

# EmpathicEngine Development Diary

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## 1 Backlog

**Scientific Problems** Definition of agent, software agent, hardware agent  
Definition of empathy Theory of emotion and affective computing

- 1 relationship between human and agent in collaborative MR system
  - 1.1 whether setting collaborative task in virtual reality can improve empathy?
  - 1.2 when and how could agent help improve understanding between two collaborators?
  - 1.3 How does social relationship influence empathy between collaborators?
- 2 pros and cons of integrating an agent into a collaborative system?
  - 2.1 Whether an agent with the capacity of empathy in MR collaborative system can help enhance humanbeings' ability of empathy? Whether agent modulating collaboration information actively can help improve understanding?
  - 2.2 Maybe in other situations it inhibits collaboration and might become intrusive.

3 How can agent generate empathic representation properly?

3.1 Emotion theory

3.2 Data processing methods

3.2 evaluation criteria or methods

4 How to calculate empathy quantitatively?

**Empathy** De Waal[1] defines empathy as the capacity to a) be affected by share the emotional state of the another, b) assess the reasons for the others state, and c) identify with the other, adopting his or her perspectives.

**Agent** An agent can make decisions automatically according to its own knowledge

**Emotion theory**

**Affective Computing**

**Collaborative Mixed reality** In MR based collaborative environment, we research empathy between or among follolwing objects:

- 1 human-human
- 2 human-Agent
- 3 agent-human
- 4 agent-Agent
- 5 human-agent-human
- 6 agent-human-human
- 7 agent-human group
- 8 human-agent group
- 9 huamn group-agent group

## 2 PhD Research Plan

### 2.1 Summary

**Preface** Construct an engine to support most mixed reality (MR) related scientific research.

Agent in MR environment help enhance understand and feeling of social presence.

Agent can manipulate (augment or depress) elements from the computer side to change focus to create new meaning of current job.

**MR content** 3D model will be placed on the web server.

**Interaction** Interaction depends intensively on terminal devices

**Display** Display is also constrained by terminal devices.

**AI** Integrate artificial intelligence to construct Agent that can sense, express and regulate emotion

**Datasource** Data comprises physical and physiological signals.

- 1) physical signals includes images, voices and so on.
- 2) Physiological signals comprises Electroencephlogram(EEG), Electrocardiogram (ECG), etc..

## 2.2 Experiment

- 1) human adjust their physical or physiological signal to reach a level and computer will change volume or picture color
- 2) Adjust physical and physiological state to colloboratively finish a task and feel oneself's state to infer other's state. This can be used for psychological training where a healthy people can help psychological disabled one to feel the normal inner state.
- 3) One adjust his or her physical or physiological level to change a VR scene by which the observer's state can be influenced.

## 3 DevDiary

### 4 20200822

- 1) Finish mingw download and configuration
- 2) Download mysql and configure it with the program
- 3)

## References

- [1] Stephanie D Preston and Frans BM De Waal. Empathy: Its ultimate and proximate bases. *Behavioral and brain sciences*, 25(1):1–20, 2002.