



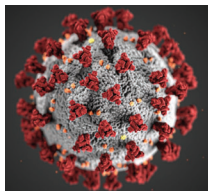
COMPUTERBYTES



Department of
Computer Science
2021 Newsletter

Department Highlights

Responding to the COVID-19 Pandemic



Starting in March 2020 the department transitioned all of its course offerings online in order to maintain the health and safety of our students, faculty, and staff. Courses remained online through Spring 2021. Starting in Fall 2021, thanks to the availability of COVID-19 vaccines, courses returned to meeting in-person. Safety protocols remained in place, including mandatory use of face masks in conjunction with mandatory employee and student vaccination or testing. Thankfully, with the return to campus,

we have seen our students and faculty adhering to these safety procedures. Further, we have seen undergraduate student enrollment continue to increase during the pandemic. While we hope to see the pandemic wane in 2022, we will continue to observe all necessary safety protocols.

ABET Reaccreditation

During 2021 the department applied for reaccreditation of the Undergraduate Bachelor of Science Degree Program from the Accreditation Board for Engineering and Technology. This process included submitting a self-survey of the department and the degree program. Additionally, ABET evaluators visited the department in October 2021 to meet with the department and interview faculty and students. Results from the process will be available in January 2022.

Board of Advisors Meeting

The Board of Advisors (BOA) is a group of industry, university and government professionals who provide an independent assessment of the Department's curriculum, teaching, research, and retention efforts. The department met with the BOA in December 2020. Through observation and discussions with CS undergraduate and graduate students, faculty, staff, and University administrators, the BOA provided prioritized feedback summarizing what is successful or improving within the Department and makes recommendations on areas needing additional focus.

Strengths identified by the BOA included recent additions of talented faculty, strong enrollments in the various undergraduate programs, research programs, extramural funding, and K-12 outreach. Key areas identified for improvement included strengthening the department's ties with industry and exposing students to real world tools and languages. The department also had the pleasure of a visit from Patty Lopez, a member of the BOA and a former Senior Engineer at Intel, in the Fall of 2021. Patty will be further advising the department in the coming months.

Outreach Programs

During the past year, the department's outreach programs have been engaging K-12 students. Young Women in Computing (YWIC) successfully hosted over 60 participants in virtual summer camps across the country. Campers enjoyed learning about CS concepts, machine learning, web dev, AI, Java, and micro:bits. Our high schoolers particularly enjoyed their sessions on virtual reality. Additionally, YWIC received \$25,000 in new funding from the Stocker Foundation to increase middle schoolers participation in computing via literacy, storytelling, and comic book creations.

New Faculty: Shah Muhammad Hamdi



Shah Muhammad Hamdi obtained his Ph.D. and M.S. in Computer Science from Georgia State University in 2020. His research interests are machine learning, data mining, and deep learning, more specifically, finding interesting patterns from real-life graphs and time-series data. His research finds applications in the fields of social networks, neuroscience, and solar physics. He worked as a data scientist intern at Amazon Web Services and LexisNexis Risk Solutions.

Outstanding Undergraduate: Yarely Ogaz



Yarely is one of our outstanding graduating seniors this semester. She was born and raised in Deming, NM, where she graduated as Valedictorian. She is a first generation college student and is graduating as a double major in Computer Science and Electrical Engineering. This semester she was selected as the College of Arts and Science's Dean's Undergraduate Award for Excellence. Yarely was also selected as the Electrical and Computer Engineering Outstanding Senior.

Outstanding Ph.D. Graduate: Dr. Emmanuel Utreras-Mercado



Emmanuel recently graduated with his Ph.D. from New Mexico State University. His research is focused in the human-computer interaction field and develops an accessibility tool that will allow young children who are visually impaired to learn programming concepts. In 2020, Emmanuel was awarded the Google-CAHSI Dissertation Award to support his work. His goal is to return to Puerto Rico as a professor to support underrepresented minorities pursuing of STEM degrees.

Outstanding Alumni: Dr. Ferdinando Fioretto



Ferdinando graduated with his PhD from New Mexico State University (with a dual degree from the University of Udine) in 2016. His research is on artificial intelligence, privacy, and machine learning, with a focus on how to align AI with societal values and how to use machine learning to solve complex optimization problems. Ferdinando was recently awarded the Association for Constraint Programming's Early Career Researcher Award.

Outstanding Faculty: Prof. Huiping Cao



Prof. Huiping Cao was selected to be the first Hue and Pat McCoy Endowed Professor. The professorship is aimed at recognizing a faculty member's dedication to promoting and advancing the role of the department and computer science, emphasizing those faculty who have made significant efforts resulting in an improvement in participation, retention, and success of students.

