



COMPUTING COWBOYS NEWSLETTER DECEMBER 2021

Computing Cowboys Annual Newsletter

IN THIS ISSUE

From the Department Head

Dear alumni and friends:

Greetings! Hope this message finds you safe and well!

It is a pleasure to communicate with you again through this newsletter. Despite the continued impact of COVID-19, as always, our faculty and staff have shown remarkable dedication to serve our students. The university has tended towards normalization. The College of Arts and Sciences (CAS) conducted the Hall of Fame awards ceremony in person in which Mr. Derric Driver was recognized as the 2021 distinguished Computer Science alumnus by Dean Krutz.

I am glad to report that the state of the department is very good. Our enrollment has been growing, our graduates are employed, and several of our students have accepted internship offers. Our online courses continue to see increase in enrollment. Our faculty are doing very well in research and received funding from federal and state agencies supporting their research. Dr. Esra Akbas received the 2021 CAS Junior Faculty Award and Dr. Thanh Thieu is a winner of the 2021 CAS Holistic Science Prize. This newsletter highlights several activities and faculty accomplishments of the department.

One significant news to mention is related to ABET accreditation of the Computer Science BS degree program. ABET review committee visited the department in October 2021. I am happy to say we expect to be accredited.

I urge you to visit the department virtually or physically and interact with the department. Interaction with the alumni will strengthen the department and will help our students. You can follow us on social media as well.

One final note; I am stepping down from the department head position and be a professor beginning June 1, 2022. I thank all the alumni and friends who supported the department over the years. I am especially grateful to all alumni who have set up endowed scholarships to support future students. Serving the department as the head during the last eight years is an honor.

Wishing all our alumni and friends a Happy New Year,

Sincerely,

K.M. George

Professor & Head



Derric Driver (right) named OSU CAS Distinguished Alumni for 2021!

Derric Driver, an OSU Computer Science alumnus (BS CS '89), recently was named as the CS Distinguished Alumni for 2021 by the College of Arts and Sciences (CAS) during the Hall of Fame awards ceremony.

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New Programs for Undergraduate and K-12 Research Experience

We have two new programs funded by NSF to support undergraduate and K-12 Research and Outreach.

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Derric Driver receives Distinguished Alumni Award

Derric Driver, BS Computer Science '89, recently was named as the CS Distinguished Alumni for 2021.

Derric Driver is a Tulsa native who graduated in December 1989 with a degree in Computer Science. Declining offers from IBM and AT&T, Derric accepted an offer with ExxonMobil and started his 31-year career with the company as a systems analyst in Houston. He has held a variety of IT positions including applications development, infrastructure and operations, SAP, customer service, and – most recently – IT projects. He also has served as financial analyst for ExxonMobil's Lubes business line. He currently is Portfolio Manager for a three year, \$50M+ global IT project to modernize and transform ExxonMobil's end user experience. Besides Houston, his other work locations have included Baton Rouge, LA; Billings, MT; Benicia, CA; Fairfax, VA; and Curitiba, Brazil.



Derric Driver receives award from CAS Dean Dr. Glen Krutz.

Derric has two passions: tennis and travel. He has been to each Grand Slam Tournament at least three times. And, he has traveled to more than 80 countries (with a goal of doing four new countries annually).

As an alumnus, Derric always has been a strong OSU supporter. He co-hosted the CS Department's 50-year anniversary and sponsors a departmental scholarship. He is both a founding and current board member of OSU's Office of Institutional Diversity.

Within the Houston community, he is an active member of St. John's Downtown Church and is a former board member of both the Houston Community Voice Mail and Houston Assistance Fund non-profit organizations.

GIVE TO THE DEPARTMENT!

Support the department and its growth by making a [donation!](#)

Congratulations to all graduating students!

DEGREES CONFERRED

- BS – 37 (Spring), 4 (Summer), 34 (Fall)
- Masters – 7 (Spring), 2 (Summer), 8 (Fall)
- Doctoral – 2 (Spring), 4 (Fall)



NSF-funded Programs for Undergraduate and STEM Educators

The Computer Science department is proud to host two outreach programs targeted towards engaging undergraduate students and K-12 Educators in computer science research. Both the Research Experience for Undergraduates (REU) and the Research Experience for Teachers (RET) programs are funded by the National Science Foundation and aim to provide undergraduate students and K-12 STEM educators experience in cutting-edge advances in computer science topic areas such as artificial intelligence and big data analytics.

The REU program, funded through a grant of \$402,772 from the National Science Foundation, is headed by Dr. Esra Akbas (Principal Investigator) and Dr. Christopher Crick (Co-Principal Investigator). NSF funds a number of research opportunities for undergraduate students through its REU Sites program. The REU program typically consists of a group of ten or so undergraduates who work in the research programs at Oklahoma State University. Each student is associated with a specific research project, where they work closely with the faculty and other researchers. Students are granted stipends and, in many cases, assistance with housing and travel.

