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Robo-Identity: Exploring Artificial Identity and Emotion via Speech Interactions

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Abstract—Following the success of the first edition of *Robo-Identity*, the second edition will provide an opportunity to expand the discussion about artificial identity. This year, we are focusing on emotions that are expressed through speech and voice. Synthetic voices of robots can resemble and are becoming indistinguishable from expressive human voices. This can be an opportunity and a constraint in expressing emotional speech that can (falsely) convey a human-like identity that can mislead people, leading to ethical issues. How should we envision an agent’s artificial identity? In what ways should we have robots that maintain a machine-like stance, e.g., through robotic speech, and should emotional expressions that are increasingly human-like be seen as design opportunities? These are not mutually exclusive concerns. As this discussion needs to be conducted in a multidisciplinary manner, we welcome perspectives on challenges and opportunities from variety of fields. For this year’s edition, the special theme will be “speech, emotion and artificial identity”.

Index Terms—artificial identity, voice, speech, emotion, affective computing, human-robot interaction, affective science

Who is a robot? There are a burgeoning number of “bodies”, from standard humanoid robots, e.g., Nao (SoftBank Robotics), to more creative renditions, e.g., a synchronized trio of robots as one¹ or a more abstract Jibo. Yet thus far, *who* resides in these artificial bodies and to what extent their identities can fluidly travel across different technologies remains a fascinating but under-explored research area.

In 2021, the first edition of *roboidentity*² [1] successfully took place by bringing around 50 researchers together to discuss 13 presented papers with 2 renowned HRI invited keynote speakers. The diversity of areas covered by the participants of this workshop initiated an exciting exchange about robo-identity. Strengthened by the success of the first edition, we propose a new edition of *Robo-Identity* to expand these exchanges. For this edition, we also propose a special

theme which is “speech, emotions and artificial identity”.

Consequently, for the second edition of *Robo-Identity* we will address the following questions:

- What is artificial identity?
- How are artificial identities delivered via emotional expression of agents?
- How do an agent’s voice and speech convey emotions in constructing its artificial identity?

Based on the success of the first edition we propose a second edition in order to consolidate these exchanges.

I. FROM *Robo-Identity* TO *Robo-Identity 2*

The first edition of *Robo-Identity* was centered around three topics: philosophy, design and embodiment. Most of the participants took part in the breakout rooms dedicated to the first two topics. In addition, these participants came from a broad range of research topics covering from the more technological to the more philosophical aspect of artificial identity. Reflecting on this outcome, we propose keeping these two topics and embracing the topic of affect, capturing the role of emotion in forming and communicating artificial identity. By focusing on these three topics and reorganizing the workshop around the modality of voice and speech, we hope to guide a discussion in a more transverse manner.

II. THEME 1: PHILOSOPHY

Human identity continues to be discussed from multiple standpoints. “*What is me?*” has been of a central question of interest of diverse scientific fields from ethics to epistemology, from psychology to neuroscience. A supplemental question is “What makes me *me* for the people with whom I am interacting?”. This question takes on various different angles when addressed in the context of artificial identity [see 2]. What makes it genuine, or affects the perception of it being so? On the contrary, when do we consider an artificial identity to be the product of deception? Accordingly, while artificial

¹<https://www.wired.co.uk/article/panasonics-aug-lab-wants-to-use-robotics-to-enrich-peoples-lives>

²<https://sites.google.com/view/agentidentity/home>

identity can support users' engagement with the agent and contribute to establishing meaningful relationships with these agents, it can also mislead people, which poses serious ethical questions.

III. THEME 2: AFFECT

An individual's identity is rooted in their sense of belonging, and is communicated via the expression of emotions and information [3]. Emotions are particularly important in HRI for conveying identity, as robots would often use a display of emotions for conveying that a robotic machine is more than just an object. Robots and artificial agents are designed to demonstrate their identity using emotional expressions like speech, facial expressions, and head movements [e.g., 4, 5], which will influence on how a robot and its identity are perceived [6, 7]. For example, previous studies show that robots that express positive emotions tend to be more accepted than robots that do not [8]. Speech is a central modality to convey emotions and information about one's identity to others. Prosodic features of speech like speech rate, pitch, or loudness express information about who we are, how we feel, and our place in society [9]. Numerous studies, like [10], show that one's speaking style influences how others behave toward them due to subconsciously encoded stereotypes. We see similar procedures when interacting with robots, as humans perceive and behave differently to robots that demonstrate different social cues during speech interactions [e.g., 11, 12, 13]. Hence, emotion is translated into artificial identity via code and hardware. Then, machines' algorithms are employed to react to humans. Human behavior is thus analyzed by machines, but also machines synthesize human and machine behaviors [14]. Accordingly, humans read on machines' demonstrated cues, perceive these cues in a socially meaningful way [e.g., 15], and react to it by displaying emotion [2, 6, 7] [e.g., 11, 12, 13].

