Autonomous gaze animation for socially interactive virtual humans during multi-party interactions

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Game Research Focus Area, Seed Funding Presentation, January 21, 2016

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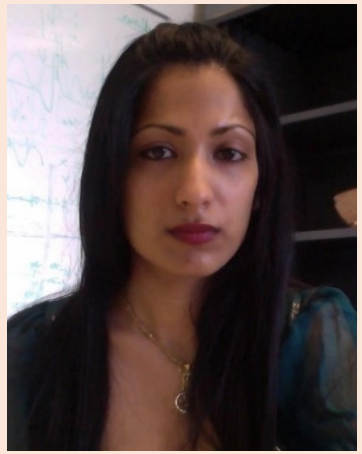

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Our goal: Simulating group (multi-party) social interactions

Vision and Motivation

- Improving soft skills with Immersive Role-Playing Games
  - Negotiation skills
  - Communication skills
  - Problem solving
  - Conflict resolution
  - Emotion management
  - Teamwork and collaboration

- Application area:
  - Job training

Goldman Sachs:
VR will overtake the TV market by 2026

Goldman Sachs explains why virtual reality will explode instead of notoriously flopping like before

Matt Weinberger

Jan. 13, 2016, 9:11 PM 384

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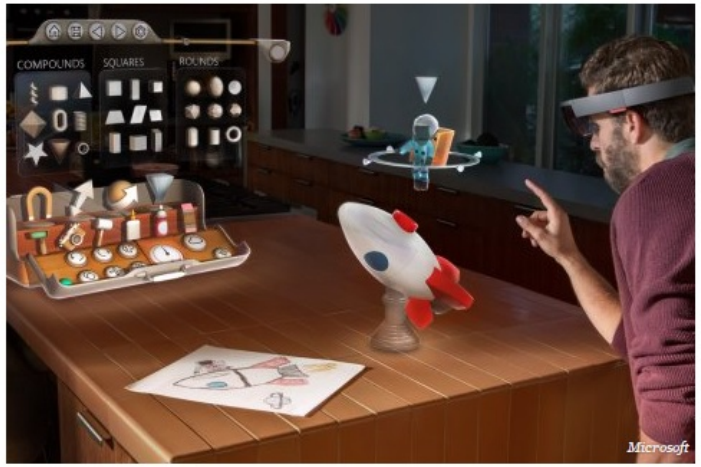
In an analyst note today, Goldman Sachs explained the thinking behind its belief that virtual reality — which notoriously flopped hard in the early nineties — is going be such a huge success this time around that it'll overtake the TV market by 2026.

