

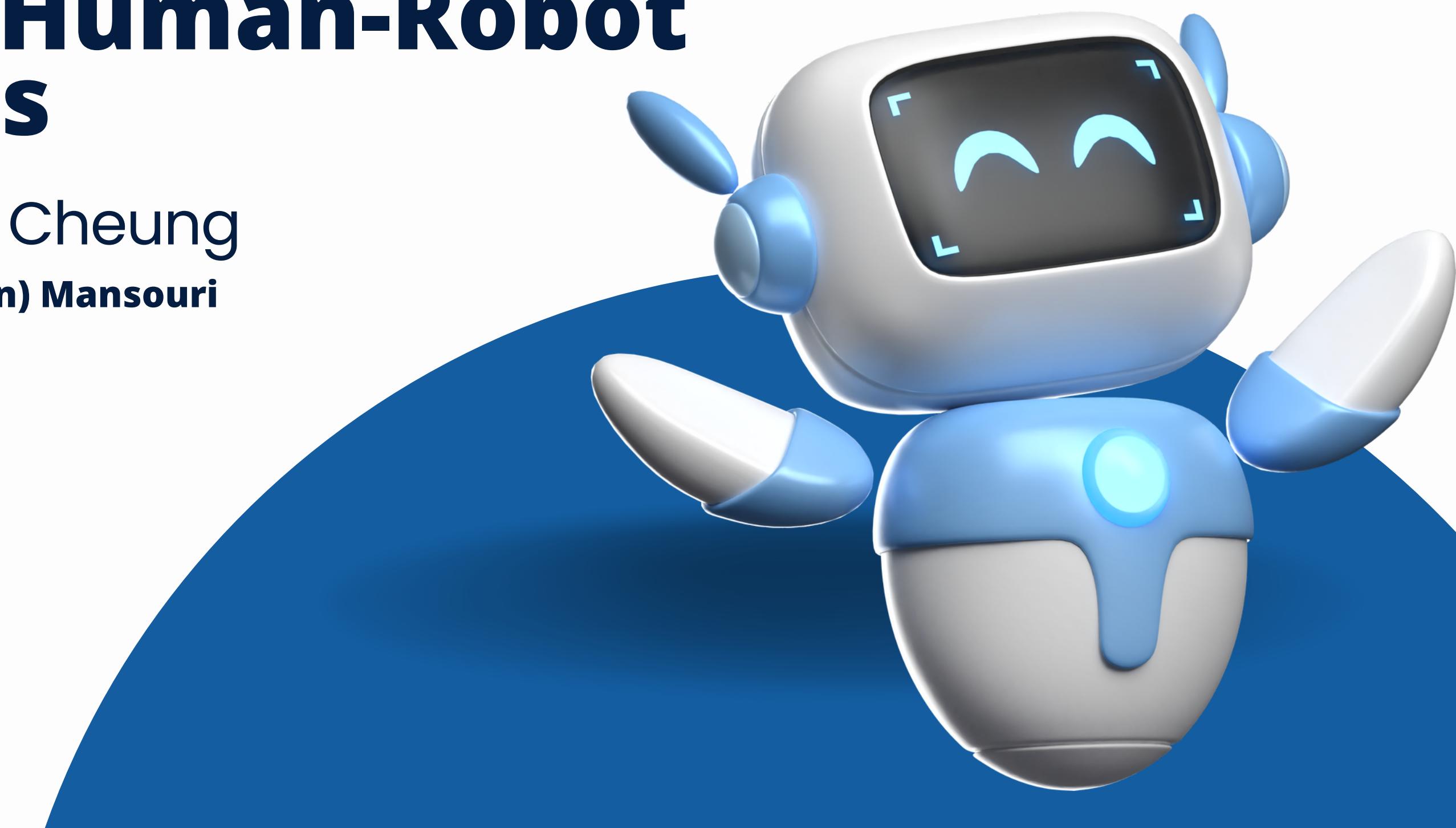
Developing a framework to examine the importance of cultures in Human-Robot Interactions

By: Man Lai (Manni) Cheung

Supervisor: Dr Masoumeh (Iran) Mansouri

Inspector: Dr Luca Arnaboldi

Date: 4 March 2024



Overview

- Introduction
- Literature Review
- Objective & Significance
- Existing tools
- My Contribution
- Development
- Demonstration
- Limitations and Future Development



Introduction

- Robot as automated system
 - Robot – from Czech, literal meaning: slave/slavery
 - Capek Brothers ~1917-1920
- (Traditional) Robotics research
- "A reprogrammable, multifunctional **manipulator** designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of task."
(Robot Institute of America, 1979)



