CiiEM Summer Research Summit 2022

CENTRO DE INVESTIGAÇÃO INTERDISCIPLINAR EGAS MONIZ

Higher Education School EGAS MONIZ

eCCo

*Harnessing the power of conversational e-Coaches*

# Harnessing the Power of Conversational e-Coaches for Health and Well-being Through Swiss-Portuguese Collaboration

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# Team

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# Joining forces and experience

- Accelerate joint work on conversational e-coaches for health and well-being, by connecting international and national research at HES-SO and ESEL

NESTORE

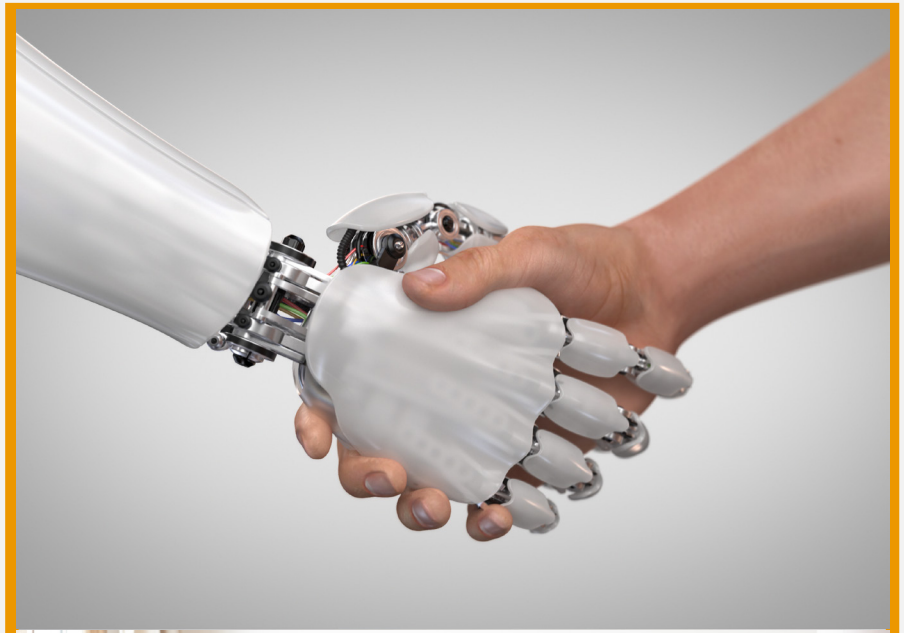
https://nestore-coach.eu/

VA Self Care
Diabetes Research

https://vaselfcare.esel.pt


# Our previous projects

- NESTORE Conversational agent
  - Chatbot
  - Vocal assistant with physical embodiment
- VASelfCare
  - 3D animated character
  - Text and Voice



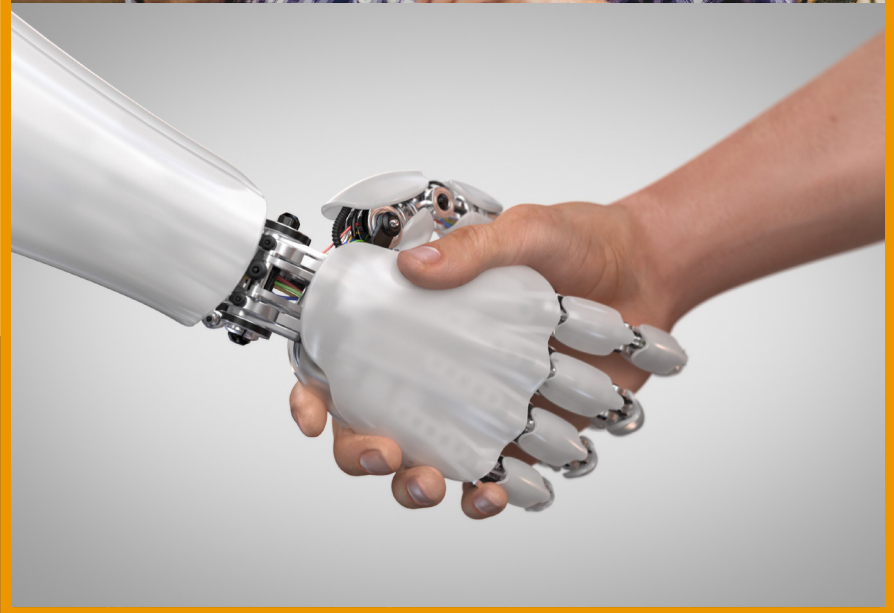
# eCCo objectives

- Conducting a mapping review on conversational e-coaches for health and well-being
- Consensualising a taxonomy on conversational e-coaches for health and well-being

