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EDUARDO DAVALOS

PROFESSIONAL SUMMARY

Associate Professor with 5 years of experience in computer system development, AI and web technologies, specializing in multimodal data analysis for educational environments. Demonstrates expertise in software engineering, computer vision, machine learning, and data engineering, with a proven track record of publishing over 10 papers and mentoring 5+ undergraduates. Passionate about advancing learning technologies through innovative data solutions and collaborative research.

EXPERIENCE

ASSISTANT PROFESSOR **Aug 2025 - Present**
Trinity University ***San Antonio***

RESEARCH ASSISTANT - SECURE, AI-ENHANCED COMPUTER SYSTEMS **Aug 2021 - Aug 2025**
Vanderbilt University ***Nashville, TN, USA***

- **SyncFlow: Secure, Cloud-based Multimodal Conferencing and IoT Integration Platform**
  - Developed a secure platform combining IoT with cloud-based conferencing to support real-time AR and 3D sensing in browser applications.
  - Implemented authenticated workflows and end-to-end encryption to ensure data integrity and user privacy in cybersecurity-focused environments.
  - Enabled seamless integration of web applications with local sensors, enhancing secure, scalable interactions across various devices and locations.
- **RedForest: AI-Enhanced E-Learning Platform for Behavioral Analysis**
  - Implemented cybersecurity measures to protect user data, creating a safe environment for sensitive educational data.
  - Created an e-learning platform with AI-driven analytics for over 100 users, focusing on scalable, secure solutions for education.
  - Analyzed learner interactions using AI, allowing for deeper insights into behavior to enhance personalized learning experiences.
  - Conducted system co-design and testing sessions with end-users, integrating feedback from educators, students, and other stakeholders early in the development process to ensure the platform met real-world needs.
  - Applied UX/UI best practices to improve user adaptation, resulting in a user-friendly interface that facilitated seamless adoption and engagement.
- **Research Outcomes**
  - Published 10+ papers in AI, Big Data, cybersecurity, and education technology, contributing to advancements in secure systems and scalable learning platforms.
  - Mentored 5+ undergraduate students in research projects focused on AI, systems security, and multimodal data, fostering their academic and professional growth.
  - Developed 3D gaze tracking for multimodal data collection, supporting research with real-time, secure data capture from up to 8 users in mixed-reality environments.

RESEARCH ASSISTANT - COMPUTER VISION **Jul 2019 - Apr 2021**
St. Mary's University ***San Antonio, TX, USA***

- Conducted advanced research in 6D Pose Estimation, applying computer vision and machine learning to build an AI-driven pose estimation system.
  - Achieved real-time pose estimation at 30+ FPS using a single webcam, enabling practical applications in real-world settings.
  - Developed a custom dataset to train a physics engine, significantly enhancing precision in object recognition and interaction.
  - Optimized pose estimation algorithms to significantly reduce computational costs while preserving real-time processing performance.

STEM TUTOR **Aug 2016 - May 2018**
St. Mary's University ***San Antonio, TX, USA***

- Tutored over 50 undergraduates in physics, robotics, programming, and engineering, strengthening their problem-solving skills and deepening their understanding of complex concepts.
- Mentored and guided 100+ high-school students in robotics and coding, fostering teamwork and collaborative skills essential for success in robotics competitions.

EDUCATION

PH.D. IN COMPUTER SCIENCE **Aug 2021 - Aug 2025**
Vanderbilt University ***Nashville, TN, USA***

- Receiving the Full Engineering Graduate Fellowship.

M.S. IN ELECTRICAL ENGINEERING **Jul 2019 - Apr 2021**
St. Mary's University ***San Antonio, TX, USA***

- Received Full Graduate Research Fellowship
- Graduated Summa Cum Laude

B.S. IN ELECTRICAL ENGINEERING **Jul 2015 - Apr 2019**
St. Mary's University ***San Antonio, TX, USA***

- Received Presidential Scholarship
- Graduated Summa Cum Laude
- Most Outstanding Electrical Engineering Graduate Award

SKILLS

Data Science, Machine Learning, Cybersecurity, Computer Vision, Real-time Systems, AI Platforms, Behavior Analysis, Software Development, Cloud Computing, Data Engineering, Big Data, Deep Learning, Human-Computer Interaction, Software Testing, User Interface Design, Edge Computing, User Experience, Systems Architecture, Data Privacy, Cloud Security, Database Management, Systems Integration, End-to-End Encryption, User-Centered Design, Data Analytics.

