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GREATER SEATTLE AREA

Perceived Empathy in Mixed Reality: Assessing the Impact of Empathic Agents' Awareness of User Physiological States

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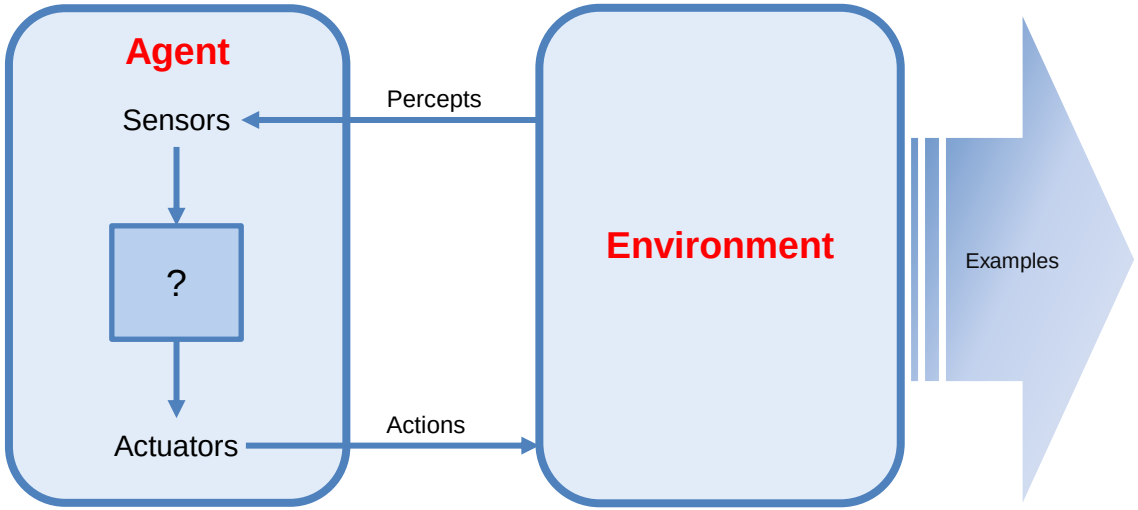
Introduction and Motivation



Examples

Robot Sophia

Virtual baby X

*An **agent** is anything that can be viewed as perceiving its **environment** and acting upon that environment through sensors and actuators* [1]

[1] Russell, S. J. (2010). *Artificial intelligence a modern approach*. Pearson Education, Inc..

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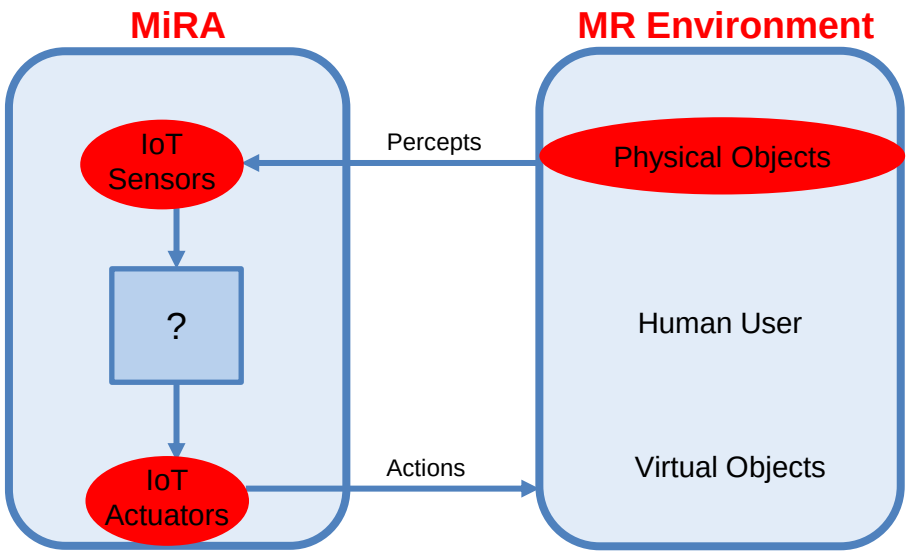
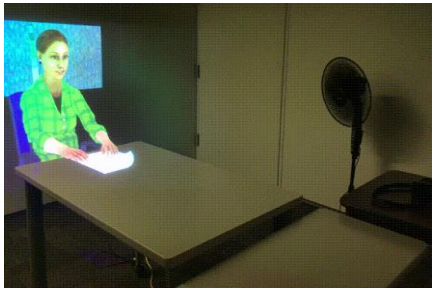
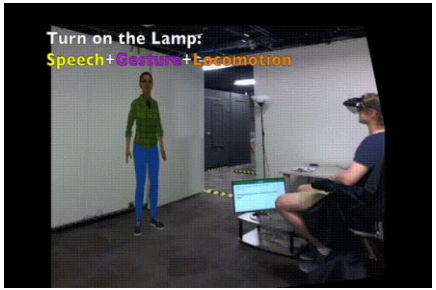