IV. THEME 3: DESIGN

Voice design in HRI is gradually becoming more prominent but still remains at an embryonic stage (c.f., [16]). Nevertheless, considering the recent advances in speech technologies, robotics and artificial intelligence, robots' speech is becoming remarkably closer to human speech. This is raising important questions regarding how these human characteristics influence the construction of artificial identity: how it is communicated, and in turn, perceived by humans. For example, recent reports (e.g., [17]) show that the use of female voices as a default is inherently linked to an increase of verbal abuse towards the agent, and might see "real-world" consequences with verbal abuse towards women. Researchers within the HRI community have responded to these potential social consequences by experimenting with the effects of deliberately gendering robots (in both appearance and voice) on perceptions of robots and biases about people [18]. Other work has suggested that designing agent voices to match personal preferences or even remind users of their friends' voices might provide a sense of comfort when interacting with an unfamiliar robot or

in an unfamiliar setting [19]. Since robots are not human-beings, it is crucial to question the voices given to them, as well as how they utilize those voices, to further understand artificial identity and its implications for human-human and human-agent interactions. Hence, designing robot identity and emotion via voice and speech takes on both social, design, and engineering challenges that should be further investigated.

V. ORGANIZATION OF ROBO-IDENTITY 2

A. Organizers

Guy Laban is a Marie Skłodowska-Curie Research Fellow and a PhD candidate at the School of Psychology and Neuroscience of the University of Glasgow. Guy is interested in the neuropsychological mechanisms that underlay human-robot interactions, and the affect of these interactions. Guy's research is aimed at exploring how people disclose their emotions and needs to social robots, and how these, in turn, can support individuals mental health.

Sébastien Le Maguer is a research fellow at the ADAPT Centre at Trinity College Dublin. His work focuses on developing methodologies to analyze synthetic speech. His interests lie in creating bridges between speech technology, speech science and any other communities using synthetic speech.

Minha Lee is an assistant professor at the Eindhoven University of Technology at the department of Industrial Design. Her research is about morally relevant interactions with technological agents like robots or chatbots. Her recent work explores how we can explore our moral self-identity through conversations with digital entities, e.g., via acting compassionately towards a chatbot.

Dimosthenis Kontogiorgos is a postdoctoral researcher at University of Potsdam and is interested in how conversational agents' embodiment and non-verbal behaviors affect the process of establishing, maintaining and repairing common ground.

Samantha Reig is a PhD student at Carnegie Mellon University in the Human-Computer Interaction Institute. Her research interests include agent embodiment and identity in socially complex contexts, multi-person-multi-embodiment interactions, robot re-embodiment, and designing for human-agent teaming in space.

Iaria Torre is a postdoctoral researcher at KTH Royal Institute of Technology. She is interested in artificial agents' communicative and affective cues, particularly through speech, and how these affect cooperation and trust in Human-Agent Interaction. She previously worked as a postdoc at Trinity College Dublin, and holds a PhD from the University of Plymouth.

Ravi Tejwani is a graduate student in Personal Robots Group at Massachusetts Institute of Technology. His work focuses on modeling the behavior of the conversational AI agent with the user from verbal and non-verbal cues using deep learning techniques.

Matthew J. Dennis is a Research Fellow at the Philosophy and Ethics group of Eindhoven University of Technology. He

studies the ethics of emerging technologies focusing on how we can live well with online technologies, and how digital well-being is affected by social and intercultural factors. He was previously a Marie Skłodowska-Curie Fellow at Delft University of Technology.

André Pereira is a researcher at KTH Royal Institute of Technology. He completed his PhD at IST Technical University of Lisbon, worked as a Postdoc at Yale University, and as a Senior Research Associate at Disney Research. André's primary research goal is to create autonomous embodied agents, typically robots, that can socially interact with humans throughout extended periods.