02

# Mapping review protocol

- “a systematic search of a broad field to identify gaps in knowledge and/or future research needs that presents results in a user-friendly format, often a visual figure or graph, or a searchable database”
(Miake-Lye et al., 2016)



# Conversational agents

- Computer programmes designed to simulate two-way human conversation using language (speech and/or text), potentially supplemented with non-language modalities (Guerreiro et al., 2021)

- Able to be integrated in multiple solutions (e.g., mobile phones, web-based, robots), with a range of goals (e.g., disease prevention, self-management of chronic disease)

# Mapping review on conversational agents for health and well-being

- Systematic search revealed a significantly higher number of hits than expected
  - 16351 records identified from databases
  - 8022 papers screened
  - Around 1300 primary studies and 150 secondary studies sought for retrieval and full text perusal
  - 354 included and analyzed so far
  - A recent update of the search query (2020-2022) found around 10k additional records
- Mapping review protocol published on JMIR
- Manuscript of the mapping review is under preparation

JMIR RESEARCH PROTOCOLS Guerreiro et al

Protocol

Conversational Agents for Health and Well-being Across the Life Course: Protocol for an Evidence Map

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https://doi.org/10.2196/26680

# Keywords and inclusion criteria

- Keyword domains:
  - K1 (variations of conversational agent–related terms)
    - variations and combinations of the terms agent (i.e., bot, robot, assistant, coach, companion, system, avatar, and entity program)
    - and conversational (i.e., talking, voice, communication, social, dialogue, and utterance)
    - popular commercial conversational agents, such as Google Home, Google Assistant, Cortana, Alexa, and Siri.
  - K2 (variations of health-related and well-being–related terms).
- Inclusion criteria:
  - studies on persons of all ages regardless of their health status
  - computer program able to simulate two-way human conversation for health or well-being using language (excluding Wizard of Oz studies)
  - reporting the design, development, evaluation, or implementation of conversational agents regardless of the involvement of human users and study design

03

# Trustworthy Conversational Agents

- “From a full-text review of 29 articles, we identified five agent design-themes affecting trust toward conversational agents: **social intelligence** of the agent, voice characteristics and communication style, **look** of the agent, **non-verbal communication**, and performance quality” (Rheu et

Rheu, M., Shin, J. Y., Peng, W., & Huh-Yoo, J. (2021). Systematic review: Trust-building factors and implications for conversational agent design. *International Journal of Human–Computer Interaction*, *37*(1), 81-96.

# Socio-emotional intelligence

- “Agents being socio-emotional with users in their dialogue are perceived as trustworthy, most of the time” (Rheu et al., 2020)

- In our 354 records…

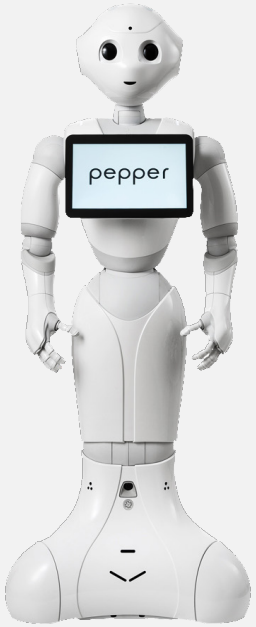
- Ability to express emotions 93
- Sentiment or emotion detection 83
- Emotion detection AND expression 60
- Exhibit personality 30

# Look of the agent

- “Embodiment increases trust, but not always. Higher levels of physical attractiveness are perceived as more trustworthy regardless of its reliability in performance” (Rheu et al., 2020)

- In our 354 records…

- Type of Embodiment:
  - Physical 110
    - Humanoid 77
  - Virtual 126
    - Humanoid (2D or 3D) 88
  - Physical+Virtual 8
  - No embodiment (e.g. text box) 85
- Mobile Robot 89




# Non-verbal communication

- “agent’s nonverbal communication skills did not always increase the trustworthiness of agents” (Rheu et al., 2020)

- In our 354 records…
- Verbal:
  - Text 164
  - Voice 218
  - Text and voice 61
- Non-Verbal:
  - Outputs in non-text or non-voice modalities (e.g. facial expressions, gestures, images, emoticons) 148