*A Mixed Reality Agent (**MiRA**) is an agent embodied in a mixed reality (**MR**) **environment*** [1]

Examples



Sensing physical wind[2]



Turn on physical lights[3]

[1] Holz, T., Campbell, A. G., O'Hare, G. M., Stafford, J. W., Martin, A., & Dragone, M. (2011). Mira—mixed reality agents. International journal of human-computer studies, 69(4), 251-268.

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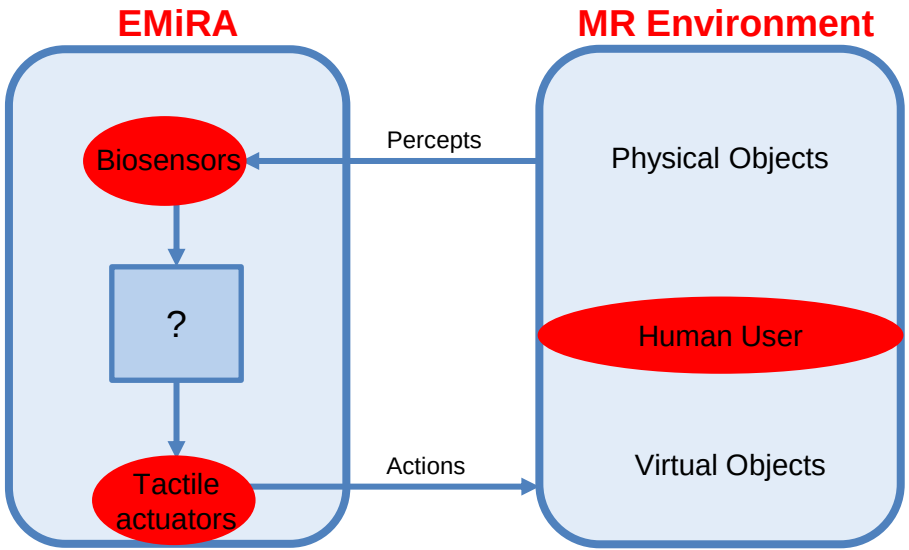

*An Empathic Mixed Reality Agent (**EMiRA**) is an empathic agent embodied in a **MR environment*** [1]

[1] Chang, Z., Pai, Y. S., Cao, J., Gupta, K., & Billinghurst, M. (2024, May). EMiRAs-Empathic Mixed Reality Agents. In Proceedings of the 3rd Empathy-Centric Design Workshop: Scrutinizing Empathy Beyond the Individual (pp. 1-7).

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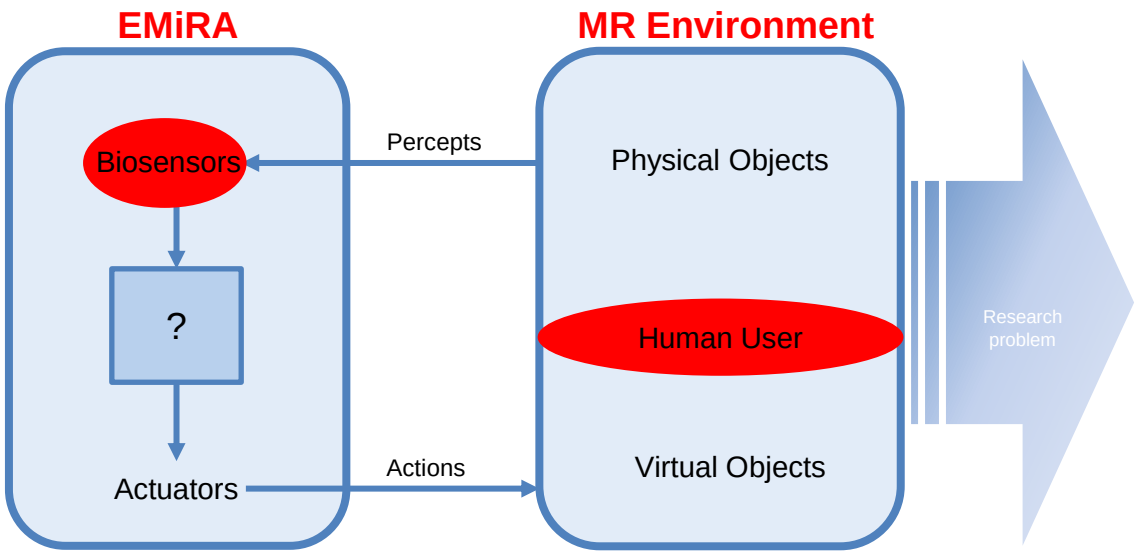

How to create empathy in EMiRAs with biosensors?

