HAI 2024 Workshop Proposal: Fluidity in Human-Agent Interaction

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Abstract

Fluidity is a key quality of human-human and more natural human-agent interaction (HAI). The concept of fluidity is difficult to define formally, however, interaction partners and users perceive the difference between more and less fluid interaction. As an initial informal definition, fluidity in interaction can be considered the abilities to seamlessly transition in turn-taking, to allow appropriate overlap of turns between agents, including multimodally, and to allow action using prediction. The purpose of this workshop is to bring agent designers together to attempt to define fluidity in interaction more precisely and propose ways in which we can make HAI more fluid.

CCS Concepts

• **Human-centered computing → HCI theory, concepts and models**.

Keywords

Fluidity, Real-time processing, Human-agent interaction

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1 Overview

A key problem for current human-agent interaction (HAI) is lack of **fluidity**. This is particularly acute for embodied agents like robots, but also for multi-modal interfaces. Although there have been significant recent advances in computer vision, virtual reality (VR), motion, manipulation and automatic speech recognition, state-of-the-art HAI can be slow, laboured and fragile. The contrast with the speed, fluency and error tolerance of human-human interaction is substantial.

The aim of this workshop proposal, in line with the aims of the FLUIDITY project[1], is to take on this key challenge by proposing and developing the technology to monitor, control and increase the interaction fluidity of artificial agents, such that they become more natural and efficient to interact with.

While it is difficult to define formally as a concept, fluidity can be felt by human participants [2]. By way of example, in a pick-and-place situations where a human responds to a spoken instruction like "put the remote control on the table" and a follow-up repair like "no, the left-hand table" when the speaker realizes the instructee has made a mistake, there is typically nearly no delay in reacting to the initial instruction, and adaptation to the correction is instant. Fluid interaction for robots with speech understanding consists of more seamless, human-like transitions from processing speech to taking physical action with **no delays**, permitting **appropriate overlap** between the two, and the ability to **repair actions in real time** as humans do [1].

In human-human interaction, fluidity is achieved through humans being able to recognize the intentions of their conversational partner with low latency and using predictions [3, 4], and in responding to speech, humans can begin moving in response to an instruction *before* the end of the instructor's utterance [1]. Current interactive agents do not exhibit these capabilities partly due to unsuitable control algorithms which demote fluid interaction quality over other concerns. This workshop aims to put interaction fluidity and the rapid recovery from misunderstanding with appropriate repair mechanisms at the heart of the effort to improve HAI from this angle.

2 Goals and objectives

The principal goal of the workshop is to bring together researchers interested in **defining and improving the fluidity of HAI**.

The objectives of the workshop will be as follows:

- To invite abstracts from those interested in fluidity in HAI and for a subset of these abstracts to be presented live as invited talks
- To have break-out discussions on how to define and design for fluid interactions.

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[1] FLUIDITY in simulated human-robot interaction with speech interfaces. UKRI EPSRC grant: EP/X009343/1 project website: https://fluidity-project.github.io/.

- To have a general discussion at the end of the conference on fluidity.
- To make plans for a joint paper on defining fluidity in HAI from abstract-submitting participants.

3 Workshop Structure

09.00-10.30 Invited Talks on Fluidity in HAI
10.30-11.00 Coffee Break
11.00-12.30 Breakout Discussion: Defining Fluidity
12.30-14.00 Lunch
14.00-15.00 Invited Talks on Fluidity in HAI
15.00-15.30 Coffee Break
15.30-17.00 Final Discussion and Future Plans

4 Expected Outcomes

The expected outcomes from the workshop are as follows:

1. A short collection of abstracts/short papers on the topic of fluidity in HAI.
2. The chance to begin collaboratively defining the property of fluidity in HAI and potential solutions to improving it.
3. The plan to combine the contributions and discussions into a focused, longer journal paper for completion after the workshop by the submitting participants.

5 Expected Audience and Call for Papers Plan

The expected audience is for those interested in designing for and researching autonomous agents where time-sensitivity and frustration with the laborious nature of their agents are of concern. Researchers and practitioners into dialogue systems/chatbots, human-robot interaction researchers, and Virtual Reality and Augmented Reality agent designers are the target audience.

The CFP for the extended abstract will be open from the acceptance notification day to the end of October to allow for later registrations for HAI.

6 Logistical requirements

The predicted logistical requirements are:

- Room capacity of 50 with projected screens/AV support
- Round table capacity for break-out discussions
- Ideally coffee break provisions provided

7 Organizers' list and mini bios

Julian Hough is a researcher and Associate Professor in Computer Science at Swansea University. His research focuses on Artificial Intelligence and Natural Language Processing techniques being applied to interaction data and within interactive systems to improve the quality of human-agent interaction. He leads the FLUIDITY project.

Carlos Baptista de Lima is a Research Officer on the FLUIDITY project and PhD student in Computer Science at Swansea University. His PhD focused on Augmented Reality in Education.

Frank Förster is a researcher and Senior Lecturer in Computer Science at the University of Hertfordshire. His work focuses on human-robot interaction and negation and is Co-I on the FLUIDITY project.

Patrick Holthaus is a Senior Research Fellow in the Robotics Research Group at the University of Hertfordshire. His research revolves around social robotics and focuses on nonverbal interactive signals, social credibility and trust in assistive and companion robots.

Yongjun Zheng is a researcher and Senior Lecturer in Computer Science at the University of Hertfordshire. His work focuses on mobile computing and applications of deep learning.

Conference website:
https://fluidity-project.github.io/fluidityhaiworkshop.

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