A Touching Agent : Integrating Touch in Social Interactions between Human and Embodied Conversational Agent in an Immersive Environment

Fabien Boucaud, Indira Thouvenin, Catherine Pelachaud

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Fabien Boucaud[1] - PhD Student
Supervisors : Indira Thouvenin[1] & Catherine Pelachaud[2]
[1]Sorbonne Université, Université de Technologie de Compiègne, CNRS UMR 7253 Heudiasyc
[2]Sorbonne Université, CNRS UMR 7222 ISIR, UPMC Campus Jussieu

Embodied Conversational Agents (ECA)

- Artificial social agent with **a body**, or at least part of a body, designed to **interact and talk** with humans or other agents.
- Can use **non verbal communication** (gestures, facial expressions) and generate **rapport**.

Social Touch & Technology

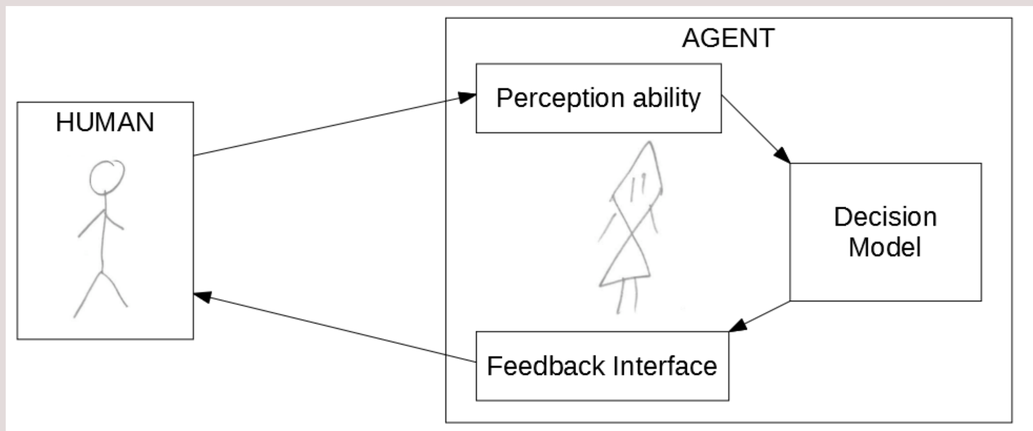
- Social touch is particularly useful to **communicate emotions**, and essential to individuals' well-being. Yet, only few communication technologies include it.

- Three kinds of social touch technologies: **detection and sensing, mediation and simulation**.
- However, very **difficult to imitate** natural haptic sensations via technology : **vibrations** feel unnatural, **force-feedback** can be heavy in terms of equipment, **temperature** is hard to set up (esp. in real time), etc.