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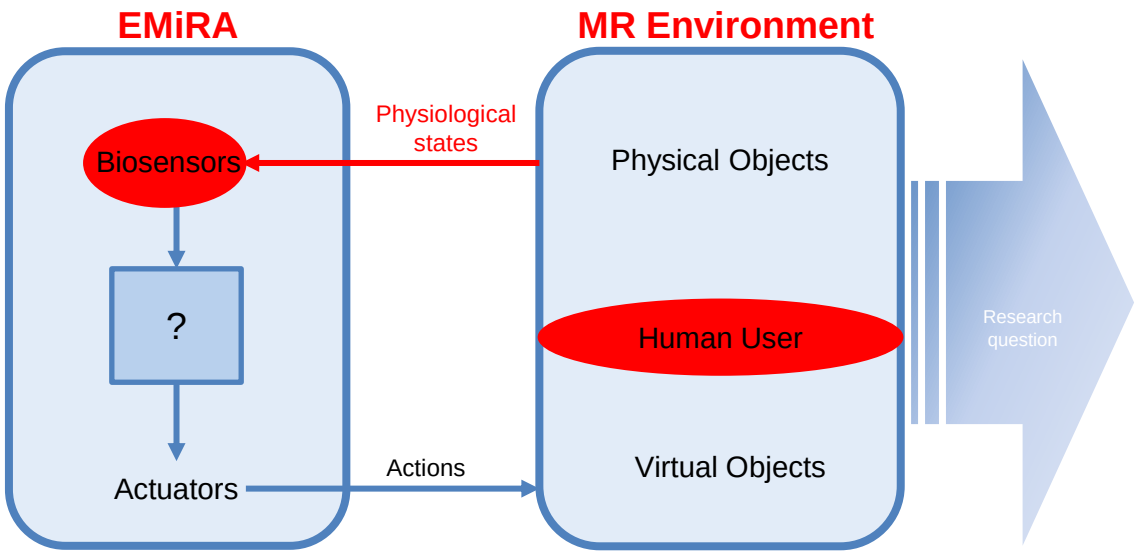

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How does an EMiRA's awareness of the users' physiological states impact users' social perception of such an agent?

