

### 3.31 Gaze Estimation and Non-Verbal Behavior Extraction from consumer cameras

#### Keywords

Computer Vision, Gaze, Behavior analysis, Interactions, HCI, HRI.

#### Key contact researcher(s)

Dr. Jean-Marc Odobez  
[odobez@idiap.ch](mailto:odobez@idiap.ch)  
Tel.: +41 27 721 77 26

#### Technology Transfer Office

Dr. Florent Monay  
Dr. Hugues Salamin  
[tto@idiap.ch](mailto:tto@idiap.ch)  
Tel.: +41 27 721 77 72

#### Corporate Sponsorship Program

See Section 4 of the present document

#### File reference & version number:

Software disclosure 10352  
Software disclosure 10353  
Invention disclosure 2013-06

## Functional description

We have developed softwares for and a long-standing experience with the automatic analysis of a variety of real-life human (non-verbal) behaviors in interaction modeling (attention, head gestures, addressee, engagement,...).

Using RGBD sensors, we have developed precise eye gaze estimation systems comprising the fitting of personalized 3D mesh face models, a real-time estimation head pose tracker, and gaze estimation modules. When relying on RGB cameras only (typically at further distance from the sensor), multiperson real-time head pose trackers have been developed.

In both domains, software have been developed to infer the attention of people towards visual targets (people, objects or scene regions), and recognize head gestures.

## Innovative aspects

- No user restriction (non-intrusive system)
- Generic or personalized head and eye gaze models
- Handles gaze tracking under head pose changes
- 3D reasoning (not only for screen-based applications)
- Works under low-resolution eye imaging

## Commercial application examples

- Attention modeling (e.g. consumer preference analysis)
- User studies, eg in sociology (NVB and gaze coding; dyadic and group interactions analysis)

## More information

K. Funes and J.-M. Odobez. Geometric Generative Gaze Estimation (G3E) for Remote RGB-D Cameras. Computer Vision and Pattern Recognition conference (CVPR), 2014.

K. Funes, L. Nguyen, D. Gatica-Perez and J.-M. Odobez. A Semi-Automated System for Accurate Gaze Coding in Natural Dyadic Interactions Proc. Int. Conf. on Multimodal Interfaces (ICMI), 2013.

L. Nguyen, J.-M. Odobez, and D. Gatica-Perez. Using Self-Context for Multimodal Detection of Head Nods in Face-to-Face Interactions ICMI, 2012.

## Software and IPR status

- RGBD simplified version - <http://www.idiap.ch/scientific-research/resources/hg3d>)
- Gaze tracking under patenting