This year, due to unfortunate circumstances caused by the COVID-19 pandemic, the program was run virtually. Many of the faculty were involved in the REU site as mentors including Dr. Esra Akbas, Dr. Christopher Crick, Dr. Thanh Thieu, Dr. Rittika Shamsuddin, Dr. Arunkumar Bagavathi and Dr. Sathya Aakur, whose projects spanned fundamental artificial intelligence research such as explainable learning to social network analysis and even bioinformatics. The students spent 10 weeks learning the fundamentals of big data analytics and presented their work at the National Science Foundation's REU symposium along with other undergraduate researchers from leading universities in the nation such as George Mason University, The University of Texas at Austin, Carnegie Mellon, University of Minnesota and Marquette University. Some students also presented their work at the inaugural Summer Research Showcase, sponsored by the Office of the Vice President for Research at Oklahoma State University.

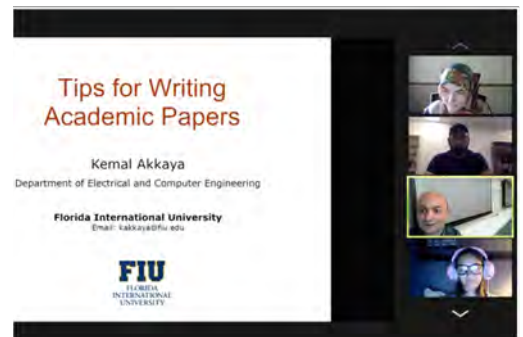
The RET program, funded through a grant of \$397,669 from the National Science Foundation, is headed by Dr. Johnson Thomas (Principal Investigator) and Dr. Rittika Shamsuddin (Co-Principal Investigator). The goal of the program is to support authentic summer research experiences for K-14 educators to foster long-term collaborations between universities, community colleges, school districts, and industry partners. With this in mind, the RET program at the Computer Science department was focused on providing an immersive experience for high school teachers in research and curricular development activities to better engage students with AI topics like Big Data, Machine Learning, and Deep Learning. The program leveraged an existing partnership with the Tulsa Regional STEM Alliance to recruit teachers to the site while simultaneously strengthening and creating relationships between industry, high schools, community colleges, and universities. This RET Site will also provide opportunities for high school and community college students to continue engaging in research after the RET program has run its course to propel the next generation of technologically savvy students into computing careers. The program is intended to recruit ten teachers from the Tulsa and surrounding areas to conduct research and curriculum development activities at the OSU campus in Tulsa for six weeks during the summer.

Our department was also awarded another NSF REU Site award, headed by Dr. Cecil, which focuses on introducing undergraduate students to research activities in Information Centric Engineering, focusing on 3 facets of modeling, simulation and exchange of information. Eight students from within and outside Oklahoma participated in these REU activities in Summer 2021 at the Center for Cyber-Physical Systems. One of the thrusts of this REU was to encourage minority and students with physical challenges towards graduate school through introducing them to cutting edge research including design of HCI based VR/AR based simulation environments in various process domains including space systems, healthcare and robotics/manufacturing. The REU participants visited Oktaha High School and Northwestern Oklahoma University to demonstrate some of their research outcomes and software prototypes created as part of this REU.



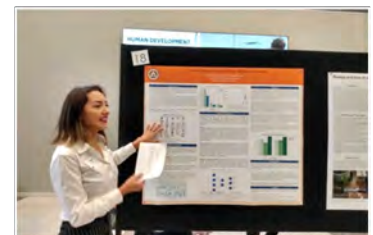
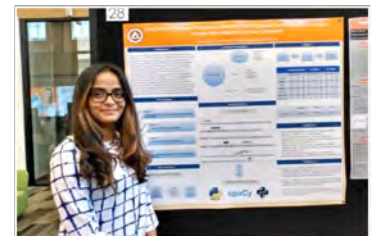
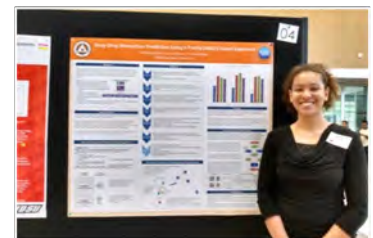
REU Student Orientation

The students from the 2021 Summer Cohort of the REU program attend the orientation session to meet and engage with faculty mentors in the research program.



Learning from Pioneers

In addition to their research experience with faculty mentors from OSU, the students also received valuable experience from engaging with pioneers of computer science research to broaden their skillsets and education.



