

# On The Emotional Transparency of a Non-Humanoid Social Robot

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## 1. Introduction

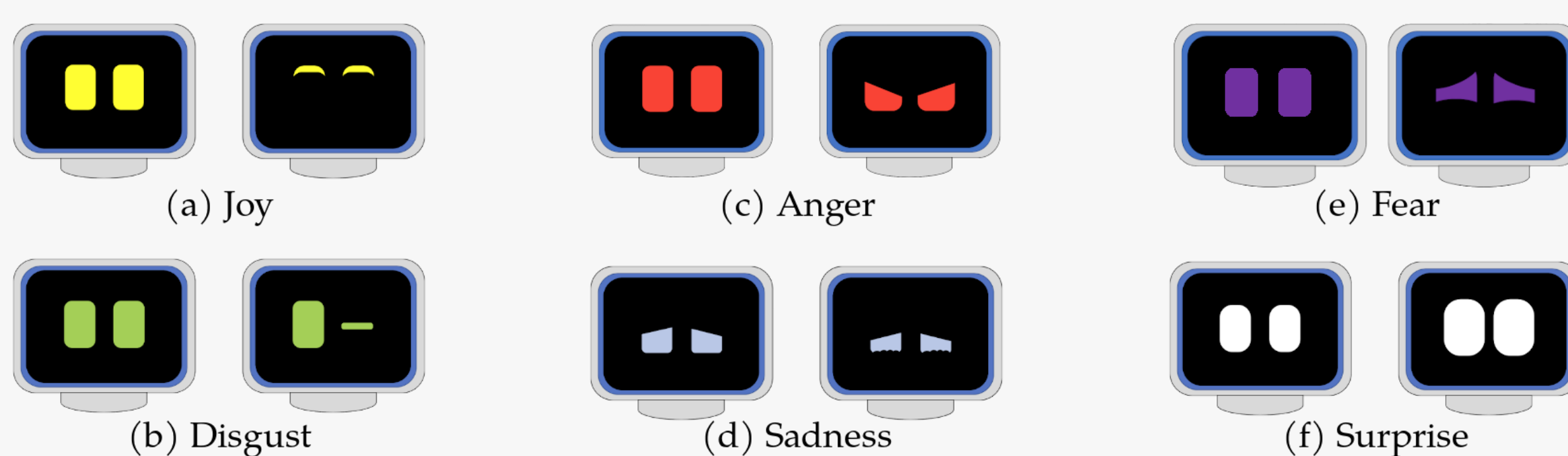
In this work, we designed six affective behaviours on the robot "ClassMate" with various modes and ran an online user study to understand whether the desired affective behaviour was correctly identified by the participants.

- Can multimodal interaction improve the emotional transparency of a social non-humanoid robot designed for classroom environments?

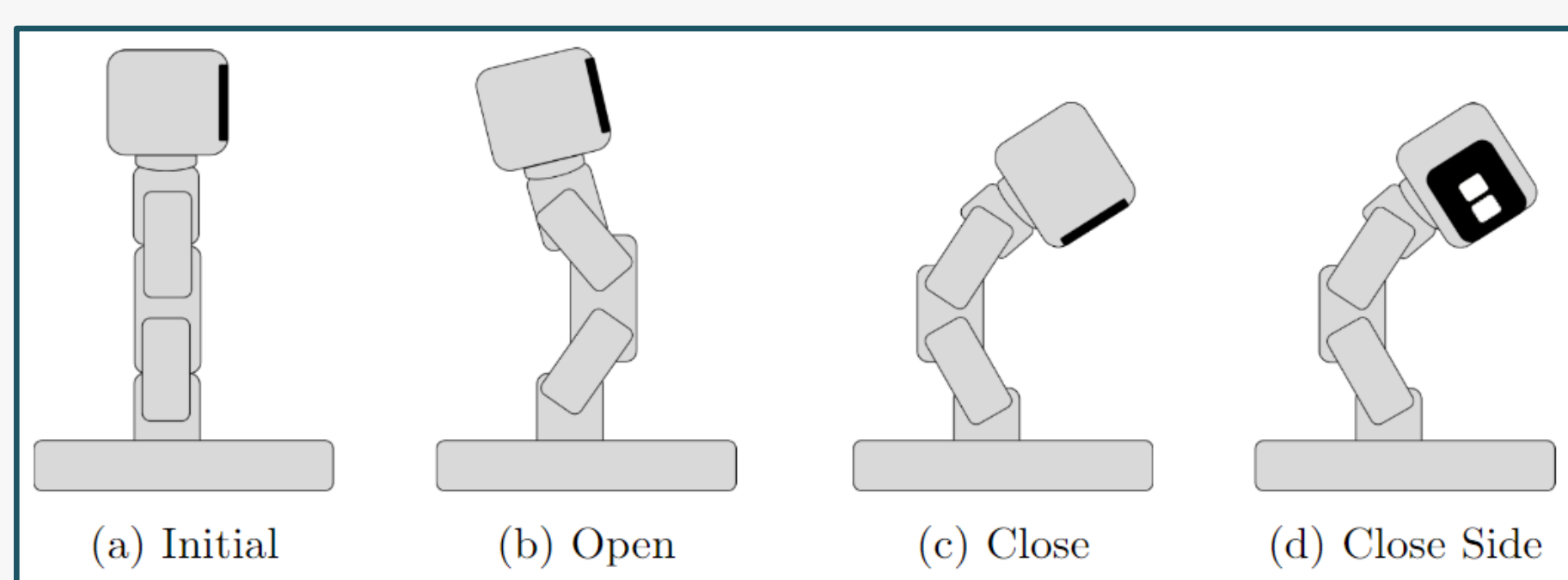
## 2. Methods

The robot emotions are obtained via combining the following modes:

