Xinlei Yu

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Education

University of Southern California, Los Angeles, CA, United States January 2022-Present
Master of Science in Computer Engineering Graduation: December 2023
Current GPA:3.54/4.0

Iowa State University, Ames, IA, United States January 2018-December 2021
Bachelor of Science in Computer Engineering with Cum Laude

On-Going Work

Wearable Electro-tactile Stimulation Device

- Working on a haptic project focused on understanding how humans perceive and emotionally respond to electro-tactile stimulation. The ultimate aim is to create a device that offers personalized and pleasant electro-tactile feedback, integrating smoothly with visual and auditory stimuli.

Presentations

Electro-tactile Stimulation as a Modality for Sensation Illusion on the Arm, Irvine, CA, United States. [Presenter]. Southern California Robotics Symposium, Oral Presentation, September 2023 (SCR '23).

Tummy Time Toy: CV-based Infant Motor Learning Assistant Toy, Los Angeles, CA, United States [Co-Presenter]. NSF DARE conference, Demo, March 2023 (DARE '23).

Research Experience

USC HaRVI Lab with Prof. Heather Culbertson May 2023-Present
Worked on a *electro-tactile stimulation device* project as the co-leading researcher and presented preliminary results at the Southern California Symposium 2023 (SCR'23).

- Presented preliminary results on the effect of the perception of Electro-tactile feedback on the forearm about factors such as location, frequency, and skin moisture based on previous studies at SCR'23.
- Designed a reinforcement learning-based Electro-tactile calibration method using a multi-armed bandit algorithm to discover the unknown human perception of the electro-tactile stimulation and find the optimal and personalized signal parameters for rendering pleasant electro-tactile stimulation.
- Participated in presenting a research poster at the World Haptics Conference 2023.

USC Brain-Body Dynamics Lab with Prof. Francisco Valero-Cuevas August 2022-April 2023
Worked on *Tummy Time Toy: Infant Motor Learning Assistant Toy* project.

- Developed the "Tummy Time Toy," a computer vision-assisted infant toy pending patent, designed to promote prone motor skills by rewarding head lifts with stimuli, and aimed at improving voluntary muscle control and tummy time duration. The toy features an interactive front end and a back end with computer vision and control logic.
- Implemented a computer vision algorithm to track infant head motion with OpenCV-Python, and constructed a full-stack web application using HTML, CSS, JavaScript, and Python Flask for remote research monitoring, data collection, and toy control.
- Developed a portable, microcomputer-controlled base for the tummy time toy, incorporating relay circuits and a custom 3D-printed housing.
- Demonstrated the Tummy Time Toy at NSF DARE conference 2023 as part of lab tour.

Grad Research Course Projects

EE 675 Data Analysis and Control Techniques for Neurotechnology Design
with Prof. Maryam Shanechi Fall 2023 (ongoing)

- The main research question is whether the use of the Kalman filter and smoothing can enhance the accuracy of EEG in recognizing emotions, especially considering prior work has demonstrated high accuracy. The project utilized SEED dataset provided from BCMI@SJTU.

EE 554 Cyber-Physical Systems, with Prof. Paul Bogdan Fall 2022

- Wrote a course paper evaluates Dijkstra's, Bellman-Ford, and Floyd-Warshall algorithms for the shortest path problem, using LLVM for graph generation and Gephi for visualization and

property analysis; increasing input nodes significantly boosts graph size while maintaining stable clustering and modularity coefficients.

Teaching Experience

CprE 308 Operating System August 2021-December 2021

Undergraduate Teaching Assistant with Prof. Mai Zheng

- Teaching assistant for the CprE308 Operating System: Principle and Practice.
- Conducted weekly lab sessions with 25 students, graded homework and lab assignments throughout the semester, and hosted weekly office hours.

Technical Skills

Programming Languages:	Python, Java, C++/C, C#
Tools and Frameworks:	OpenCV, PyTorch, GitHub
Web Development:	HTML, CSS, JavaScript, React, Flask, NodeJS
Software:	MATLAB, VS Code, Unity, ModelSim, Quartus
Hardware:	Embedded system, Circuit design and test, Analog and digital electronics

Other Experience

ISU Undergraduate Summer Research at Biocentury Research Farm, *Undergraduate Researcher* May 2019-August 2019

Awards

2018 Gold Merited Scholarship, Office of Admission, Iowa State University – $32,000

Community Involvement

IEEE-HKN@ISU, *Student Member*

References

Dr. Heather Culbertson
Assistant Professor of Computer Science at USC, **Email:** hculbert @usc.edu

Dr. Francisco Valero-Cuevas
Professor of Biomedical Engineering at USC, **Email:** valero@usc.edu