

Are you following up ? engaging human-robot collaboration with
endogenous and exogenous task distraction.

Master Internship

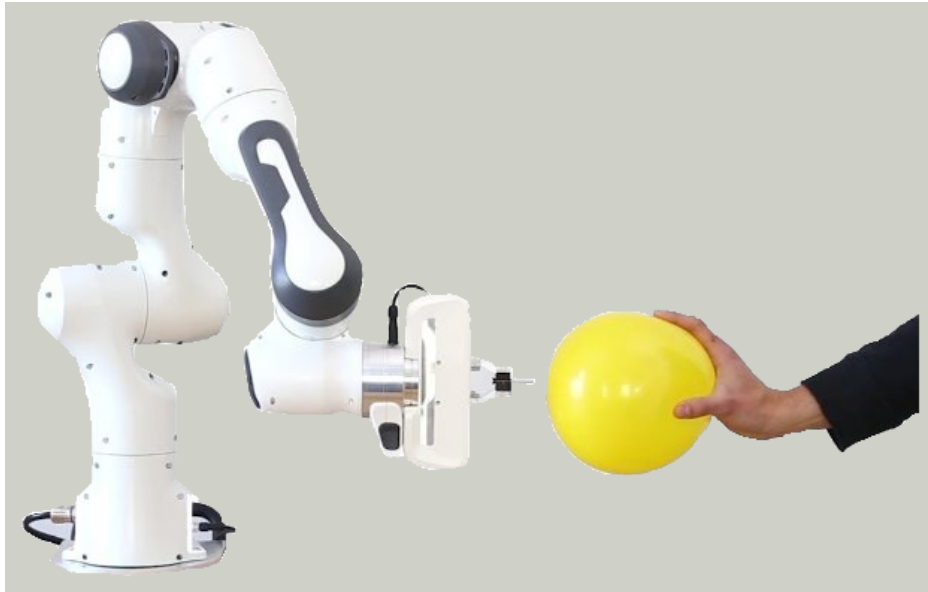
Hendry F. Chame, Alain Dutech

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Supervision: Hendry F. Chame (UL/LORIA), Alain Dutech (INRIA)

Department: Complex Systems, Artificial Intelligence and Robotics

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1 Introduction

In human collaboration, assertiveness and timing in reciprocal interaction make all the difference for the achievement of shared goals. Several researches suggest that sharing attention involves fundamental skills for interacting and achieving common goals [NGD18]. Although joint attention (JA) *initiation* and *response* have been studied in the HRI literature [Bel+22], embodiment is a very important aspect to consider, so that the robot can adequately convey its intention to share attention around a particular stimulus during the task. Moreover, task distraction is an important aspect to consider, notably in our technologically mediated society, where persons are often overwhelmed with information and stimulation. In this context, the current project focuses on integrating a JA model for HRI [CCA23] to a collaborative game task model with the robot Franka, as a mean to allow the robot to assertively re-engage the human when required during interaction.

2 Methodology

This work will involve several stages:

Joint attention model. Based on the literature, this phase of the work focuses on understanding the attention model detailed in [CCA23] and adapting it to the settings of this work. In particular, the model needs to be adapted to the sensors (mostly camera) used in the experiments.

Interaction scenario. An engaging collaborative task must be refined. We envision a task where both the robot and the human participant have to move some objects. This task can rely on simple pick and place movements that can be programmed in the robotic arm. Endogenous and exogenous distractions can also be defined and programmed.

Experiments. In order to test the model and the pertinence of engaging robotic moves, it will be necessary to conduct experiments with several participants under various conditions. Analysis of captured data will provide a better understanding of the model and its potential improvements.

Robotic platform. We plan to use a Franka robotic arm (depicted in the above image) and "RealSense" camera devices under the Robot Operating System (ROS).

3 Project details

- **Dates:** internship will ideally start in March 2026.
- **Duration:** 5 or 6 months.
- **Location:** Within the dept. "Complex systems, AI, Robotics" of the LORIA (CNRS UMR 7503). Campus Scientifique, 615 Rue du Jardin-Botanique, 54506 Vandœuvre-lès-Nancy, France.
- **Salary:** According to French law. Reference October 2025: 4.35 €/hour (around 650 € per month).

4 Profile

- Master II student in robotics, computer science, mathematical modeling or cognitive science.
- Deep research interest in human-robot interaction, embodiment, cognitive sciences and bio-inspired modeling.
- Programming skills in Python language. Knowledge of the ROS framework is a plus.
- Knowledge of dynamic system theory and neural network modeling. You can understand and work with ordinary differential equations.
- Level of French or English required: at least intermediate level. You can speak the language understandably, coherently and confidently on everyday topics that are familiar to you.

5 How to apply

The position will be filled as the candidatures are received. As soon as possible, send your application pack including a motivation letter, CV and the most recent transcript of your academic records to Prof. Hendry F. Chame (e-mail: hendry.ferreira-chame@loria.fr) and Dr. Alain Dutech (e-mail: alain.dutech@loria.fr)

References

- [NGD18] Albert Newen, Shaun Gallagher, and Leon De Bruin. "4E cognition: Historical roots, key concepts, and central issues". In: (2018).
- [Bel+22] Kathleen Belhassein et al. "Addressing joint action challenges in HRI: Insights from psychology and philosophy". In: *Acta Psychologica* 222 (2022), p. 103476.
- [CCA23] Hendry F Chame, Aurélie Clodic, and Rachid Alami. "TOP-JAM: A bio-inspired topology-based model of joint attention for human-robot interaction". In: *2023 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. 2023, pp. 7621–7627.