

## Motivation

### What is non-verbal communication?

Non-verbal communication is a wordless process of communication

### Why is it fundamental?

- Enhanced emotional state
- Make the conversation more "human"

### What is the issue?

3D communication applications neglect this key aspect of communication -see figure

### What is our goal?

Propose a non-verbal communication system:

- virtual human (VH) emotional mind
- a database of full-body emoMotions
- instantaneous & long-term emotions
- automatic gazing
- all possible facial expressions

## 3D Chatting Architecture

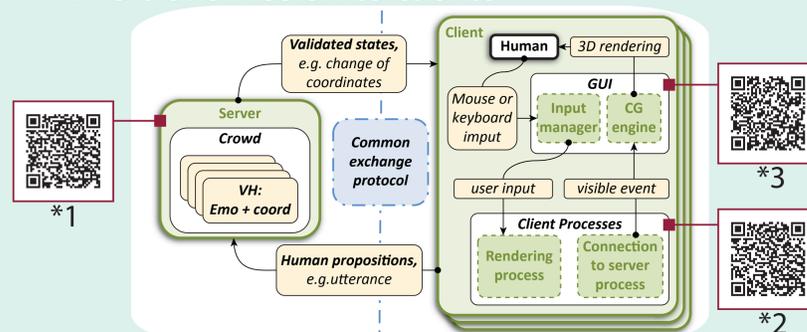
### What is the architecture key idea?

- The virtual world must be consistent
- Multiple usages should be possible -see figure
- Event driven architecture

### What about the event manager?

Key part of the architecture that guarantees:

- the correctness of time sequences
- non-verbal sub-events are produced
- info transmission to clients



### Why is it important for animation?

- event & action induce change in emo. states
- emotional states influence VHs movements

## Towards a Non-verbal Enriched Communication System



The issue: emotionless avatars



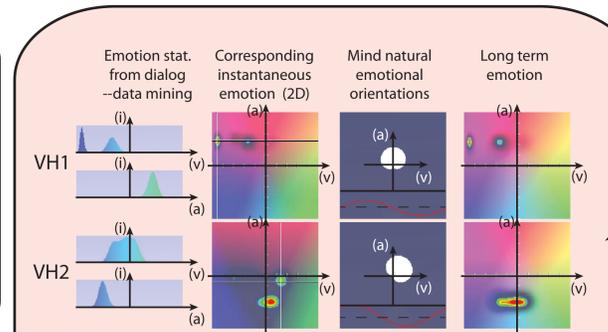
E.g.#1: a four VHs scenario



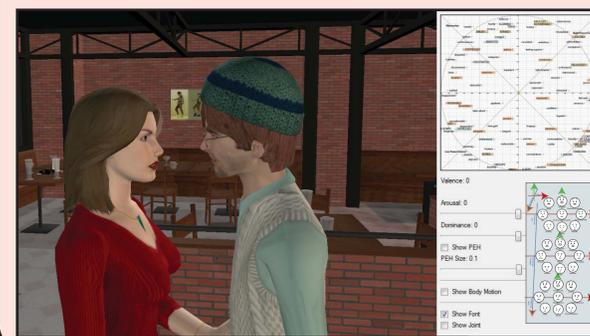
E.g.#2: one to one 3D chatting



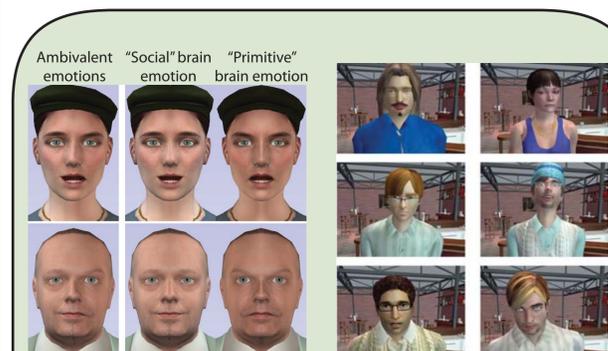
E.g.#3: four users, four paradigms



First representation of the emotional model



Graphical User Interface (GUI)



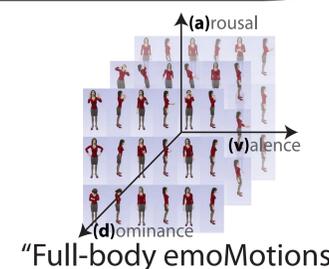
Lateral facial expressions Resulting emotionally influenced 3D chatting

Links to respective animations

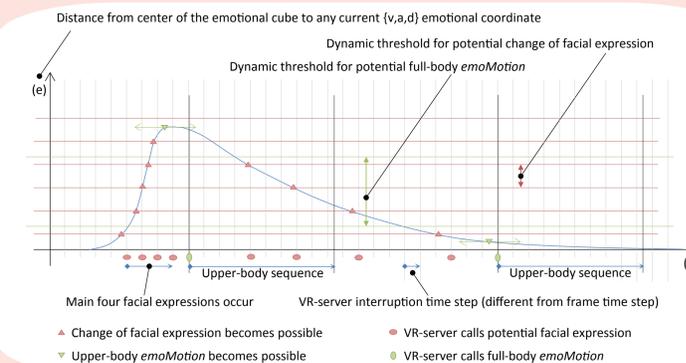
**Where to get more technical details?**  
The left QR Code provides a general view of the architecture. VR-server, clients, and GUI are detailed in \*1, \*2, and \*3.

**Where to see animation samplings relative to "full-body emoMotions"?**

The right QR Code provides 27 basic emotional animations; each emotional dimension has been subdivided into 3 regions.



## Emotional Model



### How is designed the VH-emotional model?

VH emotional mind => 3 aspects of emotions

- instantaneous emotion
- memory of affect-events
- the long term emotion

### What about instantaneous emotions?

- detected within each separate sentence
- based on the affect parameters
- using two large data-bases => classifiers

### Long term emotions?

- sum of instantaneous emotion + mind states

### How is emotion dynamics simulated?

- influenced by events, users commands, time at-tenuation functions, dialog directions, and emotional attributes

### Contributions to the field of animation?

This system allows to manage the animation of one's avatar depending of affects detected within dialog sentences

## Resulting animations

- Animations involving non-verbal communication:
- (left) lateral facial expression induced by ambivalent emotion
- (right) full-body animation relative to emotion => gaze, head orientation, facial expressions, full body high emotional related expressions...

## Conclusion

- We have presented a work in progress enable to enriched communication in 3D social networks
- Non-verbal communication brings realism to animation and in a way, humanism to virtual worlds