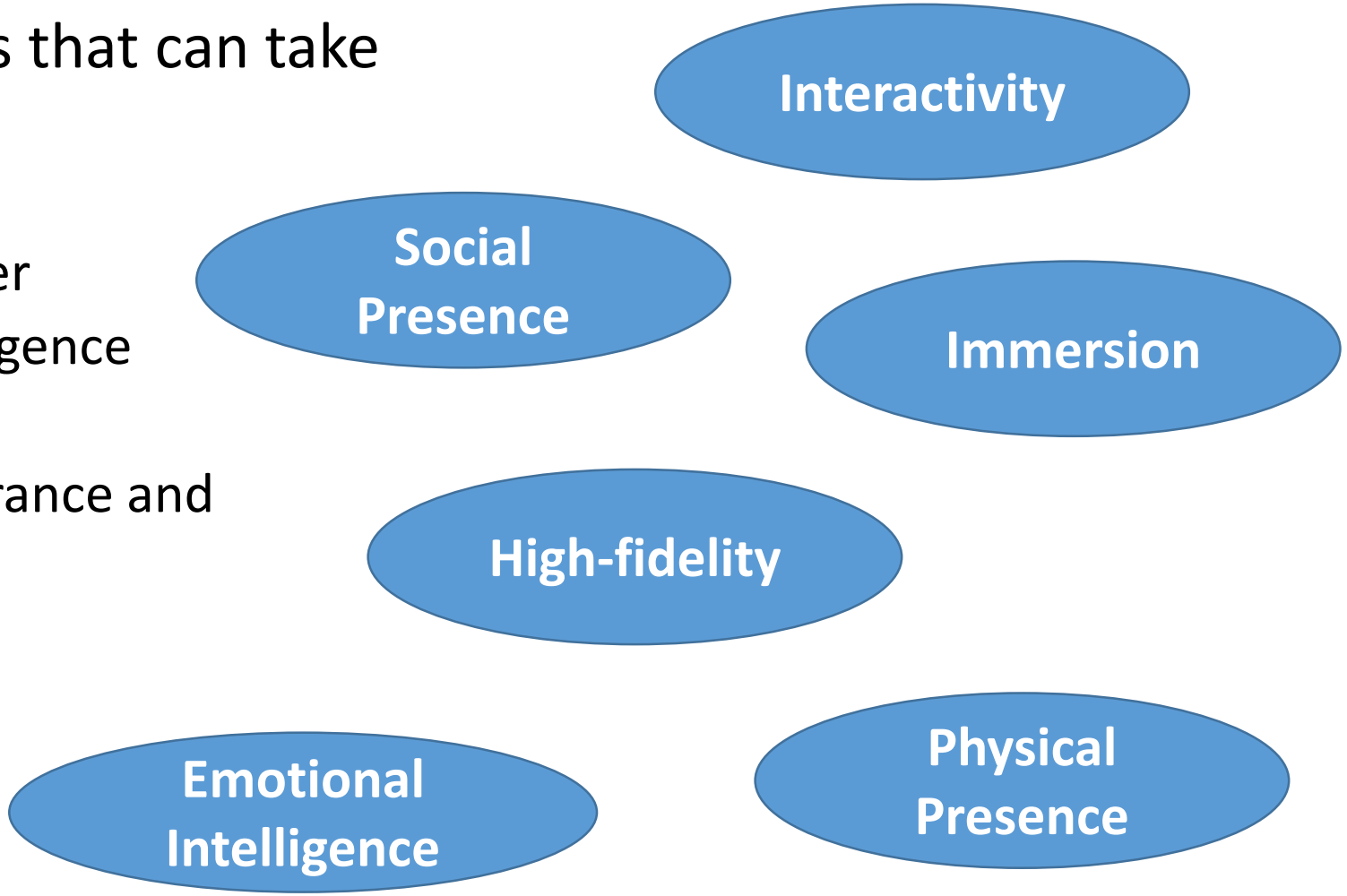
"So, what has changed that differentiates the current state from the 1990s flop? The answer is the technology, in our view," Goldman Sachs writes.



Microsoft HoloLens

Immersive Role-playing Games

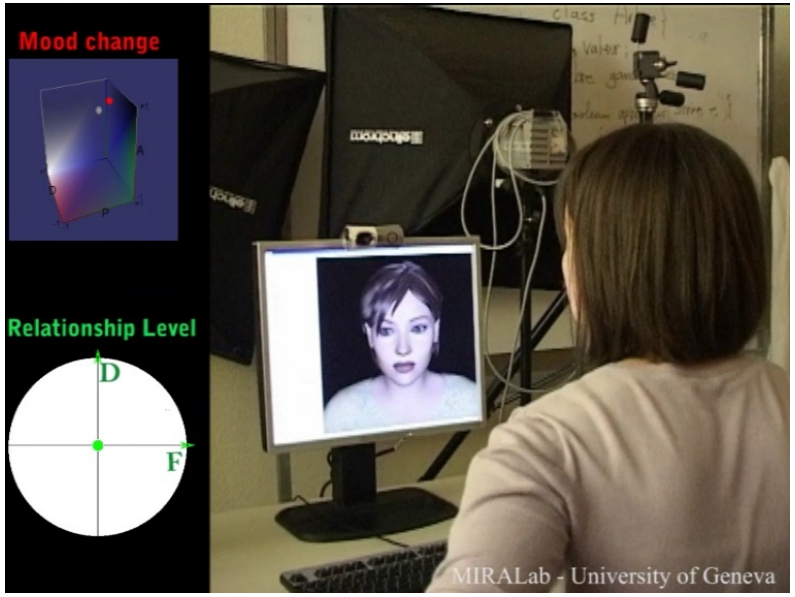
- Artificially-driven characters that can take roles in real-life simulations
  - should be engaging
  - encourage/challenge the user
  - have emotional/social intelligence
  - have real-time interactivity
  - high-fidelity (realistic appearance and behavior)
  - social and physical presence