PROJECTS

REDFOREST
AI-Enhanced E-Learning Platform

- Developed the platform using **NextJS** and **TypeScript**, ensuring a responsive and scalable frontend with smooth user interactions.
- Implemented backend functionality with **tRPC** and **Supabase**, providing seamless data retrieval and real-time analytics for user engagement insights.
- Utilized **PostgreSQL** with **row-level security** to ensure robust data access control, protecting sensitive information at the database level.
- Applied **data anonymization techniques** to safeguard student privacy, ensuring compliance with educational data protection standards such as FERPA.
- Project Page: http://redforest.app

SYNCFLOW
Secure, Cloud-based Multimodal Conferencing and IoT Integration Platform

- Developed the platform using **Rust** as the core foundation for its safety and performance benefits, with multi-language bindings to Rust for interoperability and extensibility across other programming environments.
- Integrated **JWT** (JSON Web Tokens) and **OAuth** for secure authentication, ensuring user data privacy and controlled access across browser and IoT devices.
- Implemented **end-to-end encryption** using **WebRTC** to maintain data integrity and confidentiality in real-time communication between browser and IoT devices.
- Project Page: https://syncflow.live
- GitHub Repository: https://github.com/oele-isis-vanderbilt/SyncFlow

ACADEMIC SERVICES

PROGRAM COMMITTEE MEMBER

International Conference on Computers in Education 2025 (ICCE2025)

REVIEWER FOR JOURNALS

Heliyon (Elsevier Journal in Multidisciplinary Sciences)

International Journal of Human-Computer Interaction

REVIEWER FOR CONFERENCES

Conference on Artificial Intelligence (AAAI) 2026

ACM CHI conference on Human Factors in Computing Systems 2025

International Conference of Learning Representations (ICLR) 2025

IEEE Global Engineering Education Conference (EDUCON) 2025

International Conference on Artificial Intelligence in Education (AIED) 2023

LINKS

Google Scholar: scholar.google.com, Personal Website: edavalosanaya.github.io, GitHub: github.com, ORCID: orcid.org.

PUBLICATIONS

- **Davalos, E.**, Zhang, Y., Srivastava, N., Alberto Salas, J., Goodwin, A., McFadden, S. , Cho, S., Gautam, B., & Goodwin, A. LLMs as Educational Analysts: Transforming Multimodal Data Traces into Actionable Reading Assessment Reports. **AIED2025**

- Lee, M., Vatral, C., Cohn, C., **Davalos, E.**, Jessee, M., Biswas, G., & Levin, D.. Eye movements as predictors of student experiences during nursing simulation learning events. **Cognitive Research: Principles and Implications**

- **Davalos, E.**, Alberto Salas, J., Goodwin, A., Zhang, Y., Srivastava, N., Thatigotla, Y., Gonzales, A., & McFadden, S. (2024). Beyond Instructed Tasks: Recognizing In-the-Wild Reading Behaviors in the Classroom Using Eye Tracking. **ArXiV**

- **Davalos, E.**, Srivastava, N., Zhang, Y., Goodwin, A., & Biswas, G. (2024). GazeViz: A Web-Based Approach for Visualizing Learner Gaze Patterns in Online Educational Environment. **ICCE 2025**

- **Davalos, E.**, Zhang, Y., S, A. T., Fonteles, J. H., & Biswas, G. (2024). 3D Gaze Tracking for Studying Collaborative Interactions in Mixed-Reality Environments. **ICMI Companion 2024**

- Cohn, C., **Davalos, E.**, Vatral, C., Fonteles, J. H., Wang, H. D., Ma, M., & Biswas, G. (2024). Multimodal Methods for Analyzing Learning and Training Environments: A Systematic Literature Review. *arXiv preprint arXiv:2408.14491*. **ArXiv**

- Zhang, Y., **Davalos, E.**, Su, D., Lou, A., & Noble, J. H. (2024). Monocular Microscope to CT Registration using Pose Estimation of the Incus for Augmented Reality Cochlear Implant Surgery. http://arxiv.org/abs/2403.07219 **Arxiv**

