EASE: Learning and Sensory-based Engagement, Arousal and Self-Efficacy (EASE) Modeling for Adaptive Web-Empowerment Trauma Treatment

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Motivation
• The EASE project will improve systems for web-based support of persons recovering from trauma from natural disasters, military operations, or domestic abuse.
• Critical gap to be addressed is better feedback during treatment for which we will develop EASE model of engagement (E), arousal(A) and self-efficacy (SE) and estimate it using laptop sensors. Research is motivated by advances in sensing and machine learning that will enable scalable feedback.

Technical Approach
Social cognitive theory hypothesizes that improving coping self-efficacy (SE) is critical to recovery from trauma. SE is usually measured by self-report and is time consuming. We hypothesize that changes in SE can be inferred using the EASE model and sensory data allowing for improved treatment.

Objectives:
• To test if sensor-based adaptive selection improves mental health outcomes in trauma treatment.
• To improve audio-video based modeling of engagement and physiological arousal
• To develop new domain adaption techniques that enable, for the first time, sensory-based estimation of change in self-efficacy.

Real-time physiological and facial analysis are inputs to learn mappings from states of engagement, arousal, and self-efficacy (EASE) to support scalable, feedback-corrected, evidence-based treatment of trauma.

Outreach and Broader Impacts
• Direct undergraduate participation.
• Goal of 30% or greater participation of underrepresented groups.
• Tools and theory will apply across various web-based treatment systems.

The Team:

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<tr>
<th>Name</th>
<th>Univ./Dept.</th>
<th>Biometrics &amp; Vision</th>
<th>Machine Learning &amp; Missing Data</th>
<th>CS to support Trauma Web</th>
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Millions of Americans are affected by trauma every year. Approximately 70% of adults and children will report having major traumatic exposure each year. From natural disasters to interpersonal violence to car accidents, the impact on mental and physical health is dramatic and pervasive, and the costs are very real. The financial costs associated with interpersonal trauma alone are astounding, with sexual assault economic costs estimated at $127 billion, domestic violence $5.8 billion, general assaults $93 billion. Mental trauma is directly correlated with increased physical health care utilization. Web-based support systems offer a scalable solution that circumvents many of the obstacles to reaching those in need. We are building on a supported web-based tool designed in part to promote stronger coping self-efficacy to help survivors recover faster and to be more resilient.