

MULTISENSORY VIDEO DATABASE OF PHYSIOLOGICAL AND BEHAVIORAL RESPONSES

S. Polikovskiy, A. Quiros, Y. Kameda, J. Burgoon[†], Y. Ohta
 University of Tsukuba, [†] The University of Arizon



University of Tsukuba
 筑波大学

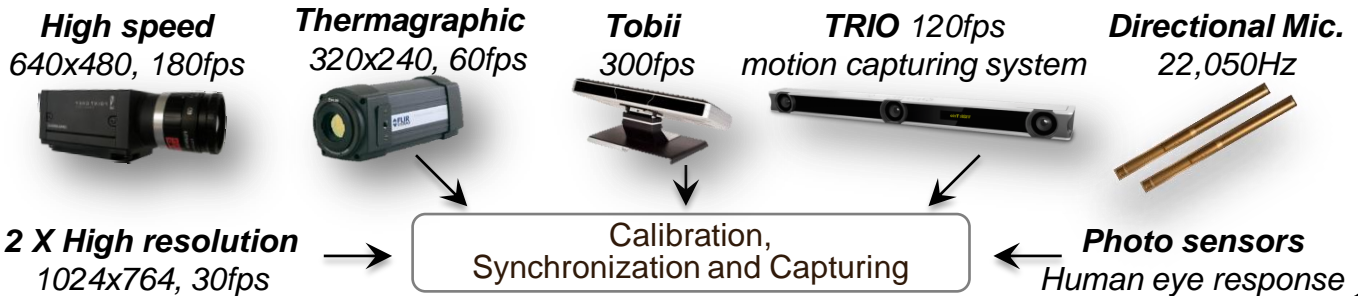


MAIN GOAL

Bring to communication and behavior analysis research a **new source of information** based on **multiple physiological change** measurements algorithms with high accuracy **synchronization** during **interview** scenarios.

CAPTURING SYSTEM

- Sensors synchronization of 1ms order
- Fast integration of additional sensors such as EEG, pressure...



MULTISENSORY DATABASES



- Head tracking
- Facial expression detection
- Hands, shoulders tracking
- Gaze, pupils tracking

Algorithms Benchmark

Features location ground-truth tagging



- Baseline interview
- Interrogation scenario
- Diagnosis scenario

Human to Human

Emotional ground-truth tagging



- Emotional stimulus:
- Image
 - Video
 - Sound

Computer to Human

Emotional ground-truth tagging

FUSION OF PHYSIOPSYCHOLOGICAL MODELS

- Measurements of physiological changes
- Fusion of all models to with strong emphasize on timing characteristics



Micro - Expressions



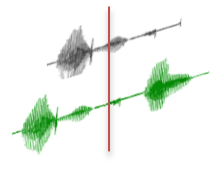
Temperature



Gaze, Pupil



Body Language



Voice

EXPANDED PHYSIOPSYCHOLOGICAL MODEL WITH APPLICATION IN:



- Suspect interrogation
- Security checkpoint screening

Police and Homeland security



- Depression
- Posttraumatic stress disorder

Medical diagnosis



- Advertisement analysis

Marketing

ABSTRACT

Two major avenues of research for detecting deception and hostile intent focus on (1) physiological and (2) behavioral responses, including cardiorespiratory signs of stress, changes in facial temperature, fleeting facial expressions, blinks, vocal stress and postural shifts. To date, no individual behaviors distinguish the "good guys" from the "bad guys" with a very high degree of accuracy. Possible reasons include lack of equipment that is sufficiently sensitive to capture highly dynamic, brief displays such as blinks and micro-expressions of emotions or the wrong indicators are being studied. Or, the reliable features may be so faint and error-prone that both physiological and behavioral features must be "fused" together to identify people who pose a threat. A final flaw may be that the assumption that the same pattern of indicators applies to everyone rather than varying from one person to the next.

In order to build the research basis to overcome these difficulties, we are planning to establish a new video database of people during screening-style interviews. The participants will be carefully selected in order to insure that the database will cover the most of the varieties in face appearances due to the difference in age, sex, nationality, facial hair, etc. One of its technical advantages is a high accuracy synchronization and calibration among multiple sensors that are used for data capturing, such as 200fps cameras, 3-D cameras, thermographic cameras, microphones, etc.

In addition, simple yet powerful API is developed to support convenient access to multi-sensors data visualization and analysis functions. The use of the API requires short learning curve, this will allow to people from different research field to start using this data in their research work in minimum time. Another significant advantage is the carefully designed interview procedure since we need to make a good balance between realistic interview situation and maximization of possibility of having chances of reaction observation upon his/her hidden intention of deception (or hostile intent). Since the data acquisition from the interviews will take place in both the USA and Japan, the database will offer a wide diversity of cultures. Analysis and utilization of this multicultural data base in the future could be a great help of improving global security.

CONTACT INFORMATION

Senya Polikovsky - senya@image.esys.tsukuba.ac.jp
<http://www.senyalab.org>

Yoshinari Kameda - kameda@iit.tsukuba.ac.jp
<http://www.kameda-lab.org>

Judee K. Burgoon - jburgoon@cmi.arizona.edu