- Fonteles, J., **Davalos, E.**, Ashwin, T. S., Zhang, Y., Zhou, M., Ayalon, E., Lane, A., Steinberg, S., Anton, G., Danish, J., Enyedy, N., & Biswas, G. (2024). A First Step in Using Machine Learning Methods to Enhance Interaction Analysis for Embodied Learning Environments. https://doi.org/10.1007/978-3-031-64299-9_1 **AIED 2024**

- **Davalos, E.**, Timalsina, U., Zhang, Y., Wu, J., Fonteles, J. H., and Biswas, G. (2023). ChimeraPy: A Scientific Distributed Streaming Framework for Real-time Multimodal Data Retrieval and Processing, https://doi.org/10.1109/BigData59044.2023.10386382 **IEEE BigData 2023**

- Vatral, C., Cohn, C., **Davalos, E.**, Biswas, G., Lee, M., Levin, D., Hall, E., & Holt, J. E. (2023). A Tale of Two Nurses: Studying Groupwork in Nurse Training by Analyzing Taskwork Roles, Social Interactions, and Self-Efficacy. https://doi.org/10.22318/cscl2023.102810 **CSCL 2023**

- **Davalos, E.**, Vatral, C., Cohn, C., Horn Fonteles, J., Biswas, G., Mohammed, N., Lee, M., & Levin, D. (2023). Identifying Gaze Behavior Evolution via Temporal Fully-Weighted Scanpath Graphs. https://doi.org/10.1145/3576050.3576117 **LAK 2023**

- Vatral, C., Lee, M., Cohn, C., **Davalos, E.**, Levin, D., & Biswas, G. (2023). Prediction of Students' Self-confidence Using Multimodal Features in an Experiential Nurse Training Environment. https://doi.org/10.1007/978-3-031-36336-8_41 **AIED 2023**

- Vatral, C., Biswas, G., Cohn, C., **Davalos, E.**, & Mohammed, N. (2022). Using the DiCoT framework for integrated multimodal analysis in mixed-reality training environments. https://doi.org/10.3389/frai.2022.941825 ***Front.Artif.Intell.***
- **Davalos, E.**, & Aminian, M. (2024). FastPoseCNN: Real-Time Monocular Category-Level Pose and Size Estimation Framework. *arXiv preprint arXiv:2406.11063*. **Arxiv**
- Munshi, A., Biswas, G., **Davalos, E.**, Logan, O., Gayathri, N., & Rushdy, M. (2022). Adaptive Scaffolding to Support Strategic Learning in an Open-Ended Learning Environment. **ICCE 2022**

INVITED TALKS AND LECTURES

- Oral presentation at EngageAI conference at North Carolina State University (Fall 2024)
- Guest lecturer for the course "Tech Innovation and AI for Learning class" at Vanderbilt University (Fall 2024)
- Oral presentation on "Eye-Tracking in the Real-World" at Vanderbilt LIVE Seminar (Spring 2024)
- Oral presentation on "Identifying Gaze Behavior Evolution via Temporal Fully-Weighted Scanpath Graphs" at LAK 2023 (Fall 2023)
- Oral presentation on "ChimearPy: A Scientific Distributed Streaming Framework for Real-time Multimodal Data Retrieval and Processing" at IEEE BigData 2023 (Fall 2023)

STUDENTS MENTORED

- Yashvitha Thatigotla, Bachelors in Computer Science, Vanderbilt, 2023 May - Present
- Anthony Chuang, Bachelors in Computer Science, Vanderbilt, 2023 Sept - Present
- Trieu Ty Truong, Bachelor in Computer Science, Vanderbilt, 2024 August - Present
- Tristan V Van, Bachelor in Computer Science, Vanderbilt, 2024 August - Present
- Nafees-ul Haque, Bachelor in Computer Science, Vanderbilt, 2024 August - Present
- Evelin Villegas Diaz, Bachelor in Electrical Engineering, St. Mary's University, 2019 August - 2020 May
- Joaquin Alejandro Diaz, Bachelor in Electrical Engineering, St. Mary's University, 2019 August - 2020 May

LAST UPDATED

AUGUST 29, 2025