B. Confirmed speakers

Arvid Kappas is a Professor of Psychology and Dean at Jacobs University Bremen. He is an expert in the psychology of emotion, and his recent projects include research on collective emotions in e-communities, the psychological foundations of affective computing, and the generation of empathic robotic tutors. He holds a PhD from Dartmouth college and had a postdoctoral appointment at the University of Geneva. Arvid was elected twice as the president-elect of the "International Society for Research on Emotions" (ISRE).

Catherine Pelachaud is a Professor of Computer Science and a director of research for the French National Centre for Scientific Research at Institut des Systèmes Intelligents et de Robotique. Catherine is an expert in human-machine interaction and multi-model interaction, known for her work with virtual agents. She completed a PhD in computer graphics and a postdoctoral appointment at the University of Pennsylvania, and a postdoctoral appointment at La Sapienza University of Rome.

Jonathan Gratch is a Professor of Computer Science and Psychology, an associate director for virtual humans research at the USC Institute for Creative Technologies, and co-director of USC's Computational Emotion Group. He completed his PhD in computer science at the University of Illinois. His research focuses on virtual humans and computational models of emotion. He studies the relationship between cognition and emotion, the cognitive processes underlying emotional responses, and the influence of emotion on decision-making and behavior.

C. Schedule of activities planned

- Introduction and agenda - 15 min
- Invited Speaker 1: Arvid Kappas - 20 min
- Presentations of papers - 90 min: 5/6 min per paper
- Invited Speaker 2: Catherine Pelachaud - 20 min
- Research synthesis: breakout rooms - 30 min
- Reconvene for a sharing session - 20 min
- Invited Speaker 3: Jonathan Gratch - 20 min
- Future plans and closing - 30 min

We would like to bridge gaps between relevant topics and explore identity and emotion as interconnected concepts in a multi-faceted way. Furthermore, due to the nature of the

topic, we expect early ideas rather than fully developed works. Therefore, we will instruct authors to present their vision in an easily accessible manner. Building on top of these presentations and the talks of the invited speakers, the discussion sessions will provide time and space for brainstorming research questions and agendas. We expect to have three breakout rooms which will focus on discussions related to the special theme of the workshop. The first will be dedicated to the philosophical and the ethical implications of artificial identity. In the second room, participants will discuss the role of affect in communicating and perceiving artificial identity. Finally, the last room will be focused on discussing the social and engineering challenges of designing artificial identities and emotions. We will then reconvene for a shared session to collectively discuss the outcomes of the breakout session discussions and research directions to follow. Finally, the workshop will finish with a closing session, in which we will plan future activities to keep a vivid discussion going after the workshop.

D. Workshop planning

Based on the organizers' communities, we hope to include researchers in HRI, psychology, design research, philosophy, conversational user interfaces, speech science, neuroscience, and HCI fields. Based on the outcome of the first edition, we expect to receive at least 15 submissions and that the actual audience will be composed of at least 20-25 participants. A website will be created to document and promote the workshop. It will include a repository for the accepted papers.

VI. CREATING A NEW COMMUNITY

Researchers from a variety of disciplines study the concept of artificial identity in different ways. Our workshop will bring the topic of the relationship between voice, speech and artificial identity to a shared foreground. By bringing together various communities, the previous edition initiated some collaborations which are still ongoing. One of the main objectives of the current edition is to consolidate these exchanges by creating a lively community whose interactions focus on artificial identity. To do so, the last session will be dedicated to a discussion on how we can facilitate these interactions at a more global level, as well as engaging more people around this topic. This could support the creation of a dedicated Special Interest Group.