Presenting Research Experiences

The students from the cohort were able to present their findings at various venues such as the CISE REU symposium and OSU's 1st Summer Research Showcase.

STUDENT AWARDEES



Outstanding Computer Science Senior
Luke Roznovsky was named the Outstanding Computer Science Senior for 2020-21.



The awardees

Luke Michael Gipson, Muhammad Ifte Islam, Reza Marzban, Avinash Gupta, Vineela Indla



Sam Kauffman, a senior in B.S. Computer Science, was selected to present his research at the Oklahoma State Capitol. Sam was the lead student on an NSF funded project which is investigating a Human Centered Computing (HCI) based design of a simulator to train and treat covid-19 patients.

Student Achievements and Awards

This year, the Computer Science Department introduced the Student Award Program to recognize our students' efforts in education, research, and leadership. All awards will be based on student criteria from the year 2020.

The goal of this award is to recognize and honor both undergraduate (Junior/Senior) and graduate (Masters and Ph.D.) students for academic excellence, research, and leadership to highlight their contributions within our department's research and academic communities. There are three award categories that each evaluate and highlight excellence in academics, research and leadership:

Outstanding Computer Science Scholar

The Outstanding Computer Science Scholar Award is given to students who show exceptional promise for achievement as evidenced by their GPA. This award is decided by the CS Departmental Scholarship Committee.

This year's winners are

- Aaron Barlow
- Luke Gipson
- Vineela Indla (Masters)

Outstanding Computer Science Researcher

The Outstanding Computer Science Researcher Award recognizes students who show outstanding research potential in the area of computer science research.

This year's graduate winners are

- Muhammed Ifte Khairul Islam
- Reza Marzban
- Avinash Gupta

Sam Kauffman was awarded the Outstanding Undergraduate Researcher award.

Outstanding Computer Science Leadership

The Outstanding Computer Science Leadership Award recognizes students who show exceptional leadership skills. This should include club membership and engagement in department events.

This year's winner is **Kayla Walkup**.

Fisher Scholarship Awards

This year's Fisher Scholarship awardees are Avinash Gupta and Muhammed Ifte Khairul Islam, Ph.D. students advised by Dr. Joe Cecil and Dr. Esra Akbas, respectively.

Endowed Scholarship Awards

In addition to the department's student awards program, thanks to the generous support of our alumni and friends, we have been able to award several endowed scholarships for outstanding undergraduate scholars to recognize their excellence in academics and research. The list of scholarships and their recipients are presented below.

- Nathan Baker - CS Endowed Scholarship
- Jason Bryant - Spring 2021 Charles Brown Scholarship
- Janice Scott - Sharon L. Daniel Scholarship
- Sarah Shoup - ConocoPhillips Scholarship
- Joshua Kole Smith - 2021-22 Charles Brown Scholarship

Faculty Spotlight: Dr. Esra Akbas

Dr. Akbas' research and teaching interests are broadly in data mining and machine learning using large-scale datasets. Specifically, her recent work focuses on graph mining, social network analysis, and applied machine learning. She works on solving big data problems focusing on the network and health domain, which is reflected in her publications and federal funding.

Her main research focuses on overcoming key challenges in network analysis, such as high computation and space costs involved in graph mining problems using real-world networks and incompatibility between parallel computing solutions and graph data. She received ASR+1 funding from the College of Art and Science at OSU and CISE Research Initiation Initiative (CRII) funding from NSF continue to her work on this area.

Moreover, she applied her theories to medical and health domain problems. Some of the problems that she is working on is opioid use and addiction in the United States, Adverse childhood experiences (ACEs) and the reasons and effects of those on persons' life. She develops novel graph and text mining methods to deal with and extrapolate useful information from big data to combat this problem. Her other work domain is drug-related problems, including detecting side effects of drug usage and drug abuse on social media. In addition to these, she works on problems in different areas with many collaborators from OSU and other institutions. For example, with her collaborator in the cyber-security area from Augusta University, she develops machine learning algorithms to detect vault applications as content hiding applications for Android from the Google Play store. Furthermore, she applies mathematical tools for different data mining problems, including influential nodes detection in networks, graph classification, bot detection in social networks, and text mining with her collaborator from University of Central Oklahoma. Moreover, with Dr. Stephen Nemeth from the OSU Political Science department, we develop computational tools to analyze the data from terrorist events. Last but not least, with her collaborator from Florida International university, she works on understanding public perception with respect to their cultural experience for election and covid-19.