Outstanding Program Manager: Raena Cota



Raena was selected for the NMSU University Research Council's Fall 2021 Research Recognition Award. This award recognizes staff who conduct and support research and creative activities. Raena has been with the department since 2014 and worked on numerous projects including: GK-12 DISSECT, CompThink! Professional Development for K-12 teachers, Verizon Innovative Learning Minority Males Program, YWIC, CSforALL Professional Development, and Expanding your Horizons-STEM day for Girls.

Outstanding Administrative Assistant: Jaki Davis



Jaki has served as an administrative assistant for the department since 2018. During that time, Jaki has been working to complete her Bachelor in Accountancy, which she completed in the Fall of 2021. She is now going on to pursue her master's degree in accounting. During her time with the department, Jaki has been an excellent representative of the department and has gone above and beyond to ensure the success of the department's faculty and students.

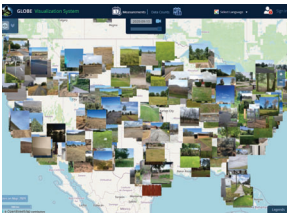
Grants & Collaborations

Connecting Practitioners to Design: Methods and Tools for Live Participatory Design Fiction



PI Z. O. Toups and Co-PI Bill Hamilton were recently awarded an \$532,000 National Science Foundation grant to support their research developing a new design methodology called Live Participatory Design Fiction (LPDF). The goal of project is to develop methods and tools for engaging geographically distributed practitioners such as emergency response workers.

Hack the Land out of them: Obtaining Land Cover Classifications from GLOBE Observer Photographs

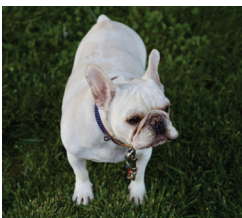


Co-PI Parth Nagarkar is part of the team that proposes to use active learning and a Hackathon to create a unique machine learning-based model to improve the labeling of NASA's GLOBE Observer Land Cover dataset. NASA's GLOBE (Global Learning and Observations to Benefit the Environment) Observer project is a citizen science app that allows volunteers (citizen scientists) to take observations to help scientists in many different domains such as mosquito research, land cover classification research, etc.

Data Analytics Use Case: Intelligent Alarm: A Collaboration with Midcontinent Independent System Operator Inc.

PI Huiping Cao is collaborating with Midcontinent Independent System Operator Inc. (MISO) on a project to explore data analytics capabilities that enhance decision making in relation to MISO's Market and Reliability functions. In particular, this project works focuses on alarm diagnosis, organization, and predictive analysis.

Characterizing Kidney Disease in Cats and Diagnosing Early Stage Canine Mitral Valve Disease using Metabolic Markers



PI Joe Song was recently awarded two grants from Nestlé Purina Pet-care Global Resources, Inc. The first grant titled "Characterizing Kidney Disease in Cats using Metabolic Markers" aims to build predictive models that can detect kidney disease in cats based on metabolic profiles in serum and urine samples. The second grant titled "Predictive Models for Diagnosing Early Stage Canine Mitral Valve Disease Using Metabolic Markers" aims to build predictive models for an early stage B1 myxomatous mitral valve disease in dogs.

Achieving Resilience in Supply Chain via Composition of Trust

PI Son Tran was recently awarded a grant from the National Institute of Standards and Technology (NIST). The project's goal is to applying automated reasoning techniques to improve supply chain resilience. The grant will fund one student to support this project.

Application Monitoring Using LDMS and Data-Driven Automatic Instrumentation for Application Monitoring

PI Jon Cook was awarded a grant from Sandia National Laboratories in the amount of \$150,000. This project will work within the Lightweight Distributed Metric Service (LDMS) ecosystem to improve and further build application monitoring capabilities. This includes developing phase-oriented models of application performance, understanding the size of computational tasks, improving job performance prediction, and job quality evaluation and reporting.

Alternative Grid Operations and the Impact of Different Network Architectures on Grid Resilience

Satyajayant Misra was awarded a subcontract from the Idaho National Laboratory on a DoE grant for the amount of \$169,000. This project will identify and investigate current foundational and emerging challenges in protection, control, and operational aspects and examine potential impacts of new and novel approaches with capability of technology. The goal is to improve and augment existing approaches in communications and networking to meet the protection, control, and monitoring operations of the grid.

An Extended CAHSI Alliance to Broaden Participation in Graduate Studies

Co-PI Enrico Pontelli was awarded a \$2.9 million collaborative NSF Broadening Participation in Computing grant to support the Computing Alliance of Hispanic-Serving Institutions (CAHSI). The expanded CAHSI membership will accelerate the adoption and adaption of CAHSI signature practices that are research- and evidence-based. The partnership between R1 HSIs and non-PhD granting CAHSI institutions will build research capacity at non-PhD granting institutions and provide the academic and social support for graduate students.