Research on multi-party interactions

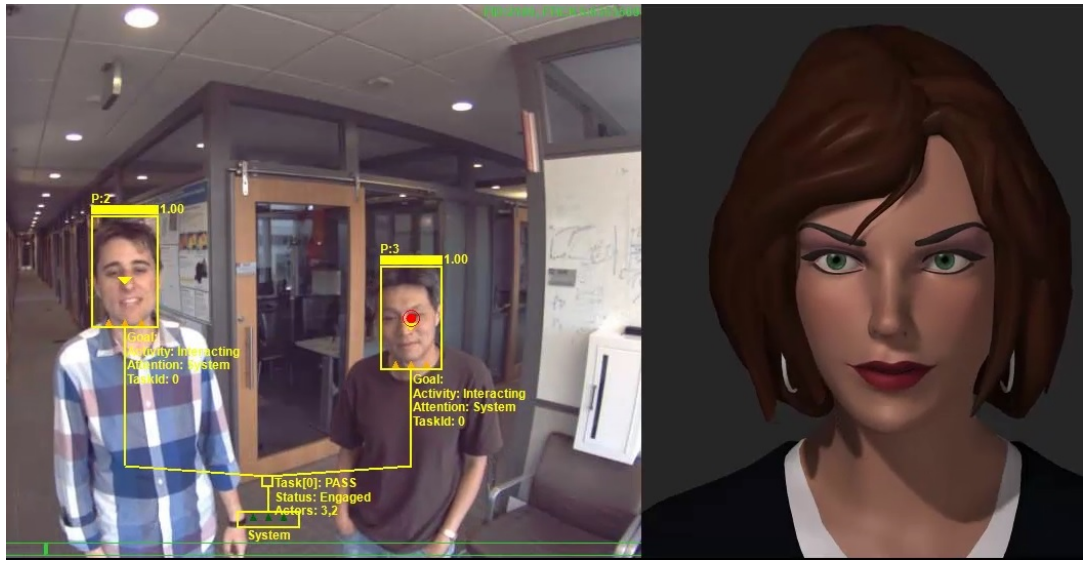
- Interaction with virtual characters **mainly focus on one-to-one** interactions.
- **Multi-party interactions** is an **open research area**.