Last but not least, as a female in the STEM area, one of her goals is to become a successful female faculty and computer scientist and inspire future generations of women in STEM and computing. She contributes significantly to undergraduate education and broaden participation in STEM and computer science. Last summer, with her NSF funding to establish an REU site in computer science, she did a successful site with 10 REU students (5 female, 9 underrepresented) and 6 faculty mentors from her department. She is working on create another successful REU site.

- 25 peer-reviewed journal articles and conference publications.
- PI for NSF REU Site: Big Data Analytics at Oklahoma State University, National Science Foundation, \$402,772
- PI for NSF CRII: III: Structure-aware Graph Compressing: From Algorithms to Applications, National Science Foundation, \$174,337
- Director of Data Engineering Lab (DELab) in the Computer Science department.
- Advising 4 Ph.D. students, 6 MS students, 1 UG, and 2 high school student in DELab.
- Received the Junior faculty award in the Natural Sciences at Oklahoma State University for her scholarly excellence.

Ph.D. Students

- Ifte Islam
- Khaled Saifudding
- Farhan Tanvir
- Tanvir Hossain

Master's and Undergraduate Students

- Penchala Prasad Vendipalli (MS)
- Saikerthi Reddy Madireddy (MS)
- Akhil Chennamsetty (MS)
- Niharika Soma (MS)
- Mani Sankar Bolli (MS)
- Sangeon Park (MS)
- Bri Bumgardner (BS)
- Max Khanov (High School Intern)

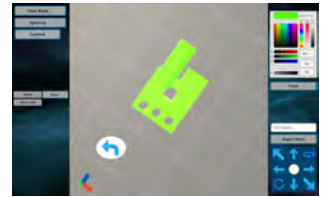


Research Spotlight: Cyber Physical Systems

The Center for Cyber-Physical Systems is anchored by Drs. Mayfield, Cecil, Crick and Shamsuddin. Other members include faculty from other departments (Psychology, Biosystems, Entrepreneurship) as well as external collaborators (NASA, hospitals, among others).

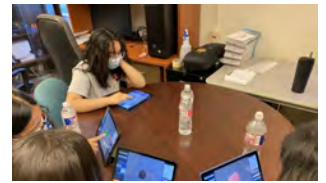
Design of a Shape Modification App to support cyber-manufacturing activities

The emergence of 3D Printing as well as IoT and Cloud technologies are transforming the manufacturing practices worldwide. As part of an NSF project in cyber manufacturing, Dr. Cecil is exploring the design of a 3D Shape Modification App (for Android platforms) which can run on smart phones; the general idea is based on the recognition of the fact that most designs today are variations of existing designs. Such an app will allow casual users, Makers and other hobbyists to modify designs quickly using their smart phones rather than use expensive CAD tools.



Human Centered Computing design based Mixed Reality User Interface for Astronaut Lunar Activities

This project involved OSU student teams participating in the 2021 NASA SUITS Design Challenge mission (in spring 2021), which was to design and develop an innovative user interface for the NASA's Exploration Extravehicular Activity Mobility Unit (xEMU). The xEMU will be used by astronauts as part of the 2024 Moon Mission. The project activities focused on (a) HCI design of approaches and environments to enable cyber-physical training of astronauts on Earth prior to landing on the Moon and (b) design of the user interfaces on the Exploration Extravehicular Activity Mobility Unit (worn by astronauts) through Mixed Reality interfaces to functionally support astronauts accomplish various tasks (such as lunar payload activities, navigating the lunar surface, rock/soil collection). The OSU team's design was selected as one of 10 designs for the final round of testing at JSC NASA Houston (see selection news screenshot). The Mixed Reality design implemented on the HoloLens 2 platform.



Creation of a HCI based Framework to support the design of Extended Reality (XR) based training simulators for surgical contexts

In recent years, the use of Extended Reality (XR) based simulators for training has increased rapidly. In this context, there is a need to explore novel HCI-based approaches to design more effective 3D training environments. A major impediment in this research area is the lack of an HCI-based framework that is holistic and serves as a foundation to integrate the design and assessment of HCI-based attributes such as affordance, cognitive load, and user-friendliness. This research addresses this need by investigating the creation of a holistic framework along with a process for designing, building, and assessing training simulators using such a framework as a foundation. The core elements of the proposed framework include the adoption of participatory design principles, the creation of information-intensive process models of target processes (relevant to the training activities), and design attributes related to affordance and cognitive load. Rigorous user-involved assessment of the framework and simulation approach has highlighted the positive impact of the HCI-based framework and attributes on the acquisition of skills and knowledge by healthcare users.