DEPICT - Engaging a Diverse Student Population in Computational Thinking through Creative Writing and Performances

PI Enrico Pontelli was awarded a \$300,000 NSF Broadening Participation in Computing grant to support the Discover Computational Thinking through Creative Writing (DEPICT) program. DEPICT aims to broaden the appeal of computing to students who may not consider themselves as belonging in a technical field by infusing computer science concepts into language and arts-dominant high school courses. By highlighting the ways in which learning computing is like learning a new language or translating between technical and informal speech, the project team will align the skill sets needed to those of the bilingual population of two southern New Mexico high schools.

Culturally Responsive Pedagogy in Computer Science

Co-PI Enrico Pontelli was awarded a \$300,000 collaborative NSF Computer Science for All grant. CR in CS uses an inclusive process of various stakeholders to design, pilot, and refine a microcredential for CR pedagogy in CS, and study how teachers shift their instructional practices.

Graduate Assistance in Areas of National Need

Two years ago the department was awarded a \$360,000 Graduate Assistance in Areas of National Need grant from the Department of Education to support Ph.D. students conducting research in the areas of Artificial Intelligence and Cyber Security. In that time, the award has supported many Ph.D. students including Emmanuel Utreras-Mercado, who graduated this year.

Recent PhD Graduates

Dr. Hua Zhong

Advisor: Joe Song

Hua defended his dissertation titled “Model-Free Gene-to-Zone Network Inference of Molecular Mechanisms in Biology” in the winter of 2019. He is currently a Computational Biologist working at the University of Texas Southwestern Medical Center.

Dr. Ruth C. Torres Castillo

Advisors: Z O. Toups & Barbara Chamberlin

Ruth defended her dissertation titled “Teaching Mathematics through Game-Play: Elementary Teachers’ Pedagogical Practices and Perceptions of Integrating Computer Games in the Classroom” in Spring 2020. She is currently a postdoc at New Mexico State University.

Dr. Ahmed S. Khalaf

Advisor: Z O. Toups

Defended his dissertation titled “Developing and Evaluating Wearable Input Device Interfaces to Direct a Team of Agents” in the summer of 2020. Ahmed is now an Assistant Professor in computer science department at Al-Baha University in Saudi Arabia.

Dr. Yifan Hao

Advisor: Huiping Cao

Defended his dissertation titled “Deep Learning Approaches to Extract Features from and Classify Multivariate Time Series Data” in the fall of 2020. He is now a software engineer at Google.

Dr. Edgar Eduardo Ceh Varela

Advisor: Huiping Cao

Edgar defended his dissertation titled “Modeling User Preferences and Item Characteristics to Improve Group and Multi-Criteria Recommendations” in the spring of 2021. He is currently an Assistant Professor Of Computer Science at Eastern New Mexico University.

Dr. Qixu Gong

Advisor: Huiping Cao

Qixu defended his dissertation titled “Processing Skyline Path Queries over Multi-dimensional Transportation Networks” in the fall of 2021. He will soon join Cisco Systems as a data scientist.

Dr. Saleem Masadeh

Advisor: Bill Hamilton

Saleem defended his dissertation titled “Investigating the YouTube Adpocalypse and Augmenting the User Experience to Address Transparency and Systemic Biases” in the fall of 2021. He is currently pursuing a research engineer position in industry.

Dr. Ghazal Fakhteh Yavari

Advisors: Bill Hamilton & Yvonne Moreno

Ghazal defended her dissertation titled “A Phenomenological Study of the Experiences of Special Education Teachers Teaching Students with Autism Spectrum Disorders in Online Learning Environments During the Covid-19 Pandemic” in the fall of 2021.

Dr. Thanh Hai Nguyen

Advisor: Son Tran

Thanh defended his dissertation titled “An Asp-Based Automatic Web Services Composition Framework and its Applications” in the summer of 2021. Thanh is now an AI developer for Elemental Cognition.

Dr. Van Duc Nguyen

Advisor: Son Tran

Van defended his dissertation titled “Explanations Generation in Logic Programs and its Application in Smart Homes” in the summer of 2021. Van is now an AI developer for Viome, a personalized healthcare company.

Dr. Emmanuel Utreras-Mercado

Advisor: Enrico Pontelli

Emmanuel defended his dissertation titled “Tangible Music Programming Tool for Students With Visual Impairments and Low Vision” in the summer of 2021.

Recent Publications

Chitta Baral, Gregory Gelfond, Enrico Pontelli, and Tran Cao Son. 2022. An action language for multi-agent domains. *Artificial Intelligence* 302 (2022).

S Chowdhury, Soukaina Filali Boubrahimi, and Shah Muhammad Hamdi. 2021. Time Series Data Augmentation using Time-Warped Auto-Encoders. In *ICMLA 2021*.