MACH: My Automated Conversation Coach, MIT Media Lab, 2013

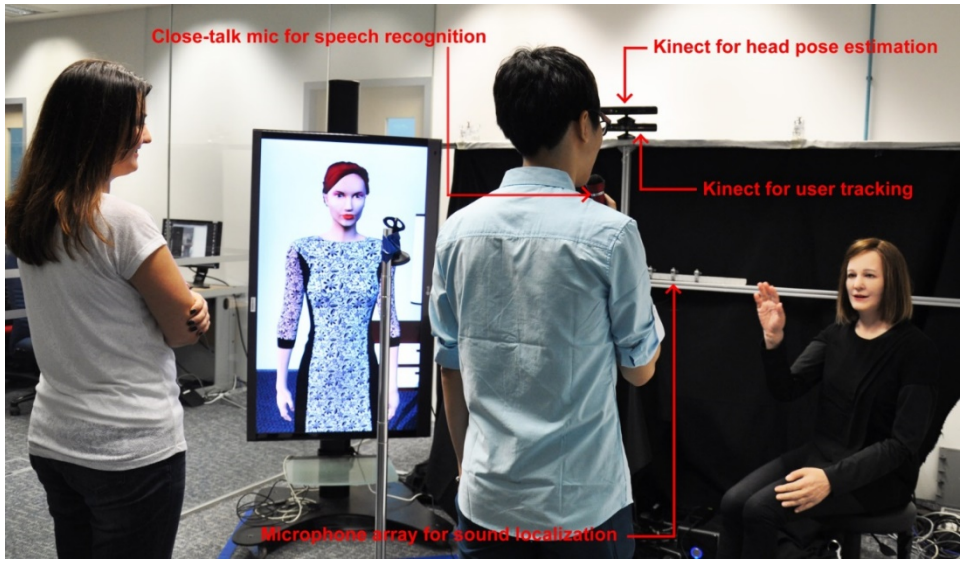


Eva Virtual Tutor, MIRALab, Switzerland, 2009

Existing work on multi-party interactions



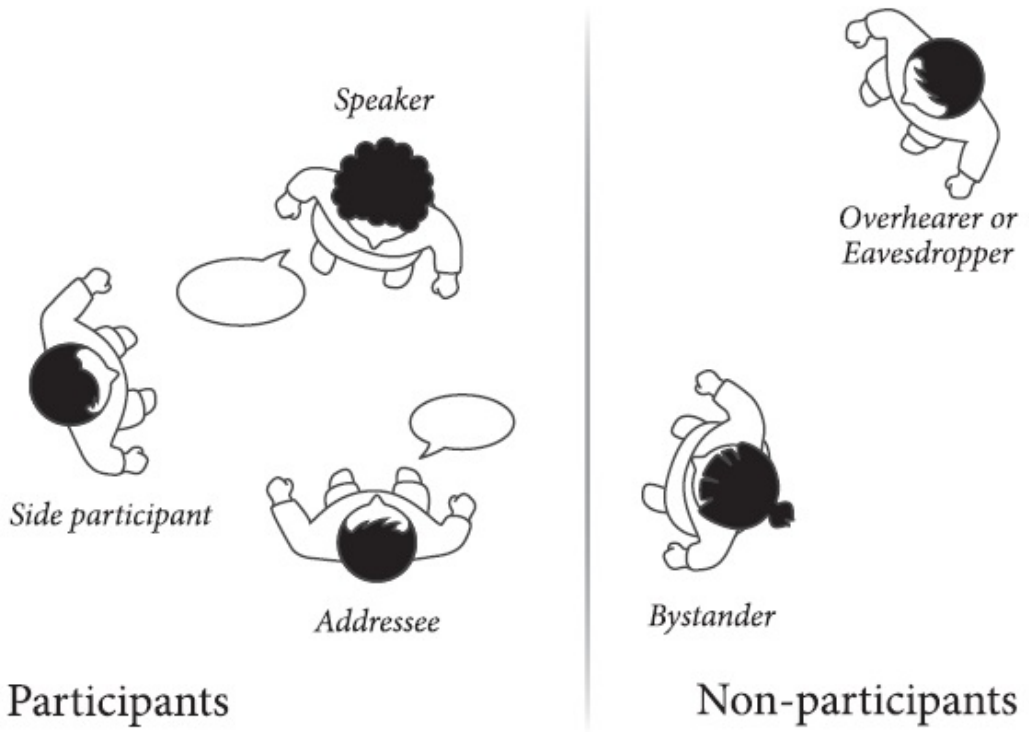
Microsoft Research Redmond, 2009



IMI, NTU, Singapore, 2014

Challenges in multi-party interactions

- Speaker identification
- Addressee detection
- Engagement modelling
- Interruptions and overlaps during speech
- Modelling turn-taking behavior
- Emotion, personality, roles



Z. Yumak and N. Magnenat-Thalmann. **Multi-modal, multi-party interactions with virtual humans**. Springer Book Chapter on Autonomous Virtual Humans and Social Robots, Edited by Nadia Magnenat-Thalmann, Junsong Yuan, Daniel Thalmann, 2014

Tasks in the project

Task 1: Scene understanding for multi-party interactions

Duration:
(October 2015 - August 2016)