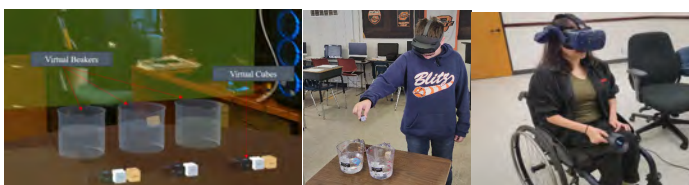


NSF REU Site Project Activities in Information Centric Engineering

REU Activities for undergraduate students focus on introducing undergraduate students to research activities in Information Centric Engineering, focusing on 3 facets of modeling, simulation and exchange of information. These include creation of VR/AR based simulation environments for manufacturing, space systems and surgical training. Eight students from within and outside Oklahoma participated in REU activities in summer of 2021.

Virtual Learning Environments to support STEM learning

This project involves designing Virtual Reality based Learning environments to support learning of STEM concepts for autistic elementary, middle and high school students. Assessment activities is focusing on studying the impact of such environments to help children with special needs learn science and engineering.



Research Spotlight: Language and Intelligence

Dr. Thieu received his degree from The University of Missouri – Columbia. Dr. Thieu research focuses on using Natural Language Processing and Deep Learning to advance the fore front of healthcare, bioinformatics, and education. He currently works on processing whole-person functioning information in electronic health records, knowledge discovery of host- pathogen interaction from biomedical literature, and enhance lexical diversity in semantic embedding. Dr. Thieu is interested in the human's cognition process in relation to language learning, representation and compositional learning.

The Language and Intelligence (LAI) Lab has been expanding projects in natural language understanding of clinical notes in electronic health records. We investigated information extraction of low-resourced domains including whole-person function and medical billing. We also partnered with other OSU faculty to mentor K-12 teachers and under-representative undergraduate students.

Awards:

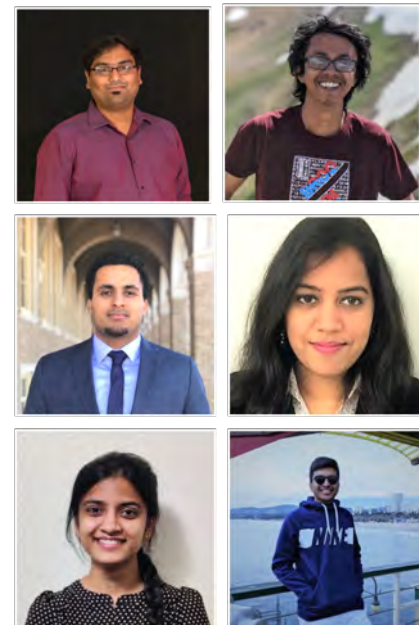
- OSU CAS Holistic Science Prize (PI)
- OCAST Health Research (PI)
- NSF Research Experience for Teachers (senior personnel)
- NSF Research Experience for Undergraduates (project mentor)
- Arts and Sciences Research (ASR) Program (PI)



Research Spotlight: Vision and Understanding

The Vision and Understanding lab is directed by Dr. Sathya Aakur. The group focuses on studying the human brain, robotics, computers and their interplay in building intelligence systems. We aim to build computational approaches driven by artificial intelligence to allow robots to learn and perceive the world like humans. The real world is complex and requires an understanding of many different phenomena such as object permanence, physics, social interactions, and commonsense reasoning, among many other things. How the human brain balances all these factors, in addition to processing the onslaught of sensory observations is a mystery and serves as the inspiration for much of our group's work. At the Computer Vision and Understanding Lab, we are interested in building computational models of the visual world that integrates perception and reasoning to build commonsense knowledge over time from large amounts of unlabeled data such as text, videos and images. We work on building intelligent agents that understand the visual world beyond just recognition of objects or actions without the need for explicit human supervision leveraging cognitive theories of event perception and commonsense reasoning. Much of my group's current work focuses on analyzing, modeling, and synthesizing complex video scenes and the semantic structure that can describe them.

In addition to computer vision research, we are interested in using artificial intelligence for understanding biological processes. Specifically, we work with colleagues from the College of Veterinary Medicine to apply artificial intelligence to develop computational pipelines for detecting the presence of novel and emerging pathogens from genome data. This line of research offers an exciting alternative to traditional testing by allowing us to leverage the learning capabilities of artificial intelligence approaches to the problem of learning to detect pathogens from genome data and help improve the quality of life by early diagnosis and treatment of complex diseases to provide an acceptable and affordable option for use in diagnostic laboratories. Our research is funded by active grants from the US Department of Agriculture (USDA) and the National Science Foundation (NSF).