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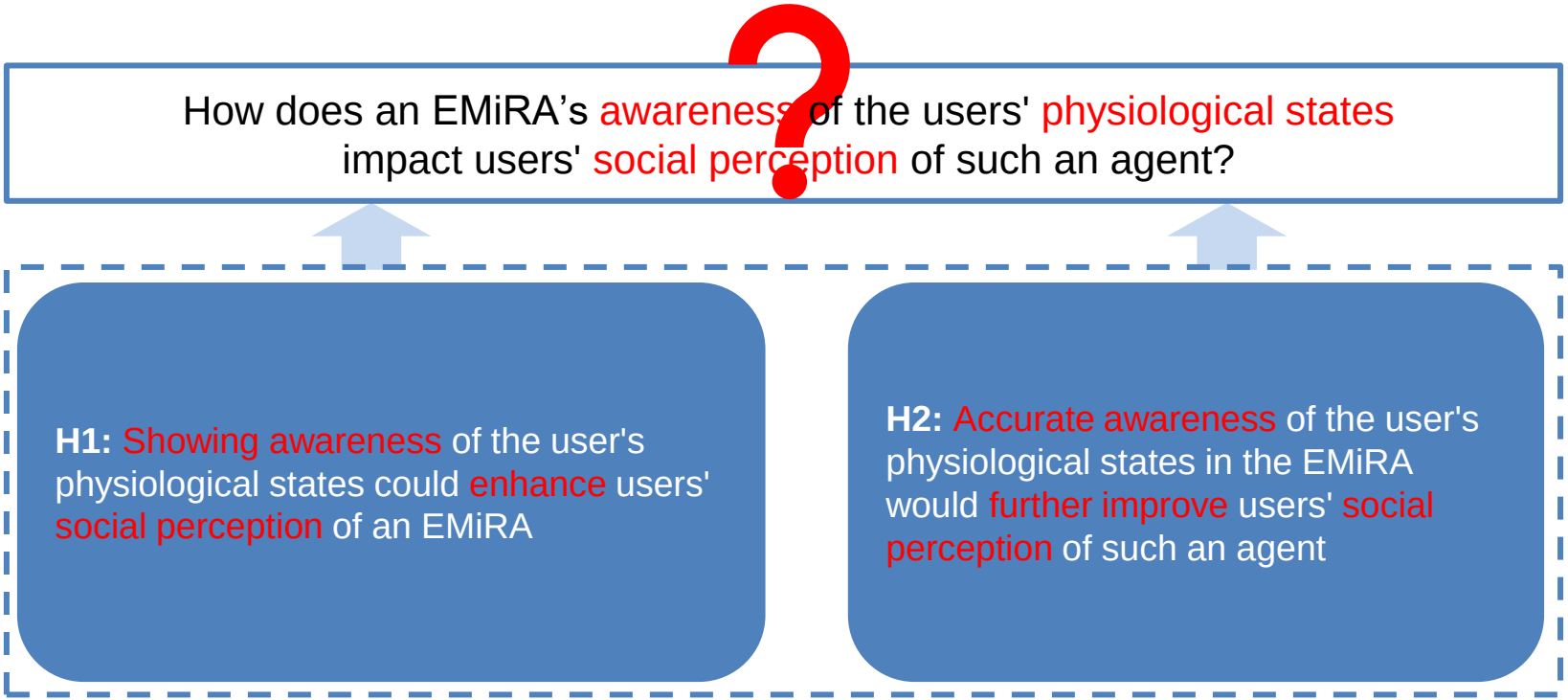
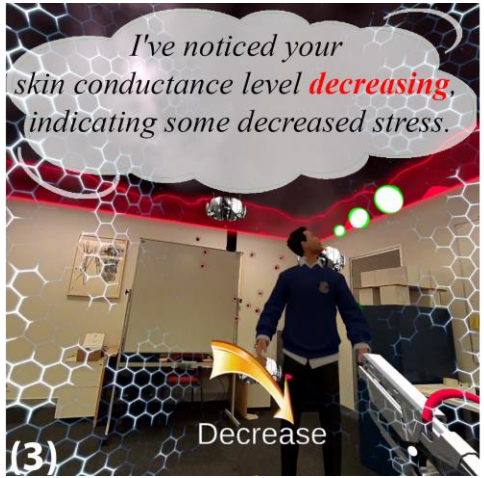
Research Question and Hypotheses



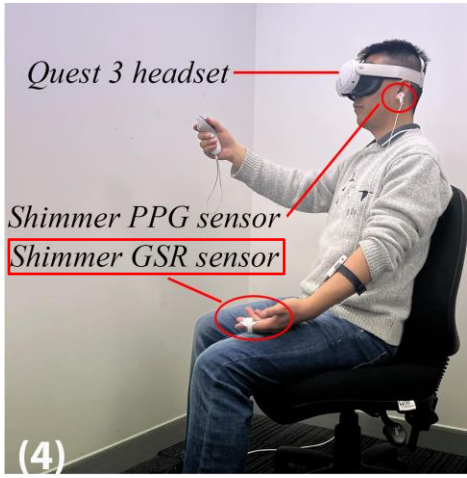
User Study Design - Conditions

(1) No Awareness Agent (NAA)

(2) Random Awareness Agent (RAA)



