



Exploring Applications for Autonomous Nonverbal Human-Robot Interaction

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ABSTRACT

Non-verbal Human-Robot Interaction (nHRI) encompasses the study of the exchange of human-robot gaze, gesture, touch, body language, paralinguistic, facial and affect expression. nHRI has advanced beyond theoretical and computational contributions. Progress has been made through a variety of user studies and laboratory experiments as well as practical efforts such as integration of nonverbal inputs with other HRI modalities including domain specific implementations. This workshop seeks to promote collaboration between two threads of research: experimental nHRI, and application domains that can benefit from its use.

The workshop will link researchers working on new approaches to nHRI in the laboratory to applied roboticists who present challenges in specific domains, such as: service robots, field robotics, socially-assistive robotics, and human-robot collaborative work that could benefit from richer nHRI. This workshop will draw participation from diverse areas to evaluate best practices and integration efforts across different research domains. We will target a broad, cross-disciplinary audience, and provide a venue for recent efforts related to multimodal interaction, system integration, data collection, and user studies.

CCS CONCEPTS

• **Human-centered computing**; • **Computer systems organization** → **Robotics**;

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1 WEBSITE

<https://sites.google.com/view/non-verbal-hri-2021/home>

2 INTRODUCTION

"Exploring Applications for Autonomous Nonverbal Human-Robot Interaction (nHRI)" is a full-day workshop to be held on March 7, 2021.

As robots emerge in real-world applications operating in close proximity to people, fluid, clear interaction will become increasingly important. Robots that do not understand people and which are not understood by people will be seen as burdensome obstacles rather than helpful assistants. People will need to be able to interact with robots in the ways that they expect to, not simply the ways that they are told the robot will perform, if they are to share sidewalks, workspaces, offices, and homes with them. Forms of nonverbal communication are crucial for negotiating manipulations, navigating past each other, or sharing and handing over objects. Gestures make up a family of explicit communications, while gaze and body posture communicate implicitly. Information is conveyed by the force exerted when jointly lifting an object, the proximity of people standing in groups, and the expressions on our faces. This contrasts with other approaches in robotics that focus primarily on verbal exchange, direct control, or programmatic instruction in specific robot applications. Future co-speech nHRI systems could provide a novel interactive experience that improves teamwork, factors in socially assistive robotics, and in general, mutual understanding of intent between humans and robots in such scenarios.

3 TARGET AUDIENCE AND GOAL

This workshop targets a combination of researchers and practitioners working in the area of nHRI. The work that these roboticists do ranges from doing laboratory experiments, algorithm and model development, and field studies to live real-world deployments of products, algorithms, and systems. The workshop's goal is to cross-pollinate ideas by bringing participants together in order to foster more intensive and new collaborations as well as inspire new research and apply ideas and techniques more broadly. This workshop will accelerate the development of comprehensive, fluent, nonverbal human-robot interaction.

4 CONTENT AND STRUCTURE

This workshop will focus on a wide range of topics in nHRI. The workshop's goal is to include a variety of ongoing work from research laboratories focusing on the use and implementation of nHRI systems. The workshop also seeks to increase collaboration among attendees.

4.1 Contributed papers

Contributions are invited on all topics relevant to nHRI, including (but not limited to):

- Advantages of systems that leverage nHRI in teamwork, companionship, and other applications
- Theories and perspectives of non-verbal communication
- The exchange of gesture
- Studies of the interpretation of gesture and facial expression
- Microexpressions and affect
- Theory of mind approaches to non-verbal communication
- Variations of nonverbal expression across cultures
- Physical, mental, age, and gender specific expressions
- Proposed, under-development, or deployed systems leveraging nHRI **OR**
- Systems which could benefit from the application of nHRI

Papers include short work-in-progress and position papers (2-4 pages) and long-format integration and experimental papers (4-6 pages). All papers are to be considered for both oral presentations and posters. Posters will be presented during the third session. The submission site can be found under the Call for Papers (CfP) on the workshop's website.

4.2 Sessions and Schedule

The workshop is organized as a day of invited talks, contributed papers, a poster session and interactive discussion. The schedule is broken into three sessions. The first two sessions begin with invited talks, to be followed by oral paper presentations, ending with a discussion of the material presented with the presenters. The third session is reserved for poster presentations and discussion. After the day's presentations, there is breakout discussion intended to aid in the formation of collaborations and the synthesis of ideas. In the evening there will be a social hosted in Gather <http://gather.town>.

Sessions 1 & 2

Invited Speaker

Oral presentations: 3-4 per session

Panel Discussion: Discussion and questions with presenters

Session 3

Poster session

Breakout

Discussion including all workshop participants to form new ideas and collaborations. Participants will discuss how best to advance nHRI within industry and the research community.

Social

A social hour for attendees, industry participants, and researchers to get to know each other better.

5 DOCUMENTATION

Contributed papers will be posted on <http://arXiv.org>. At the conclusion of the workshop, if there is sufficient interest, the workshop will be used to seed a special issue in a relevant journal.