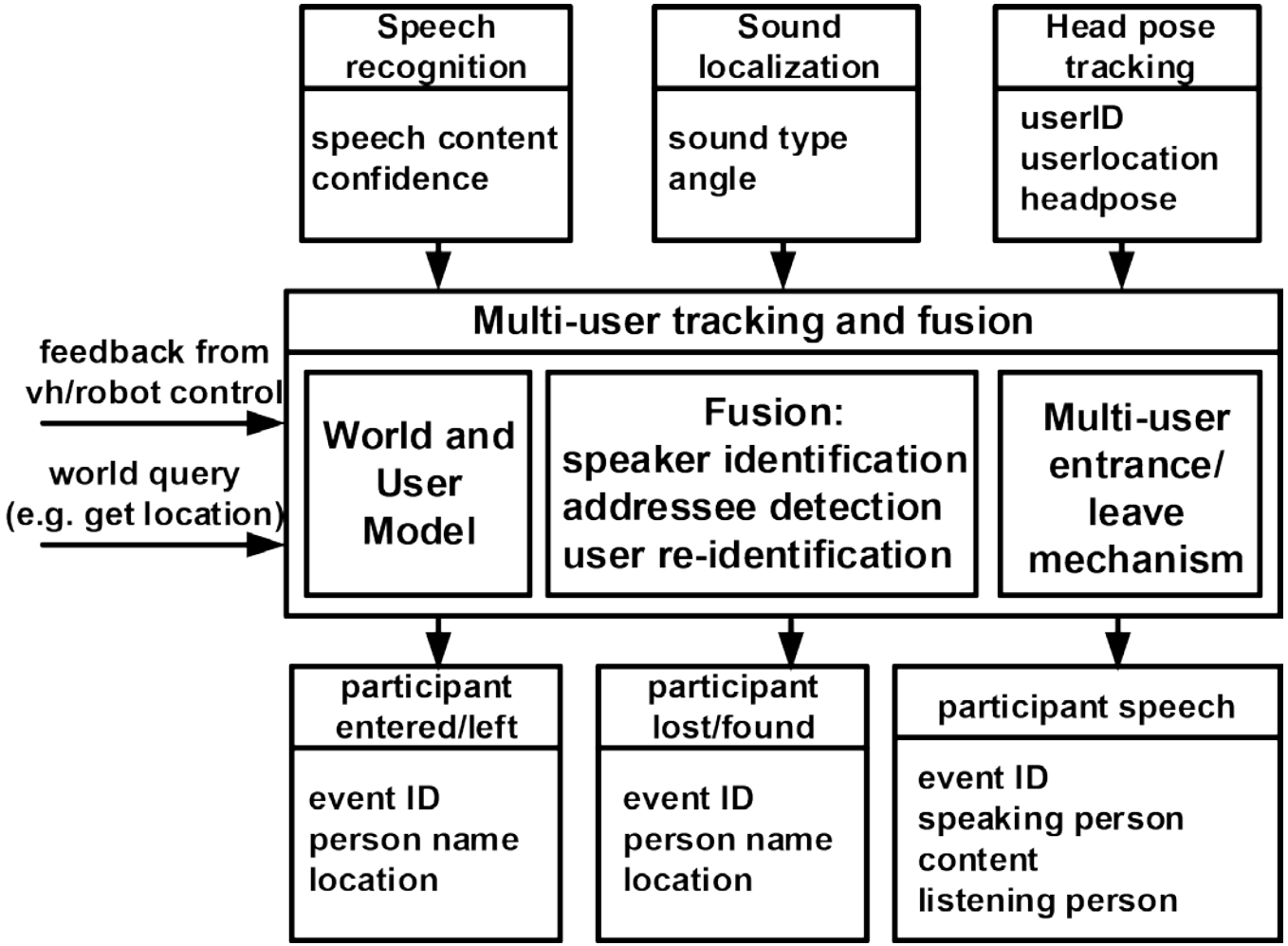
Task 2: Virtual Human Controller for Behavior Generation

Duration:
(October 2015 - August 2016)

Task 3: Integration

Duration:
(December 2015 - August 2016)

