May 8th, 12:30 PM - 1:30 PM

Detection of Cocaine Use with Wireless Electrocardiogram Sensors

Annamalai Natarajan
*University of Massachusetts - Amherst*

Abhinav Parate
*University of Massachusetts - Amherst*

Edward C. Gaiser
*Yale School of Medicine*

*See next page for additional authors*

Follow this and additional works at: https://escholarship.umassmed.edu/cts_retreat

Part of the Biomedical Commons, Biomedical Devices and Instrumentation Commons, Computer Sciences Commons, Substance Abuse and Addiction Commons, and the Translational Medical Research Commons


https://escholarship.umassmed.edu/cts_retreat/2013/posters/23

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in UMass Center for Clinical and Translational Science Research Retreat by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.
Presenter Information
Annamalai Natarajan, Abhinav Parate, Edward C. Gaiser, Gustavo A. Angarita, Robert T. Malison, Deepak Ganesan, and Benjamin M. Marlin

Creative Commons License
This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.

This poster abstract is available at eScholarship@UMMS: https://escholarship.umassmed.edu/cts_retreat/2013/posters/23
Detection of Cocaine Use with Wireless Electrocardiogram Sensors

Annamalai Natarajan, M.S.; Abhinav Parate, M.S.; Edward C. Gaiser, B.A.; Gustavo A. Angarita, M.D.; Robert T. Malison, M.D.; Deepak Ganesan, PhD.; Benjamin M. Marlin, PhD.

aSchool of Computer Science, University of Massachusetts, Amherst, Massachusetts
bDepartment of Psychiatry, Yale School of Medicine, New Haven, Connecticut

In recent years, the ability to continuously monitor activities, health, and lifestyles of individuals using sensor technologies has reached unprecedented levels. Such ubiquitous physiological sensing has the potential to profoundly improve our understanding of human behavior, leading to more targeted treatments for a variety of disorders. The long term goal of this work is development of novel computational tools to support the study of addiction in the context of cocaine use. The current paper takes the first step in this important direction by posing a simple, but crucial question: *Can cocaine use be reliably detected using wearable on-body sensors and current machine learning algorithms?* We select wireless ECG as the most promising sensing modality for cocaine use detection.

The main contributions in this paper include the presentation of a novel clinical study of cocaine use in which a unique set of wireless ECG data were collected, the description of a computational pipeline for inferring morphological features from noisy wireless ECG waveforms, and the evaluation of cocaine use detection algorithms based on data-driven and knowledge-based feature representations. Our results show that cocaine use can be detected with AUC levels above 0.9 in both the within-subjects and between-subjects cases at the 32mg/70kg dosage level.