Thathagata Debnath and Mingzhou Song. 2021. Fast Optimal Circular Clustering and Applications on Round Genomes. *IEEE/ACM Transactions on Computational Biology and Bioinformatics* (2021), 1–1.

Sean Dougherty, Reza Tourani, Gaurav Panwar, Roopa Vishwanathan, Satyajayant Misra, and Sri-kathyayani Srikanteswara. 2021. APECS: A Distributed Access Control Framework for Pervasive Edge Computing Services. In *Proc. ACM SIGSAC (2021)*. 1405–1420.

Mustafa Elfituri and Jonathan Cook. 2021. Analyzing the Factors that Cause Parallel Performance Degradation in Parallel Graph-Based Computations Using Graph500. *International Journal of Computer and Information Engineering* 15, 3 (2021), 230–238.

Francesco Fabiano, Alessandro Burigana, Agostino Dovier, Enrico Pontelli, and Tran Cao Son. 2021. Multi-agent Epistemic Planning with Inconsistent Beliefs, Trust and Lies. In *Pacific Rim International Conference on Artificial Intelligence*. Springer, 586–597.

Marlena R Fraune, Ahmed S Khalaf, Mahlet Zemedie, Poom Pianpak, Zahra NaminiMianji, Sultan A Alharthi, Igor Dolgov, Bill Hamilton, Son Tran, and ZO Toups. 2021. Developing Future Wearable Interfaces for Human-Drone Teams through a Virtual Drone Search Game. *International Journal of Human-Computer Studies* 147 (2021), 102573.

Yifan Hao and Huiping Cao. 2020. A New Attention Mechanism to Classify Multivariate Time Series. In *IJCAI. 1999–2005*.

Yifan Hao, Huiping Cao, and Erick Draayer. 2020. CNN Approaches to Classify Multivariate Time Series Using Class-specific Features. In *2020 IEEE SMDS*. 1–8.

Tao Hou, Tao Wang, Zhuo Lu, and Yao Liu. 2021. Combating Adversarial Network Topology Inference by Proactive Topology Obfuscation. *IEEE/ACM Transactions on Networking* (2021).

Omid Jafari, Preeti Maurya, Khandker Mushfiqul Islam, and Parth Nagarkar. 2021. Optimizing Fair Approximate Nearest Neighbor Searches Using Threaded B+-Trees. In *International Conference on Similarity Search and Applications*. Springer, 133–147.

Omid Jafari, Parth Nagarkar, and Jonathan Montaño. 2020. mmLSH: A Practical and Efficient Technique for Processing Approximate Nearest Neighbor Queries on Multimedia Data. In *International Conference on Similarity Search and Applications*. Springer, 47–61.

Ahmed S Khalaf, Sultan A Alharthi, Bill Hamilton, Igor Dolgov, Son Tran, and ZO Toups. 2020. A framework of input devices to support designing composite wearable computers. In *International Conference on Human-Computer Interaction*. Springer, 401–427.

Sanuj Kumar and Tuan Le. 2021. A Word Embedding Topic Model for Robust Inference of Topics and Visualization. In *The First International Conference on AI-ML-Systems*. 1–7.

Recent Publications Cont.

Ali Ahsan Muhammad Muzaaheed, Shah Muhammad Hamdi, and Soukana Filali Boubrahimi. 2021. Sequence Model-based End-to-End Solar Flare Classification from Multivariate Time Series Data. In ICMLA 2021.

Gaurav Panwar, Roopa Vishwanathan, and Satyajayant Misra. 2021. ReTRACe: Revocable and Traceable Blockchain Rewrites using Attribute-based Cryptosystems. In Proceedings of the 26th ACM Symposium on Access Control Models and Technologies. 103–114.

Dang Pham and Tuan Le. 2021. Neural Topic Models for Hierarchical Topic Detection and Visualization. In Joint European Conference on Machine Learning and Knowledge Discovery in Databases. Springer, 35–51.

Matthew Rueben, Matthew Rodney Horrocks, Jennifer Eleanor Martinez, Nicolas LaLone, Marlena R Fraune, and Z Toups. 2021. [Hidden] / [Caution] / [Danger]: How Video Games Can Inform the Design of Sight Cues for Agents. In Proc. HAI '21.

Ruby Sharma, Sajal Kumar, and Mingzhou Song. 2021. Fundamental gene network rewiring at the second order within and across mammalian systems. *Bioinformatics* 37, 19 (05 2021), 3293–3301.

Tao Wang, Jian Weng, Jay Ligatti, and Yao Liu. 2019. Far Proximity Identification in Wireless Systems. *IEEE Transactions on Dependable and Secure Computing* (2019).

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