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REFERENCES

- [1] M. Lee, D. Kontogiorgos, I. Torre, M. Luria, R. Tejwani, M. J. Dennis, and A. Pereira, “Robo-Identity: Exploring Artificial Identity and Multi-Embodiment,” in *HRI '21 Companion: Companion of the 2021 ACM/IEEE International Conference on Human-Robot Interaction*, 2021.
- [2] A. Henschel, G. Laban, and E. S. Cross, “What makes a robot social? a review of social robots from science fiction to a home or hospital near you,” *Current Robotics Reports*, pp. 9–19, 2021. [Online]. Available: <https://doi.org/10.1007/s43154-020-00035-0>
- [3] J. M. Cheek, *Identity Orientations and Self-Interpretation*. New York, NY: Springer US, 1989, pp. 275–285.
- [4] C. Pelachaud, N. I. Badler, and M. Steedman, “Generating facial expressions for speech,” *Cognitive Science*, vol. 20, pp. 1–46, 1996. [Online]. Available: [/record/1996-04318-001](https://doi.org/10.1007/978-1-4318-001-0)
- [5] C. Pelachaud, “Multimodal expressive embodied conversational agents: Multimodal expressive ecas,” *Proceedings of the 13th ACM International Conference on Multimedia, MM 2005*, pp. 683–689, 2005.
- [6] R. Hortensius, F. Hekele, and E. S. Cross, “The perception of emotion in artificial agents,” *IEEE Transactions on Cognitive and Developmental Systems*, vol. 10, pp. 852–864, 2018, iD: 1.
- [7] K. Fischer, M. Jung, L. C. Jensen, and M. V. aus der Wieschen, “Emotion expression in hri – when and why,” 2019, pp. 29–38.
- [8] R. Stock-Homburg, “Survey of emotions in human–robot interactions: Perspectives from robotic psychology on 20 years of research,” *International Journal of Social Robotics*, 2021.
- [9] J.-A. Bachorowski, “Vocal expression and perception of emotion,” *Current Directions in Psychological Science*, vol. 8, no. 2, pp. 53–57, 1999.
- [10] I. Torre, J. Goslin, and L. White, “Investing in accents: How does experience mediate trust attributions to different voices?” in *ICPhS*, 2015.
- [11] G. Laban, A. Kappas, V. Morrison, and E. S. Cross, “Protocol for a mediated long-term experiment with a social robot,” *PsyArXiv*, 2021. [Online]. Available: <https://psyarxiv.com/4z3aw/>
- [12] G. Laban, J.-N. George, V. Morrison, and E. S. Cross, “Tell me more! assessing interactions with social robots from speech,” *Paladyn, Journal of Behavioral Robotics*, vol. 12, pp. 136–159, 2021. [Online]. Available: <https://doi.org/10.1515/pjbr-2021-0011>
- [13] D. Kontogiorgos, A. Pereira, O. Andersson, M. Koivisto, E. Gonzalez Rabal, V. Vartiainen, and J. Gustafson, “The effects of anthropomorphism and non-verbal social behaviour in virtual assistants,” in *Proceedings of the 19th ACM International Conference on Intelligent Virtual Agents*, 2019, pp. 133–140.
- [14] A. Kappas, R. Stower, and E. J. Vanman, “Communicating with robots: What we do wrong and what we do right in artificial social intelligence, and what we need to do better,” pp. 233–254, 2020.
- [15] G. Laban, “Perceptions of anthropomorphism in a chatbot dialogue: The role of animacy and intelligence.” *ACM*, 11 2021, pp. 305–310. [Online]. Available: <https://dl.acm.org/doi/10.1145/3472307.3484686>
- [16] J. Cambre and C. Kulkarni, “One Voice Fits All? Social Implications and Research Challenges of Designing Voices for Smart Devices,” *Proc. ACM Hum.-Comput. Interact.*, vol. 3, no. CSCW, pp. 1–19, Nov 2019.
- [17] M. West, R. Kraut, and H. E. Chew, “I’d blush if I could: closing gender divides in digital skills through education,” UNESCO, Tech. Rep., 2019. [Online]. Available: <https://unesdoc.unesco.org/ark:/48223/pf0000367416>
- [18] K. Winkle, G. I. Melsión, D. McMillan, and I. Leite, “Boosting robot credibility and challenging gender norms in responding to abusive behaviour: A case for feminist robots,” in *Companion of the 2021 ACM/IEEE International Conference on Human-Robot Interaction*, 2021, pp. 29–37.
- [19] S. Reig, M. Luria, J. Z. Wang, D. Oltman, E. J. Carter, A. Steinfeld, J. Forlizzi, and J. Zimmerman, “Not some random agent: Multi-person interaction with a personalizing service robot,” in *Proceedings of the 2020 ACM/IEEE International Conference on Human-Robot Interaction*. ACM, 2020, pp. 289–297.