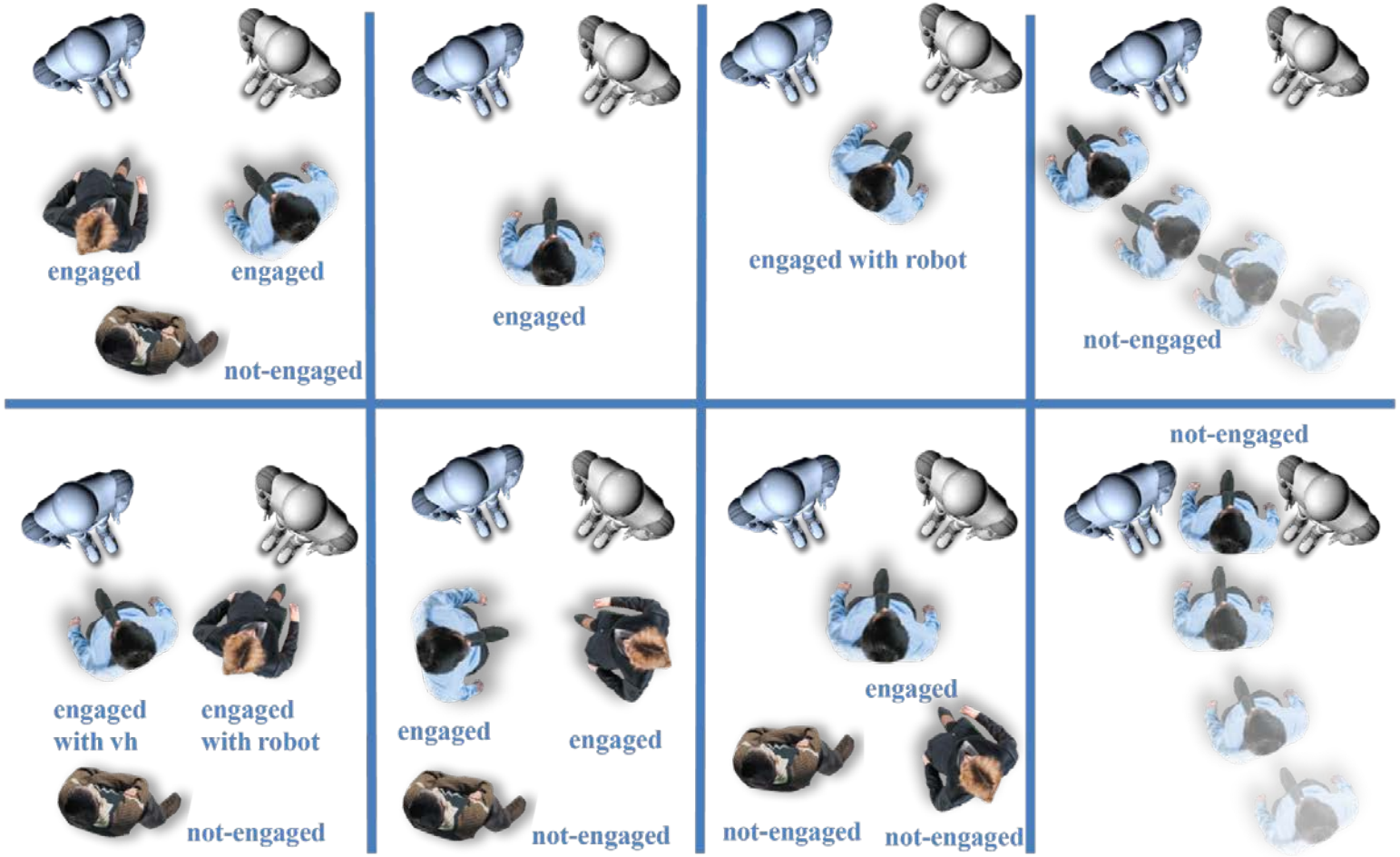
Task 1: Scene understanding



Kinect v2

Z. Yumak, J. Ren, N. Magnenat Thalmann and J. Yuan, **Modelling Multi-party Interactions among virtual characters, robots and humans**, MIT Presence: Tele-operators and Virtual Enironments (Presence), 23(2), 2014 .

Engagement Intention Detection



List of features

Feature	Explanation
Change of distance and orientation	If the user is not only passing by but staying stable for a while
Greeting/ calling by name	If the user calls by name or greets explicitly
Waving hand	If the user waves hand
Distance	If the user is closer to the vh/robot
Orientation	If the user configures his/her body towards the vh/robot
Closeness to the center of FoV	If the user is closer to the center of the field of the view of the vh/robot
Speaking	If the user is speaking
Smiling	If the user is smiling

Z. Yumak and J. Egges, **Autonomous gaze animation for socially interactive virtual characters during multi-party interactions**, Poster presentation, Motion in Games, Lisbon, May 2016

Task 2: Virtual Human Controller

- Lip-synchronized speech
- Facial expressions
- Gestures
- Gaze
- Based on Unity-3D and CereVoice Text-to-Speech System
- Driven by Behavior Mark-up Language (BML): http://www.mindmakers.org/projects/bml-1-0/wiki

Research page and video

http://www.uu.nl/en/research/virtual-worlds/virtual-interaction

Thank you

Questions?

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