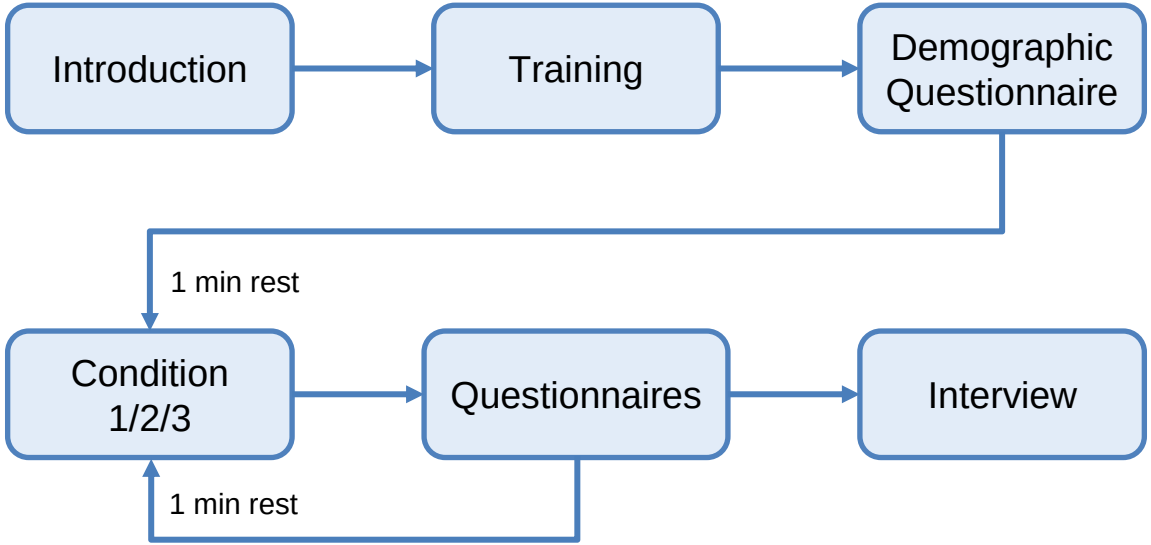
(3) Accurate Awareness Agent (AAA)



(4) Hardware Setup

- Within-subjects design
- 24 Participants aged 19 to 39 (M=25.92, sd= 4.49), 11 male, 12 female, 1 non-binary

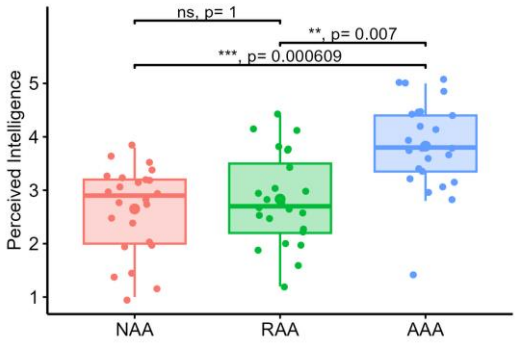
User Study Design - Procedure



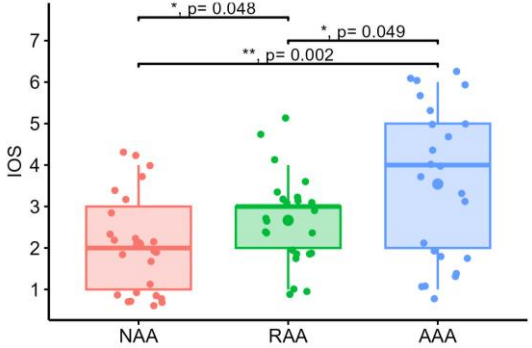
Results Highlights

Perceived Empathy

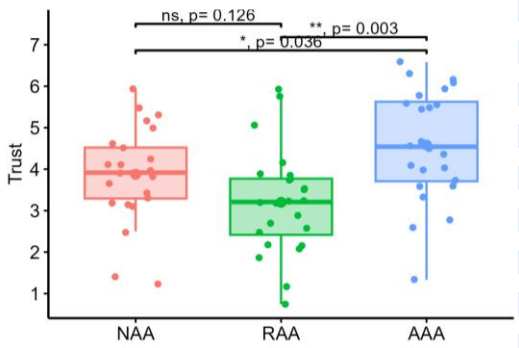
No Awareness Agent, Random Awareness Agent < Accurate Awareness Agent