1. Facial Expressions (built on the Ekman's six basic affective states):

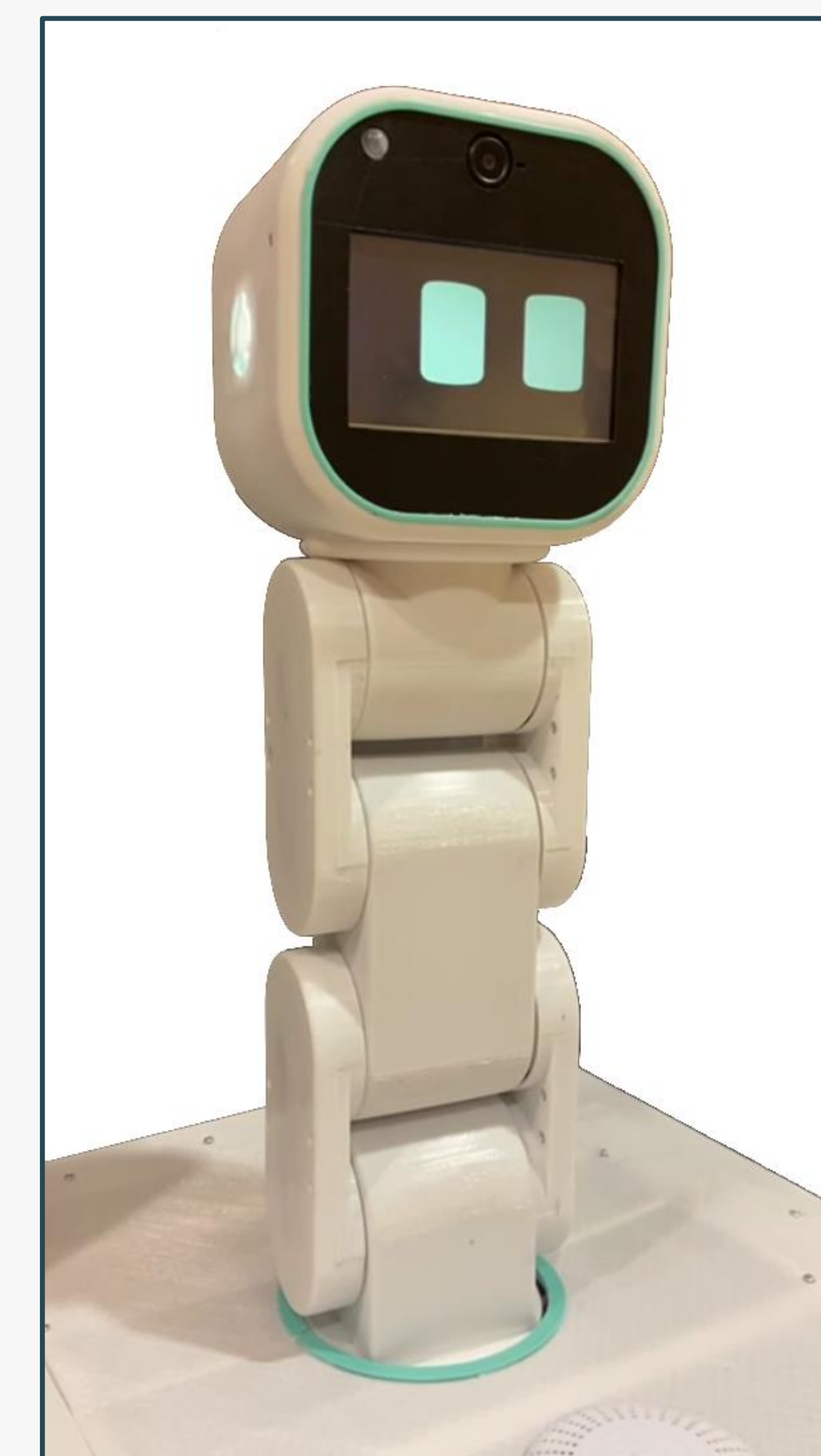


2. Body Expressions:



3. Non-verbal sounds:

Sounds mimicking the natural backchannelling cues of humans



We conducted an online questionnaire-based study, organised as a between-subject experimental design to evaluate the perceived expressions of the robot's animations.

The three designed conditions are:



In each condition the robot uses the mode(s) to mimic a desired emotion.

## 3. Results

We recruited a total of 102 participants and roughly distributed them among the conditions.

Each participant was shown a video (an animation of about 3 seconds) of the robot behaviour and was asked to associate it to one of Ekman's six basic affective states (joy, sadness, disgust, fear, anger and surprise).

- When the robot behaviour was obtained only by the face, the anger emotion was not clearly assigned to the anger face (above image 1.c)
- Participants were not able to differentiate clearly fear from other negative emotions

