

Polikovsky Senya

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Education and Research

- 2010 – 2013 **Ph.d. in Computer Vision** **University of Tsukuba (Japan)**
JSPS full scholar student at Computer Vision and Image Media Lab.
Thesis: “A Study on Micro-Expression Detection and Multi-Sensor Data-Set Acquisition for Psychophysiological Analysis during Interview Scenario”
- Development of capturing system for physiological measurements by integrating high-speed, IR, high-resolution cameras; eyes tracking and motion capturing systems; array of microphones, and pressure sensors.
 - Analysis of multi-modality such as facial micro-expressions, thermal face changes, gaze and pupil, body motion, and voice
 - Establishment of Benchmark Driven Framework (BDF)
 - Intensive database collection based on psychological experiments
- 2008 – 2010 **M.Sc. in Computer Vision** **University of Tsukuba (Japan)**
Monbukagakusho full scholar student at Computer Vision and Image Media Lab.
Thesis: “Facial Micro-Expressions Recognition using High Speed Camera and 3D-Gradient Descriptor”
- Development of algorithm for facial micro-expression detection and timing characteristic measurements
 - Collection of high-speed video database and FACS tagging
- 2002 – 2005 **B.Sc. in Electronic Engineering** **Holon Institute of Technology (Israel)**
Thesis: “Eyes movement analysis”
- Results contribute to recognition of individual’s suspicious behavior.
 - In collaboration with Israeli Police Negotiation Unit division.
 - Logistic and financial support from industry
- 1997 – 1999 **Practical engineer in Electronic Engineering** **ORT Singalovski College (Israel)**
Thesis: “Portable system for automated navigation units testing in Sikorsky UH-60 / S-70 Blackhawk.”
- Supervised by external development group

Professional Courses

- 2007 Object Oriented programming in C++ (100 hours)
2006 Simulation system development using Matlab (50 hours)
2006 Photogrammetry (50 hours)

Academic Experience

Activities

- 2012 **Establishment of Emotional research Center (ESC) in University of Tsukuba.**
The main goals of the center are: 1) to develop and provide easy accessible technologic solutions for noninvasive recognition of human emotions; 2) to provide an effective platform for collaboration between the technical and psychological disciplines. (esc.iit.tsukuba.ac.jp)
- In collaboration with University of Arizona (BORDERS) and former Police Negotiation Unit officers.
 - Collection of high quality video database and benchmarks design
 - Hardware and software development of noninvasive capturing systems
- 2011 Research visitor in University of Arizona (one month)

Research Grants

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| 2011 – 2012 | Japan Society for the Promotion of Science (JSPS), Japan, | 20K\$ |
| | Hostile Intent Detection by Using Video Signal | |
| 2011 | University of Tsukuba, Young Researches Traveling Support, Japan | 3K\$ |
| | Training in executing psychological experiments at University of Arizona | |
| 2011 | Center for Identification Technology Research (CITeR), USA | 10K\$ |
| | Comparison of Methods for Identification & Tracking of Facial & Head Features Related to Deception & Hostile Intent | |

Teaching

- 2010 Lecturer of a new Computer Vision for Security Applications course at Holon Institute of Technology (during summer semester)
- Build the course from scratch
 - Two final projects were presented at IMVC2011 conference
- 2009 – 2012 Invited lectures: Introduction to Thermal Cameras and Thermal Image Analysis
Introduction to Principal Component Analysis (PCA)
Introduction to Kalman Filter
- 2010 – 2012 Teaching assistant: Pattern recognition graduate course
English for Engineers, Multimedia Project undergrad courses at University of Tsukuba

Technical Skill

Programing languages and Libraries

- Matlab, C / C++, C#, CUDA, OpenCV (Strong)
- Assembler, Java, Ruby, VB, LabView, OpenGL (Intermediate)

Operation Systems

- Windows (Strong)
- Mac OS X, Ubuntu (Intermediate)

Languages

- Hebrew, Russian – native
- English – high level
- Japanese – intermediate level (improving every day)

