**Publications**

**Cecilia O. Alm and Reynold Bailey.**

**Alexander Calderwood, Elizabeth A. Pruett, Raymond Ptucha, Christopher M. Homan, and Cecilia O. Alm.**

**Alexander Calderwood, Anthony Massicci, Srinivas Sridharan, Joe Geigel, Linwei Wang, Reynold Bailey, and Cecilia O. Alm.**

**Aliya Gangji, Trevor Walden, Preethi Vaidyanathan, Emily Prud’hommeaux, Reynold Bailey, and Cecilia O. Alm.**
Using co-captured face, gaze and verbal reactions to images of varying emotional content for analysis and semantic alignment. In Proceedings of the Workshop on Human-Aware Artificial Intelligence (at AAAI 2017), pages 621-627.

Fundamental research in multisource data acquisition and fusion has valuable implications for many fields and applications. This REU program is designed to build essential life-long capabilities in students for continued research careers, and to yield positive outcomes at the institutional and research community levels.

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Computational Sensing REU Program
https://cs.rit.edu/~reu/

PI Cecilia Ovedotter Alm, Ph.D.  
coagla@rit.edu  
(585) 475-7237

Co-PI Reynold Bailey, Ph.D.  
rjb@cs.rit.edu  
(585) 475-6181
Attention and behavior in online vs. face-to-face learning
In the United States, online learning enrollments are on the rise and competing in growth with traditional course offerings. How is this shift in STEM educational delivery impacting attention, behavior, and performance of students? This project used sensing devices that capture facial expressions and skin response to explore how online vs. face-to-face learning contexts influence students. We also considered the role of content difficulty. Project outcomes contribute towards improving individualized learning experiences.

Sensing in computer-based creative writing
How does artificial intelligence technologies, such as the Amazon Echo, impact creative work which is deeply tied to the sensations and interactions of listeners? This project applied linguistic and facial sensing modalities to understand how people respond to new creative forms of digital writing, with implications for creative writing instruction and for interactions with the Amazon Echo and similar technologies, as they play a growing role in our daily lives.

Learning and sensing of job-related narratives
Employment and work circumstances have profound impacts on the well-being and prosperity of individuals and communities. Social media platforms enable sharing about jobs and other topics in narrative form. We explored how readers engaged in narrative sense-making with this new format. Based on responses to narrative sorting and content-based annotation tasks as well as co-collected physiological data, we studied how readers processed narratives using data analysis and machine learning.

Visual-linguistic alignment with complex imagery
In statistical machine translation, bilingual word alignment is a first step in translating text from one language to another. Such algorithms can also establish meaningful relationships between observers’ gaze data and their co-collected verbal descriptions, for machine annotation of visual information. This project extended our visual-linguistic multimodal alignment framework to include complex visual content with positive or negative valence. We also considered both descriptive and affect-driven responses and explored observers’ verbal and facial expression reactions to images and videos.

About Us
This REU program advances fundamental research in human-centered computational sensing. The program exposes students to a transdisciplinary research environment, infused with career-enhancing learning elements. We ensure that transformative research experiences reach an unusually diverse student group of underrepresented subpopulations in computer science.

Sample Projects

Success Stories
After attending the program, Ashley Edwards presented research at the Council on Undergraduate Research REU Symposium at the National Science Foundation. She published a research paper with her team titled “Sensor-based methodological observations for studying online learning” at the ACM Workshop on Intelligent Interfaces for Ubiquitous and Smart Learning. She has also volunteered at the RIT Girls Soaring in STEM Fair. Ashley is continuing on to doctoral studies.

Following her summer research experience, Aliya Gangji presented work to faculty and peers at her home institution, Muhlenberg College. With her team, she also published and presented a research paper with the title “Using co-captured face, gaze and verbal reactions to images of varying emotional content for analysis and semantic alignment” at the AAAI Workshop on Human-Aware Artificial Intelligence. She is joining a leading computing technology company.

Alexander Calderwood published “Understanding the semantics of narratives of interpersonal violence through reader annotations and physiological reactions” with his team, and presented this work at the EACL Workshop on Computational Semantics Beyond Events and Roles. Alexander is continuing on to a dual-degree graduate program that combines computer science and liberal arts.