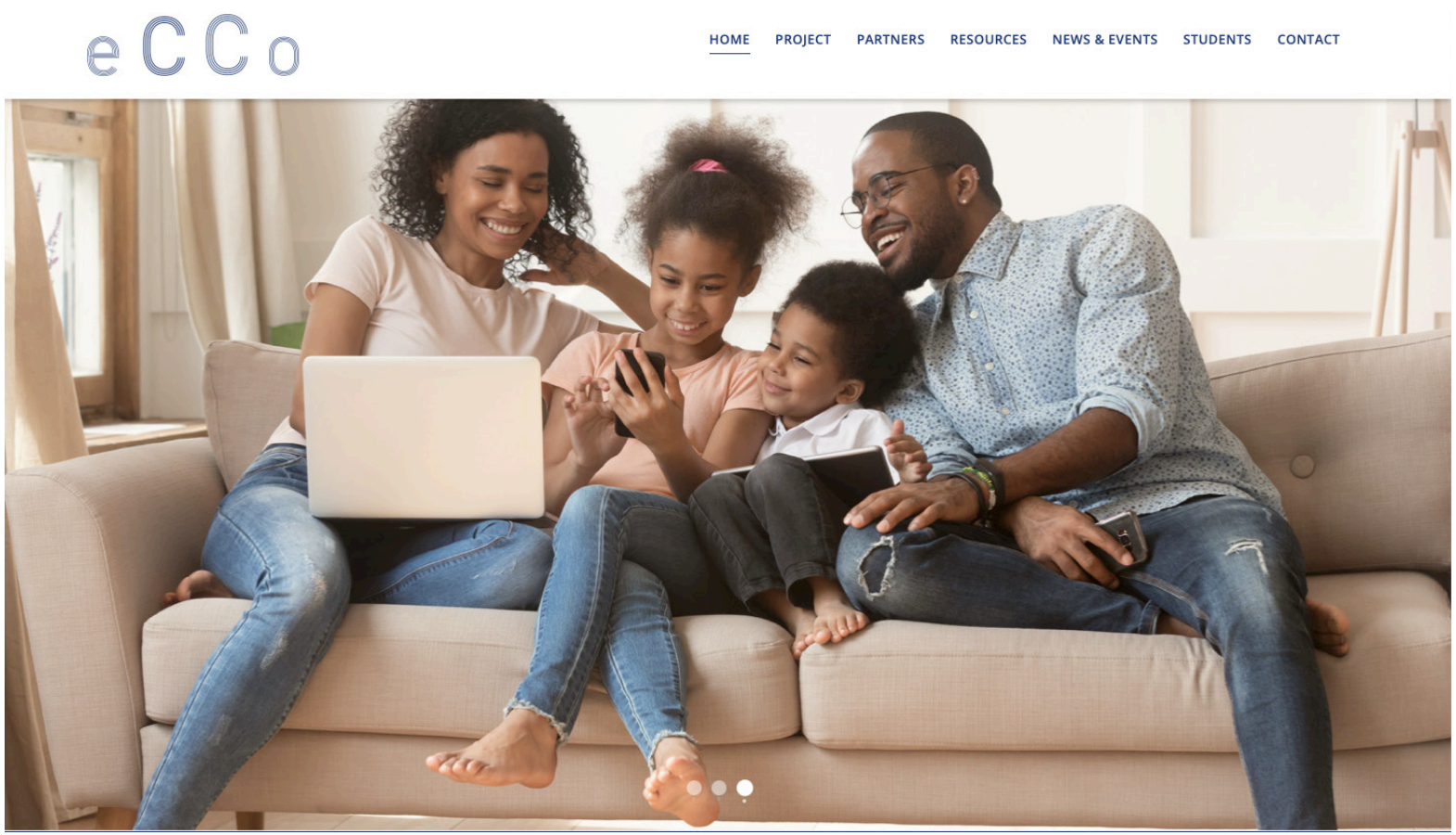
04

# Final Considerations on AI Trust

- “From a full-text review of 29 articles, we identified five agent design-themes affecting trust toward conversational agents: **social intelligence** of the agent, voice characteristics and communication style, look of the agent, non-verbal communication, and **performance quality**” (Rheu et al., 2020)

# Final considerations on conversational AI trustworthiness

- Domain knowledge is important
- General knowledge is often expected
- Increasing knowledge can decrease the performance of natural language understanding software
  - (possibility of confusing user's intents, complexity of the dialogue manager, context management, etc.)
- Humanoid conversational agents may increase trustworthiness
- But…
  - They also increase the users' expectations in terms of performance
- A calibration of user expectations with respect to the system performance is needed




# Thank you for your attention

https://ecco.esel.pt

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Technology for Human Wellbeing Institute

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