NRI: FND: Creating Trust Between Groups of Humans and Robots Using a Novel Music Driven Robotic Emotion Generator

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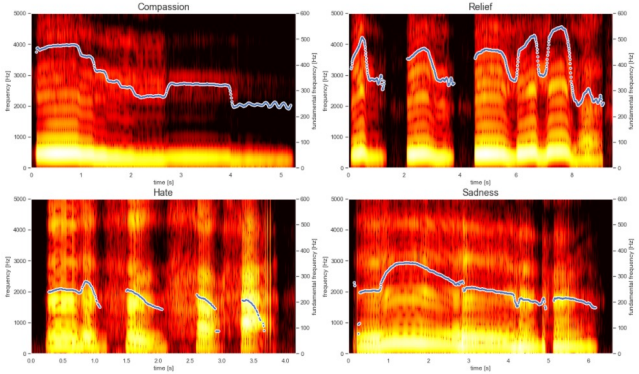
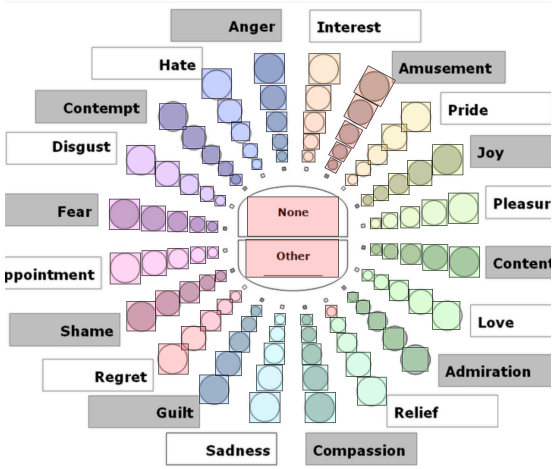
Previous Work

- Created a novel emotion labeled sound dataset from singers and guitar players
- Trained ConvNet Conditional Variational Auto Encoder to generate new emotion driven sounds
- Embedded generated sounds in robotic arms to improve human-robot trust
- Conducted preliminary studies with positive results for improved HRI trust and Godspeed metrics





2021 work

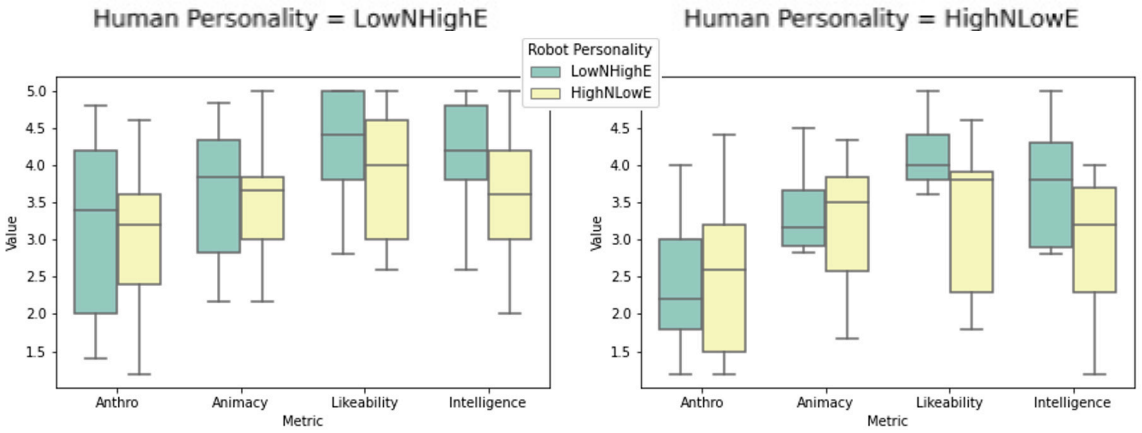
- **Gestures:** Generated rule- and data-driven emotion gesture for robotic arms
- **Scalability:** Embedded sound and gestures in a group of 12 robots
- **Personality:** Studied the relationship between human and robot personalities
- **Entitativity**: Studied perception of a robotic group as single entity
- **Contagion**: Studied emotion contagion between robots and humans
- **Dissemination**: Created a dance and music performance to showcase the research products of the project

Gestures

- Collected a set of emotional dances based on the Geneva emotion wheel
- Used dances to create new frameworks for emotional gestures

Personality

- From Big 5 personalities, we tested neuroticism (N) and extroversion (E)
- Robot responds with gesture and audio to have either HighNLowE or LowNHighE emotion regulation strategies.
- Different participants' personality types shows significant variation between the preferred robot across metrics. Both human personalities found the robot with LowNHigh E more Likeable.
- Anthropomorphism and animacy were rated higher with robot personalities that matched the humans.
- Submitted to HRI interactions ACM Journal

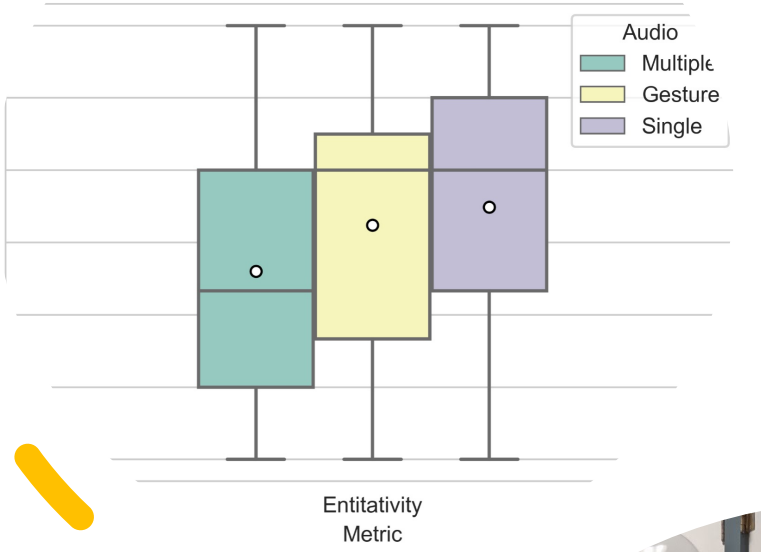


Personality Reaction: Penley and Tomaka (2002) - "Associations among the Big Five, emotional responses, and coping with acute stress."