Working Experience

- 2013 - present **Research Fellow** **Center for Computational Sciences
University of Tsukuba (Israel)**
- Non-invasive multi-sensor emotion analysis project
 - Development of an open access to multi-sensor emotion databases
 - Benchmark Driven Framework (openCV, MATLAB, C++)
- 2006 - 2007 **Photogrammetry and Image Processing Algorithm Designer** **Image Info.Tech.
(Israel)**
- Development of algorithms for satellite and airplanes camera models calibration, robust estimators, and pattern recognition. (MATLAB)
 - Implementation of the algorithms under high performance constraints in to Photogrammetry library (MATLAB to C/C++)
 - Reverse-engineering project for Aircraft Camera model extraction
- 2005 – 2006 **Video Processing Algorithm Designer / Co-founder** **Star-Up Company (Israel)**
- Development of passive eyes tracking and pupils changes measurements technology based on PCA, SVM, and Neural Network algorithms.
 - Algorithm implementation in DSP environment (Matlab, C, Assembler)
 - Project and Human resources management
- 1995 – 2005 **Programmer in IT-CAD Application Division** **ECI Telecom (Israel)**
- Development of CAD middle size applications (Java, C, C++, VB, VBA)
 - Development of extended functionality for VeryBest, Orcad, Solid Work programs using built-in API
 - Infrastructure for creation, management, distribution and migration of electronic and mechanical parts libraries (MS Access , Oracle)
 - Development of application in VBA for Microsoft Office, OpenOffice, Microsoft Visio by using built-in API.
- 1999 – 2002 **Head of IAF Development Unit (Army Service)** **Israel Air Force**
- Leading a team of four developers, working on projects in electronics and programming fields under pressure and strict deadlines
 - Projects budgets management up to 100K\$
 - Renovation of HP1000 computer hardware and software used in aircraft body inspection system. Reverse-engineering for conversion of algorithms implemented in HP Assembler code to C code in order to use with PC computers.
This project was nominated for IAF project competition award.
 - F-15 (improved model) aircraft electric wiring testing project. Development of automated creation of wiring documentation and scripted code of DITMICO testing system.
 - Computerizing control systems for automatic aircraft units testing and analysis. Utilizing variety of sensors, Data Acquisition boards (DAQ) and LabView program environment.

Activities

2002 – 2005 In charge of **Computer Laboratory for Students with Learning Disabilities**, students guidance, software development, and purchasing of a new equipment and programs at Holon Institute of Technology.

2003 – 2007 Volunteering as instructor assistant in **Rehabilitation Aikido Class** for people with special needs.

Hobbies Aikido,
Motorcycle touring (10 countries in 3 continents),
Japanese calligraphy and Go

Publications

Journal Paper

- [1] **Facial Micro-Expression Detection in Hi-Speed Video Based on Facial Action Coding System**
S. Polikovsky, Y. Kameda, and Y. Ohta, *IEICE Transactions on Information and Systems*, Vol.E96-D,No.1,Jan. 2013

Conferences

- [2] **Towards Developing Robust Multimodal Databases for Emotion Analysis**
A. Ramirez, S. Polikovsky, Y. Kameday, T. Onisawa, *The 6th International Conference on Soft Computing and Intelligent Systems*, 8 pages, 2012.
- [3] **A non-invasive multi-sensor capturing system for human physiological and behavioral responses analysis**
S. Polikovsky, A. Quiros, T. Onisawa, Y. Kameda and Y. Ohta, *Workshop on Multimodal pattern recognition of social signals in human computer interaction*, 8 pages, 2012.
- [4] **Benchmark Driven Framework for Development of Emotion Sensing Support Systems**
S. Polikovsky, A. Quiros, Y. Kameda, J. Burgoon, and Y. Ohta, *Workshop on Innovation in Border Control 2012*, 3 pages, 2012.
- [5] **Evaluation of Synchronization Accuracy Between High Speed Cameras in Infrared and Visible Spectrums**
S. Polikovsky, *Proceedings of IAPR Conference on Machine Vision Applications*, pp.51-54, 2011
- [6] **Facial Micro-Expressions Recognition Using High Speed Camera and 3D-Gradients Descriptor**
S. Polikovsky, Y. Kameda, and Y. Ohta, *3rd International Conference on Imaging for Crime Detection and Prevention*, 6 pages, 2009.

Abstracts

- [7] **A New Noninvasive Multi-Sensor Capturing System for Human Physiological and Behavioral Responses Analysis During the Interview**
S. Polikovsky, Y. Kameda, and Y. Ohta, *The 30th International Congress of Psychology*, Panel, 2012.
- [8] **Multisensory Video Database of Physiological and Behavioral Responses**
S. Polikovsky, A. Quiros, Y. Kameda, J. Burgoon, and Y. Ohta, *Israel Machine Vision Conference and Exhibition 2012*, poster, 2012.

Domestic Conferences in Japan

- [9] **Infrared and Visible Spectrum Camera Calibration**
S. Polikovsky, Y. Kameda, and Y. Ohta, *Proceedings of the 2011 IEICE General Conference / Information and Systems Society*, D-12-1, 2011.
- [10] **Detection and Measurement of Facial Micro-Expression Characteristics for Psychological Analysis**
S. Polikovsky, Y. Kameda, and Y. Ohta, *IEICE Technical Report, PRMU*, vol.110, no.97, pp.57-64, 2010.
- [11] **Experimental Setup for Micro-Expression Detection**
S. Polikovsky, Y. Kameda, and Y. Ohta, *Proceedings of the 2010 IEICE General Conference / Information and Systems Society*, pp.136, 2010.
- [12] **Hostile Intent Detection by Using Video Signal**
S. Polikovsky, Y. Kameda, and Y. Ohta, *Proceedings of the 2009 IEICE General Conference / Information and Systems Society*, pp.202, 2009.