Notable News

Computer Science Students Excel in NASA sponsored Mixed Reality Design Contest

Project: A Human Centered Computing (HCC) design based Mixed Reality User Interface for Astronaut Lunar Activities

SPONSOR: NASA

PI: J. Cecil, senior personnel: Shelia Kennison, Rittika Shamsuddin, R. Krishnamurthy, B. Mayfield

A Computer Science student team (aptly named Space Cowboys) were selected competitively to participate in the 2021 NASA SUITS Design Challenge (in spring 2021); the project objectives was to design and develop an innovative Mixed Reality user interface for NASA's Exploration Extravehicular Activity Mobility Unit (xEMU), which is planned for use by astronauts as part of the 2024 Moon Mission. The Cowboys team was advised by Drs. J. Cecil, Shelia Kennison, Rittika Shamsudding, Rajesh Krishnamurthy and Blayne Mayfield along with Kristine Davis (an engineer at JSC Houston). The project activities focused on (a) HCI design of approaches and environments to enable cyber-physical training of astronauts on Earth prior to landing on the Moon and (b) design of the Mixed Reality (MR) interfaces to functionally support astronauts accomplish various tasks (such as lunar payload activities, navigating the lunar surface, rock/soil collection). The Mixed Reality design was implemented on the HoloLens 2 platform. Our team submitted their designs to NASA Johnson Space Center (JSC) as part of this design competition. Our team's design was selected as one of 10 designs for the final round of testing at JSC NASA Houston. The top 10 finalists included Texas A&M, Virginia Tech, Columbia University and others. Seven of the Cowboys team along with faculty also submitted a paper (which was accepted) to the 2022 AIAA SciTechForum.



New Hires

The CS department is happy to introduce the two newest members of the staff – Indu Bala Grover (Administrative Assistant) and Mohammed Sherbini (IT Supervisor).



Dr. Cecil recognized as one of the 20 Most Influential Academics in the world In Smart Manufacturing



Dr. Cecil was named one of the most influential academics in Smart manufacturing for his pioneering work in Cyber Physical systems. According to the SME, Dr. Cecil is a part of a group of academics who are the "pioneers and dreamers" exploring opportunities and creating new ones in smart manufacturing.

Prominent researchers visit the Center for Cyber-Physical Systems including the Director of the National Science Foundation and OSU Associate VP

Dr. Panchanathan ('Panch') visited the Center for Cyber Physical Systems and met with Drs. Cecil, Crick and Mayfield. He was also given an overview of the current and past NSF grants. Dr. Panch was accompanied by Congressman Lucas and President Shrum. He congratulated Dr. Cecil on the 4 current NSF grants as well as expressed his appreciation of the societal impact of the current research on healthcare practices as well as on STEM learning outcomes of autistic and other students.

OSU Associate VP, Dr. Christine Johnson visited with Dr. Cecil and his students in the lab to learn more about our research projects as well as experience firsthand the groundbreaking VR and MR simulation environments created in the area of cyber-physical systems in smart health, robotics and space systems. Wearing the 3D headsets, she was able to immerse herself in various 3D environments and complemented the research team on their breakthrough work as well as receiving various awards nationally and at OSU.



Research Outcomes: Publications

The Computer Science Department had a great year engaging in research that push the boundaries of cutting edge research in fields such as artificial intelligence, big data, data mining and computational biology resulting in several publications at highly prestigious venues. Some publications are listed below to highlight the great work of our students, faculty and researchers.