Perceived Intelligence



Social Connectedness

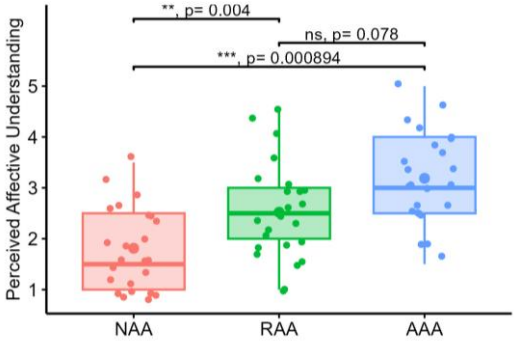


Trust

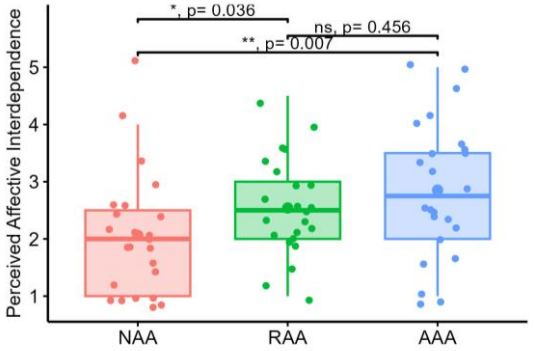
Results Highlights

Perceived Affective Understanding and Interdependence

No Awareness Agent < Random Awareness Agent, Accurate Awareness Agent



Perceived Affective Understanding

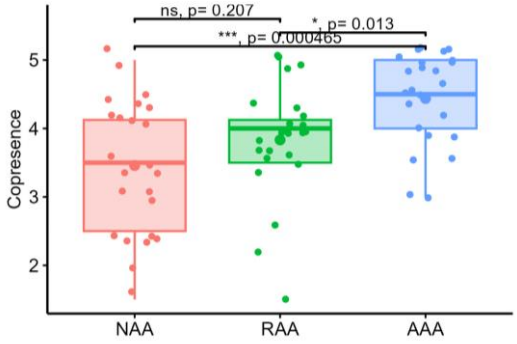


Perceived Affective Interdependence

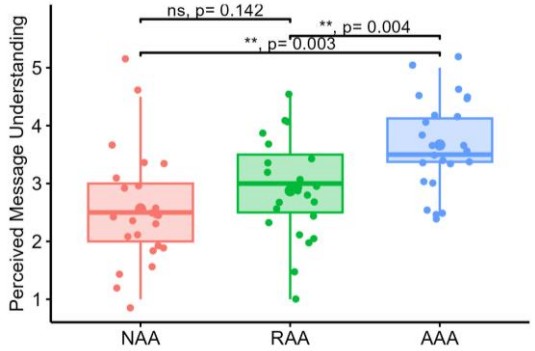
Results Highlights

Social Presence

No Awareness Agent, Random Awareness Agent < Accurate Awareness Agent



Copresence



Perceived Message Understanding

Design Implications

1. Using physiological sensors to enable EMiRAs to perceive user physiological states helps build perceived empathy in EMiRAs

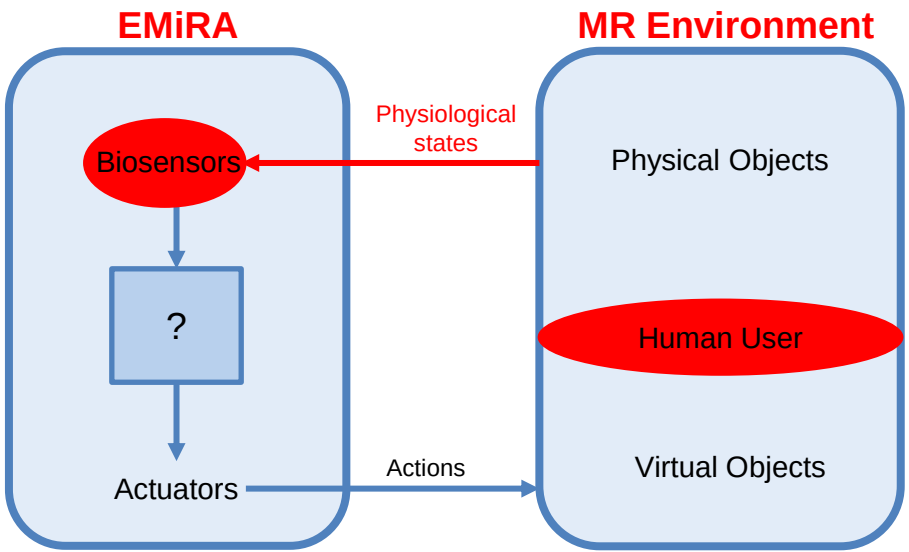
2. Higher accuracy in detecting physiological states can further improve social perception of EMiRAs

3. Users' physiological data safety and privacy should be handled properly

4. Prioritize guaranteeing EMiRAs' accuracy in detecting physiological states over emotional states

5. To enrich EMiRAs' biofeedback loop, incorporate non-verbal cues and personalized behaviors for more empathic responses

Summary and Contributions



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Research Contributions question

How does an EMiRA's awareness of the users' physiological states impact users' social perception of such an agent?

1. Pioneering the integration of physiological sensors to foster empathy in MiRAs
2. Assessing how agents' recognition of users' physiological states influences perceived empathy
3. Offering new design implications for enhancing empathy in MiRAs

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Thank you!

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