

EE 368 Project Proposal: Mobile Cardiac Pulse Measurements

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Group Members:

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Droid Phone: Yes

Project Description:

In this project, we aim to implement a system that allows users to measure their cardiac pulses simply by taking a facial video. We will firstly implement the system on PC (with static camera on it) . If time permits, we will transplant the algorithm to Android mobile phones. The system is finally based on frequency analysis on the real-time facial images captured by the camera, either on PC or an Android phone.

The system modules in this project includes:

- 1) Image Capturing and pre-processing
- 2) Facial Recognition
- 3) Independent Component Analysis
- 4) Bio-information extraction
- 5) Statistical Signal Processing

Image processing techniques to be used in this project includes:

- Feature detection
- Face location [3]
- OpenCV face detection [4][5]
- Independent source signal decomposition using ICA (possibly using the joint approximate diagonalization of eigenmatrices (JADE) algorithm) [6]

Reference:

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- [3]. A. Noulas, and B. Krise, "EM detection of common origin of multi-modal cues," in *Proceedings of ACM Conference on Multimodal Interfaces (ACM, 2006)*, pp. 201–208.
- [4]. P. Viola, and M. Jones, "Rapid object detection using a boosted cascade of simple features," in *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (IEEE, 2001)*, p. 511.
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- [6]. J.-F. Cardoso, "High-order contrasts for independent component analysis," *Neural Comput.* 11(1), 157–192 (1999).
- [7]. J. M. Bland, and D. G. Altman, "Statistical methods for assessing agreement between two methods of clinical measurement," *Lancet* 1(8476), 307–310 (1986).