Visual Stimuli: Kurdi et al (2017)- "Introducing the open affective standardized image set (OASIS)"

Entitativity

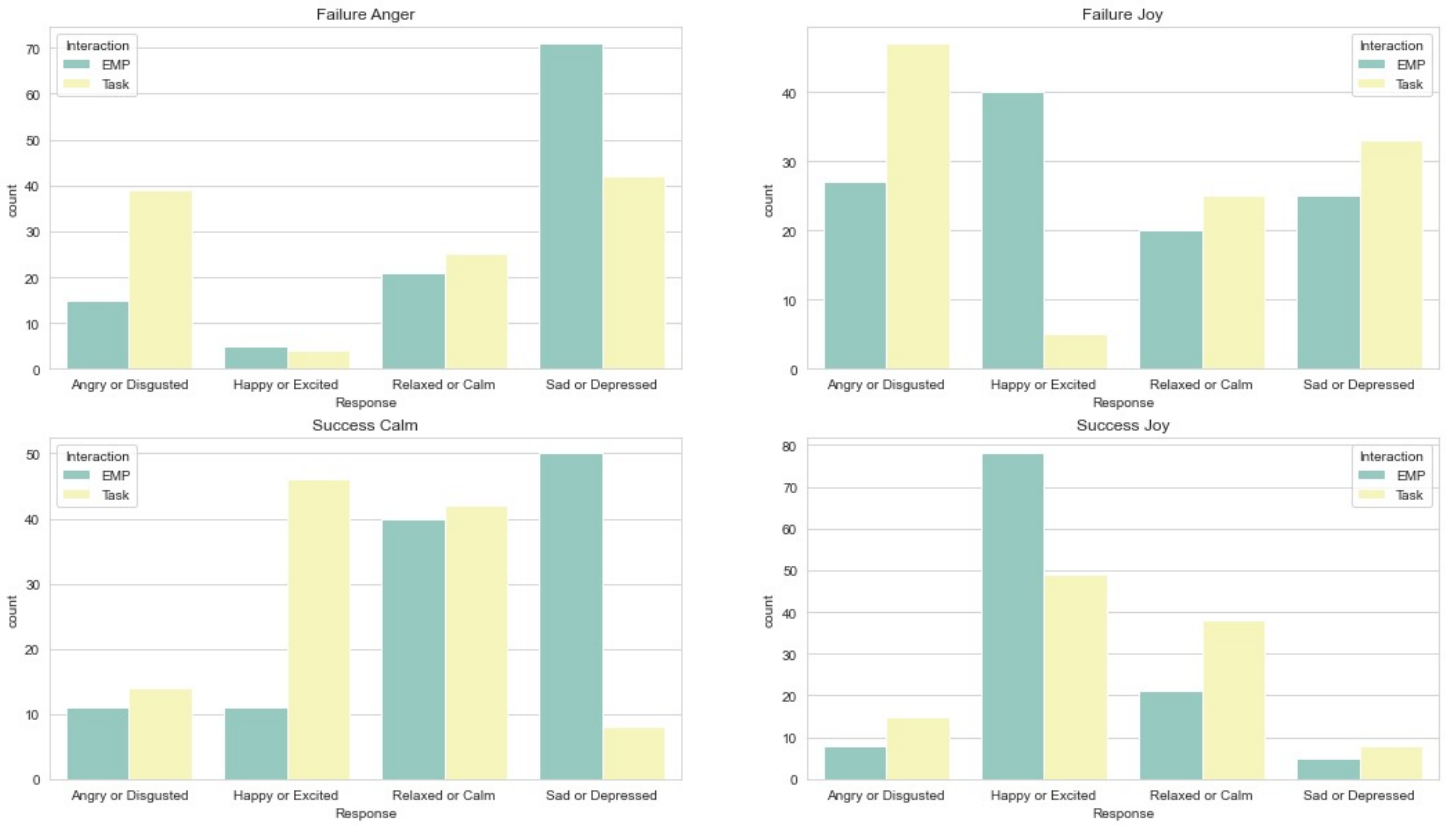
- Robots pass rings into a box
- Emotional Musical Prosody can be used to improve entitativity.
- Higher levels of entitativity improved Godspeed metrics



R. Savery, A. Rogel and G. Weinberg, "Emotion Musical Prosody for Robotic Groups and Entitativity," *2021 30th IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)*, 2021, pp. 440-446, doi: 10.1109/RO-MAN50785.2021.9515314.

Contagion

- Robots would pass rings into a box and use emotional prosody and gestures to react to the task
- The use of musical prosody increases levels of contagion
- Higher levels of contagion showed an increase in trust and social attribute ratings



Davies(2011)- “Infectious music: Music-listener emotional contagion”

Dissemination - FOREST

- Performance with 6 dancers using prosody research