1. J. Cecil, Sam Kauffman, Avinash Gupta, Vern Mckinney, Miguel Pirela-Cruz. Design of a Human Centered Computing (HCC) based Virtual Reality Simulator to train First Responders Involved in the COVID-19 Pandemic. 15th Annual IEEE International Systems Conference, Apr 15- May 15, 2021
2. J. Cecil, Mary Sweet-Darter, Aaron Cecil-Xavier, Avinash Gupta, Role of Affordance, Visual Density and Other HCI Criteria in Designing Virtual Learning Environments to Support STEM Learning for Autistic Students, In Frontiers in Education (FIE) Conference, Oct 13-16, 2021, Nebraska, USA
3. J. Cecil, Avinash Gupta, An Experiential Approach to Support Learning of Cyber-Physical Systems Concepts involving Mixed Reality Platforms, In Frontiers in Education (FIE) Conference, Oct 13-16, 2021, Nebraska, USA
4. Avinash Gupta, J. Cecil, Miguel Pirela-Cruz, Identification of Human-Centered Design Factors and their impact on Design of Cyber-Human training environments for orthopedic surgery. In 9th International Conference on Serious Games and Applications for Health, IEEE SeGAH, 4th - 6th of August, 2021
5. J. Cecil, Ph.D., Rittika Shamsuddin, Ph.D., Sam Kauffman, Avinash Gupta, Yuhan Jin, Brandon Conley, Michelle Echeverri, Cole Hutson, Caleb Newport, Zachariah Albert, Caroline Dinger, The Design of an HCC Based Mixed Reality User Interface to Support Astronauts in Lunar Activities, In 2022 AIAA SciTech, 3-7 January, San Diego
6. K.M. George, Data Reduction with Distance Correlation, 13th Asian Conference on Intelligent Information and Database Systems, Phuket, Thailand, 7-9 April 2021.
7. K.M. George, Slicing the Past to Predict Future, IECON 2021 - 47th Annual Conference of the IEEE Industrial Electronics Society, October 13-16, 2021.
8. M. E. Aktas, Thu Nguyen, Sidra Jawaid, Rakin Bin Riza, Esra Akbas, Identifying critical higher-order interactions in complex networks, Nature Scientific Reports, 11, 21288, <https://doi.org/10.1038/s41598-021-00017-y>, 2021
9. Farhan Tanvir, Muhammad Ifta Islam, and Esra Akbas. Predicting Drug-Drug Interactions Using Meta-path Based Similarities, 18th IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), 2021, pp. 1-8, doi: 10.1109/CIBCB49929.2021.9562802.
10. Khaled Mohammed Saifuddin, Muhammad Ifta Islam, Esra Akbas Drug Abuse Detection in Twittersphere: Graph-Based Approach IEEE International Conference on Big Data.
11. Mingming Peng, Max Khanov, Saikeerthi Reddy Madireddy, Hongmei Chi, Esra Akbas, Gokila Dorai, DECADE - Deep Learning Based Content-hiding Application Detection System for Android, IEEE International Conference on Big Data.
12. Khaled Mohammed Saifuddin, Max Kahanov, Esra Akbas, Jason Beaman, Effects of COVID-19 on individuals in Opioid Addiction Recovery, 19th IEEE International Conference on Machine Learning and Applications (ICMLA)
13. Bri Bumgardner, Farhan Tanvir, Khaled Mohammed Saifuddin, Esra Akbas Drug-Drug Interaction Prediction: a Purely SMILES Based Approach, IEEE International Conference on Big Data, 2021.
14. Mehmet Emin Aktas, Sidra Jawaid, Ebony Harrington, Esra Akbas Influential nodes detection in complex networks via diffusion Fréchet function , 19th IEEE International Conference on Machine Learning and Applications (ICMLA)
15. Mehmet Aktas, Thu Nguyen, Esra Akbas, Homology Preserving Graph Compression, 19th IEEE International Conference on Machine Learning and Applications (ICMLA).
16. Mehmet Aktas, Esra Akbas, Graph Classification via Heat Diffusion on Simplicial Complexes, in IEEE Access, vol. 9, pp. 12291-12300, 2021, doi: 10.1109/ACCESS.2021.3050662.
17. Moawia E. Eldow. The worldwide methods of artificial intelligence for detection and diagnosis of COVID-19. Leveraging Artificial Intelligence in Global Epidemics. Elsevier Academic Press, 2021, Pages 181-201.
18. Yu Li, Hisham Abuella, Md. Zobaer Islam, John O'Hara, Christopher Crick and Sabit Ekin. Hand gesture recognition through reflected infrared light wave signals. IEEE Transactions on Human-Machine Systems, vol. 51, no. 1, February 2021, pp. 44-55.
19. Reza Marzban, Johnson Thomas and Christopher Crick. Targeting the most important words across the entire corpus in NLP adversarial attacks. Proceedings of the 20th International Conference on Artificial Intelligence and Soft Computing (ICAISC), 2021.
20. Reza Marzban and Christopher Crick. Lifting sequence length limitations of NLP models using autoencoders. Proceedings of the 10th International Conference on Pattern Recognition Applications and Methods (ICPRAM), 2021.
21. Reza Marzban and Christopher Crick. Interpreting convolutional networks trained on textual data. Proceedings of the 10th International Conference on Pattern Recognition Applications and Methods (ICPRAM), 2021.
22. Kyungho Nam and Christopher Crick. Self-trainable 3D-printed prosthetic hands. Proceedings of the 30th IEEE International Conference on Robotic and Human Interactive Communication (RO-MAN), 2021.