Main research questions

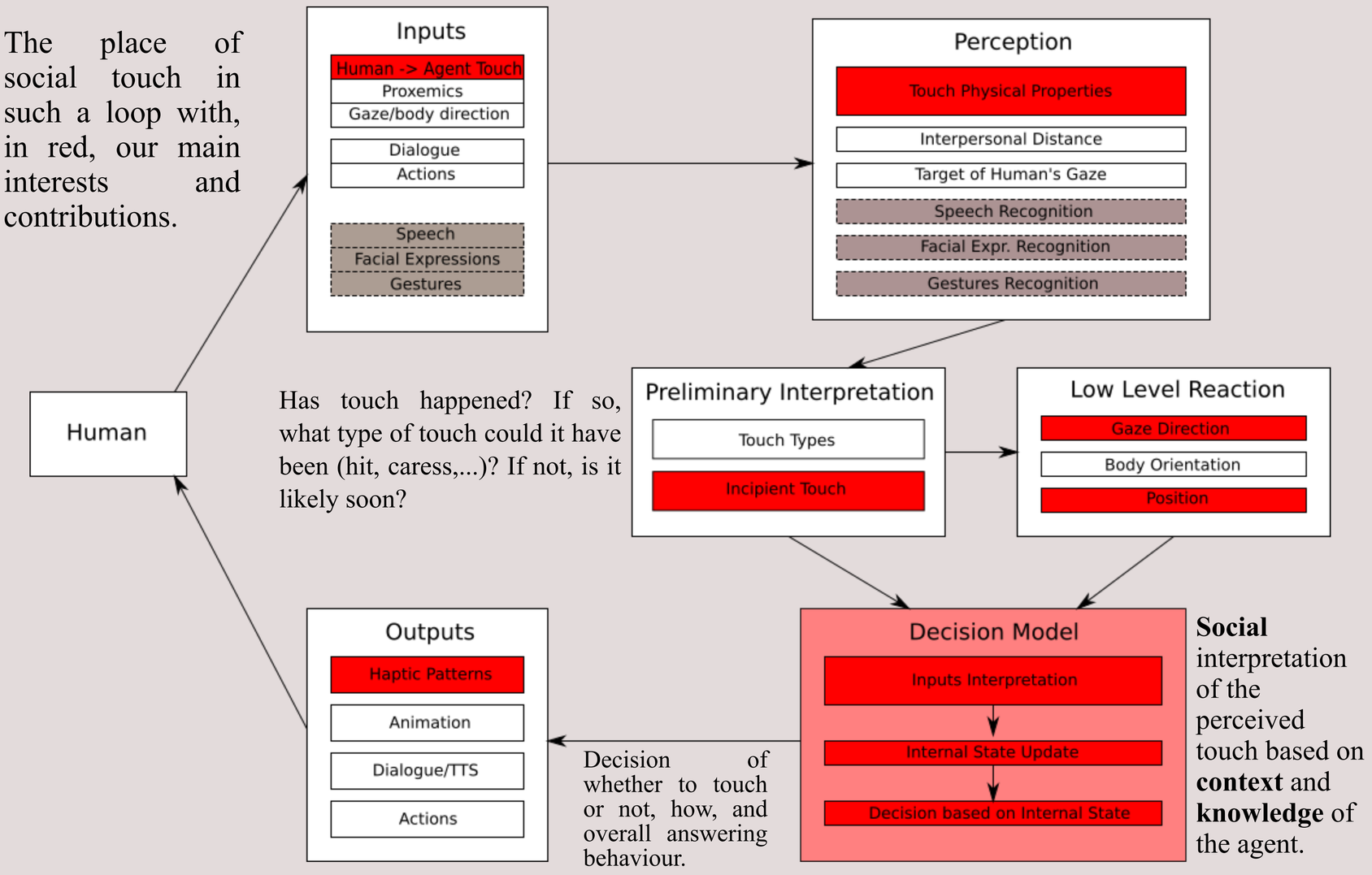
To which extent granting an ECA the ability **to touch and be touched** would enhance its ability to **communicate emotions** and to **build and maintain** a **social and emotional relationship** with a human?
From the agent's perspective : **when and how to touch the human, and how to react to being touched**?

Integrating touch to the interactive loop

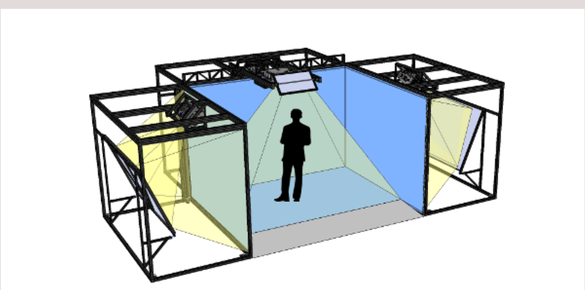


A traditional **interactive loop** between human and autonomous social agent is based on the ability of the agent to **perceive** the human's behaviour in the environment, to then **reason** and **decide** how to answer, and to eventually provide his answer to the human via some kind of **interface**.

The place of social touch in such a loop with, in red, our main interests and contributions.



The immersive room



The virtual environment and the agent are projected on the walls and the floor in **stereoscopic 3D**. The user can then see everything in **1:1 scale** through the glasses.

Giving the agent a sense of touch

The agent's body can **detect whether the human is touching** the agent or not, and **how** (where, for how long, velocity,...), based on the spatial coordinates.
However, the agent is **intangible** and thus we need to provide **haptic feedback** to make it able **to touch the human**.

Haptic feedback device

- **Voice coils** can be used to produce **richer vibration patterns** on our pre-defined **hit, caress and tap** touch types.
- More **diversified** and detailed **frequencies** for interesting noises (white, pink, ...)
- Implemented in a **tactile sleeve** device.