

Thesis Proposal

Title	Automatic Detection of Social Discomfort in Human-Robot Interaction
Supervisors	Radoslaw Niewiadomski (DIBRIS, UNIGE) Alessandra Sciutti (Contact Unit, IIT)
Team/Company	Contact Unit, IIT
Research field	HRI / Computer Vision
Motivations and general objectives:	<p>As social agents, we experience social interactions that we enjoy being involved in, as well as those from which we wish to withdraw. It is crucial for artificial agents (e.g., social robots) to estimate when their human interaction partners want to maintain or withdraw from an interaction. The aim of this thesis is to explore whether it is possible to recognize automatically these tendencies from non-verbal behaviors. To this end, a set of previously collected videos will be analyzed and used to train machine learning models which will then be embedded in the robot and tested in a human-robot interaction scenario.</p> <p>The main objective of the thesis is to develop a new model to detect when a person is feeling uncomfortable (or “not at ease”) when interacting with a robot, using videos of nonverbal behaviors (facial expressions, body movements) of human interaction partners. For this purpose, the dataset containing audiovisual recordings of people being interviewed by the iCub robot, as well as the participants' self-assessments and external annotations will be used.</p> <p>An example of the video can be seen here: https://www.youtube.com/watch?v=L7OhMywxmiQ</p> <p>The student will have the opportunity to develop innovative solutions and, consequently, be involved in scientific publications. Most of the activities will be held at the CONTACT Unit, directed by ERC winner Alessandra Sciutti. The student will have the chance to work with an interdisciplinary and international team of researchers.</p> <p><u>Required skills</u></p> <ul style="list-style-type: none"> • Knowledge of the recent CV/ML methods • Programming skills (Python, C++) <p><u>Proposed work plan and expected results</u></p>

- The first task is to analyze the existing dataset of around 10 hours of human-robot interactions (see [1]).
- Next, the student will design and train a new model for comfortability computation.
- In the last step, the new model will be tested in real-time setting during human robot interaction.

The expected outcome of the thesis is a model capable of quantifying the comfortability of the person (i.e., how comfortable or uncomfortable she feels). Ideally the model should improve the baseline results [2] and be suitable for real-time human-robot interaction scenario.

Place of activity

The main place of activity is the Contact Unit at IIT (Erzelli), which has the robot iCub.

References

[1] Lechuga Redondo, M., Niewiadomski, R., Rea, F., Incao, S., Sandini, G., Sciutti, A., Comfortability Analysis under a Human-robot Interaction Perspective, International Journal of Social Robotics 10.1007/s12369-023-01026-9

[2] Lechuga Redondo, M.E., Sciutti, A., Rea, F., Niewiadomski, R., Comfortability Recognition from Visual Non-verbal Cues, In Proceedings of the 2022 International Conference on Multimodal Interaction (ICMI '22), November 7–11, 2022, Bengaluru, India, Association for Computing Machinery, New York, NY, USA, 207–216, 2022.
doi: 10.1145/3536221.3556631

[3] Lechuga Redondo, M.E., Sciutti, A., Incao, S., Rea, F., Niewiadomski, R., Can Robots Impact Human Comfortability During a Live Interview?, In Companion of the 2021 ACM/IEEE International Conference on Human-Robot Interaction (HRI '21 Companion). Association for Computing Machinery, New York, NY, USA, 186–189, 2021.
doi: 10.1145/3434074.3447156

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