25. Reza Marzban and Christopher Crick. Deep NLP explainer: Using prediction slope to explain NLP models. *Artificial Neural Networks and Machine Learning -- ICANN 2021* (I Farkas, P Masulli, S Otte and S Wermter, eds.), Springer, 2021.
26. Shamsuddin R, Maweu BM, Dakshit S, Prabhakaran B. Generating Healthcare Time Series Data for Improving Diagnostic Accuracy of Deep Neural Networks. *IEEE Transactions on Instrumentation and Measurement*. 2021 May 03; 70:1-15. Available from: <https://ieeexplore.ieee.org/abstract/document/9421374> DOI: 10.1109/TIM.2021.3077049
27. Maweu BM, Dakshit S, Shamsuddin R, Prabhakaran B. CEFes: A CNN Explainable Framework for ECG Signals. *Elsevier Artif Intell Med*. 2021 May;115:102059. PubMed PMID: 34001319.
28. Islam M, Shamsuddin R. Machine learning to promote health management through lifestyle changes for hypertension patients. *Elsevier Array*. 2021 August 30; 12. Available from: <https://doi.org/10.1016/j.array.2021.100090> Other: ISSN 2590-0056
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30. Ahmed F, Shamsuddin R. A Comparative Study of Credit Card Fraud Detection Using the Combination of Machine Learning Techniques with Data Imbalance Solution. 2021 2nd International Conference on Computing and Data Science (CDS). 2021 January 28. Other: 1614755237490
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32. Sathyanarayanan N. Aakur, Vineela Indla, Arunkumar Bagavathi, Sai Narayanan, Akhilesh Ramachandran, Vishalini Laguduva Ramnath. MG-NET: Leveraging Pseudo-Imaging for Multi-Modal Metagenome Analysis. *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI-2021)*
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35. Sathyanarayanan N. Aakur, Arunkumar Bagavathi. Unsupervised Gaze Prediction in Egocentric Videos by Energy-based Surprise Modeling. *International Conference on Computer Vision Theory and Applications (VISAPP)*, 2021.
36. Z. Ke and N. Park, Performance Study on Various Hyperledger Fabric Node Types and Transaction Flow, *IEEE International Conference on Blockchain Computing and Applications 2021*
37. A. Kancharla, J. Seol, N.-J. Park, T. Feng and N. Park, A Hybrid Chain and A Variable Bulk Arrival and Static Bulk Service of Double-Tuple Queueing Model, *IEEE International Conference on Blockchain and Cryptocurrency 2021*
38. A. Kancharla, J. Seol, H.-Y. Kim and N. Park, Distributed Decentralized Chain (DDC) and k-Queue Variable Bulk Arrival and Static Bulk Service model, *ACM International Symposium on Blockchain and Secure Critical Infrastructure 2021*
39. Z. Ke and N. Park, A Queueing Model for Industrial Public Blockchains and Validation, *IEEE International Conference on Industrial Technology 2021*
40. Prasad Hajare, Sadia Kamal, Siddharth Krishnan, and Arunkumar Bagavathi, A Machine Learning Pipeline to Examine Political Bias with Congressional Speeches, *International Conference of Machine Learning and Applications, 2021*

Research Outcome: Funding

The faculty in the Computer Science Department have been active in securing external funding to support the excellence in research. Below are some of the currently funded grants that highlight the work of the faculty members.

1. Esra Akbas, CRIL: III: Structure-aware Graph Compressing: From Algorithms to Applications, National Science Foundation, \$174,337
2. Esra Akbas, Christopher Crick, NSF REU Site: Big Data Analytics at Oklahoma State University, National Science Foundation, \$402,772.
3. J. Cecil, IRES: Track 1: International Research Experiences in Design of Next Generation VR Simulation based Training Approaches for Orthopedic Surgery, National Science Foundation, \$300,759
4. J. Cecil, EAGER: Investigation of a Next Generation Application Tool for Cybermanufacturing, National Science Foundation, \$187,253
5. J. Cecil, REU Site: Research Experiences in Information Centric Engineering for Emerging Process Domains, National Science Foundation, \$425,279
6. J. Cecil, RAPID: A Virtual Reality simulator to train first responders involved in health care efforts related to the COVID-19 virus outbreak. National Science Foundation. \$103,339
7. Cecil, J., PI, Investigation of an HCC based Mixed Reality approach to support training of medical residents in microsurgery, Oklahoma Center for Advancement of Science and Technology (OCAST).
8. Thanh Thieu. Leveraging deep active-transfer learning to identify low-resource mobility functioning information in public clinical notes. Oklahoma Center for Advancement of Science and Technology (OCAST) Health Research. \$90,000
9. Sathyanarayanan Aakur, Arunkumar Bagavathi. Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequence, USDA National Animal Health Laboratory Network, \$158,136
10. Sathyanarayanan Aakur. Collaborative Research: RI: Medium: Understanding Events from Streaming Video - Joint Deep and Graph Representations, Commonsense Priors, and Predictive Learning, National Science Foundation, \$285,126
11. Sathyanarayanan Aakur. REU Supplement: Collaborative Research: RI: Medium: Understanding Events from Streaming Video - Joint Deep and Graph Representations, Commonsense Priors, and Predictive Learning, National Science Foundation, \$7,920