of parallel spectroscopic observations of intermediate redshift extragalactic deep fields for the study of star formation, galaxy evolution and the formation of dust. The Primary Investigator of this program -- - PASSAGE: Parallel Application of Slitless Spectroscopy to Analyze Galaxy Evolution --- is Dr. Matthew Malkan at UC-Los Angeles and consortium members are located in the US, Europe and Australia. The first round of general observations to be made by JWST will have a duration of approximately one year, beginning in late Spring 2022 and continuing into the following Spring of 2023. Approximately 60000 hours were requested of primary science time, with 6000 available, in the first proposal. Students who are enrolled in the physics major, astronomy minor, or computer science major are invited to contact Dr. Rutkowski about opportunities to engage in this cutting-edge research when the data become available. Dr. Rutkowski is also affiliated with a guaranteed time program with JWST led by Arizona State University which will provide additional opportunities for MNSU student to be amongst the first astronomers in the world to make use NASA's JWST upon launch.

This observatory will launch in October 2021 from Guiana and if everything goes well, it will start taking data in the following Spring. This telescope is THE premier NASA astrophysics mission.



Pictured: The SIM and Mirror assembly has been integrated with the radiator shield in one of the last steps before JWST is shipped to French Guiana for launch (Photo Credit: NASA)



2021 Big Ideas Challenge Winners!

The 2021 Big Ideas Challenge, hosted by the College of Business had six CSET students place in all top three categories!

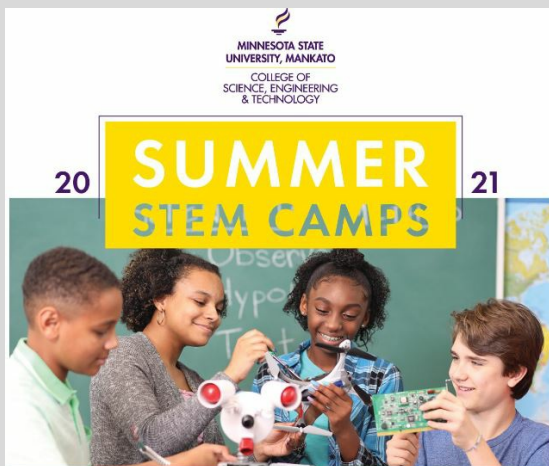
Grand Prize, Tocco VR- Jim Boyd (Engineering)

2nd Place and High Tech Division Winners, Hearing Glasses - Kaitlyn Gloege (Management Information Systems), Abdelrahman Elkenawy (Electrical & Computer Engineering Technology), Alex Shepherd (Computer Information Technology)

3rd Place and People's Choice Winners, Smart Beehives-

Abdelrahman Elkhatib (Electrical Engineering)
Sumit Mahajan (Mechanical Engineering)

[Learn more about the challenge and watch their videos!](#)



SUMMER STEM CAMPS

The College of Science, Engineering, and Technology will be holding STEM Summer Camps for grades 6-9.

Dates:

July 6-9- Theme: Ideation to Market

July 26-29 Theme: Farm to Table

August 2-5 Theme: Artificial Intelligence in Engineering

Cost: \$200

For further information visit:

<https://cset.mnsu.edu/stem-summer-camps/>

Contact: Joann Jaqua, at joann.jaqua@mnsu.edu or 507-389-1257

Summer Orientation Dates

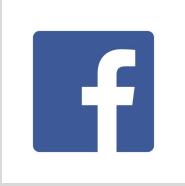
NEF Transfer

May 24 June 17
June 7 June 28
June 14 July 19
June 21 August 16
June 28
July 12
July 19
August 16

For more information on summer orientations, please contact Ken Adams, Student Relations Coordinator, at: ken.adams@mnsu.edu or 507-389-1521.

Share your updates and good news!

Want to share the good news happening in your area for the Summer edition? Email your updates to Emily Frederick, Director of Marketing and Communications at: emily.frederick@mnsu.edu.



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