Introduction

- Robots as agent
 - vs robots as automated system
- Human-Robot Interaction (HRI) research
 - e.g., Assistive Technology and Social Care (Soriano et al., 2022)
 - Social Robotics
 - **Cultural Robotics**
 - **(research interest of Dr Mansouri)**



Literature Review

- Lim et al. (2020)
 - 50 HRI studies
 - cultural influences on expectations towards robots
 - culturally social cues for improving human engagement

Problem 01

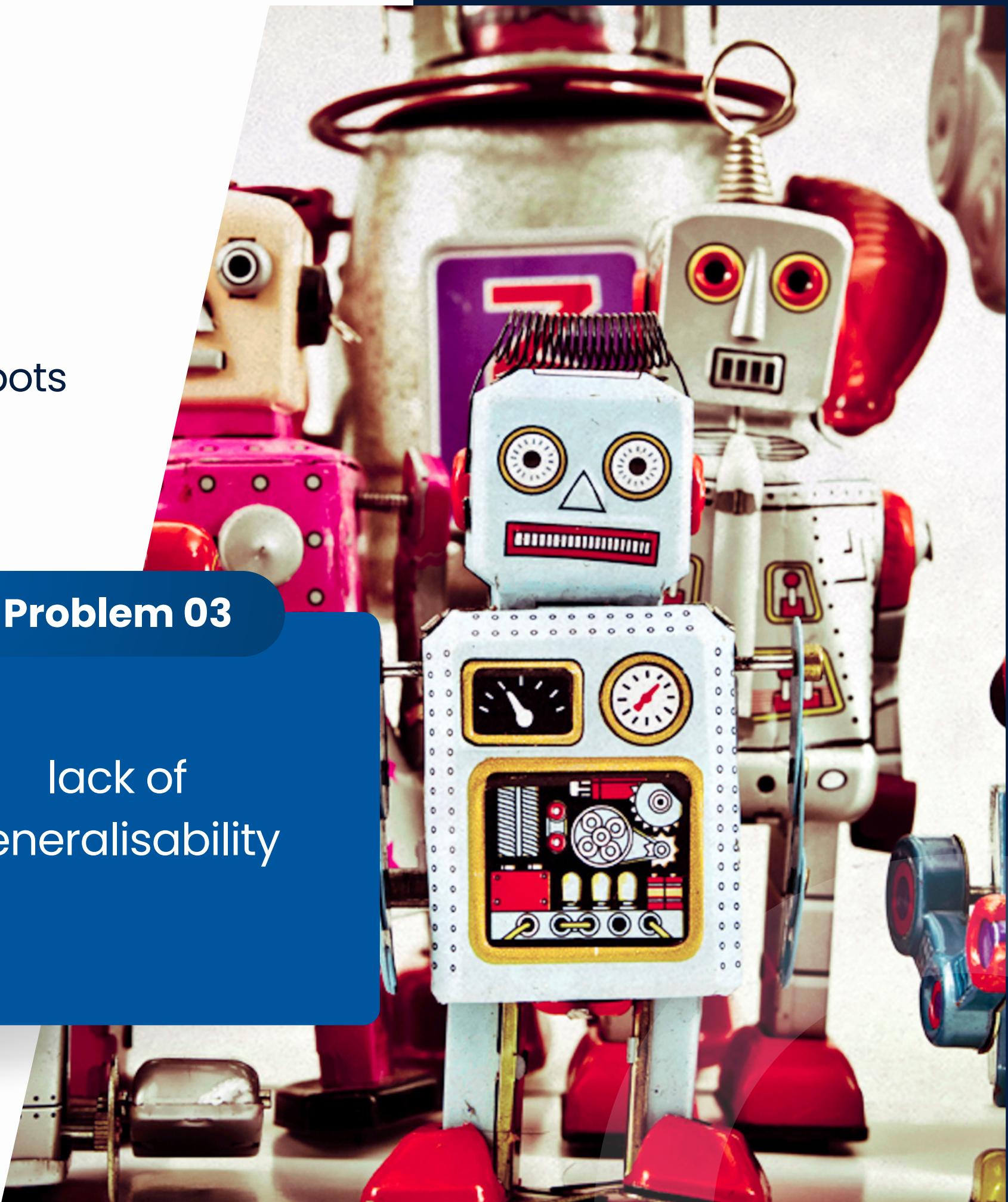
varyations in methodologies

Problem 02

lack of unifying framework

Problem 03

lack of generalisability





Objective

To design and develop a **framework** that enables understanding the importance of cultures in **Human–Robot Interaction (HRI)** research



Significance

To **fill the gap** by attempting to create an **open-source unified framework for relevant research** in Human-Robot Interaction (HRI) and Cultural Robotics which cannot otherwise be solved by existing tools

(e.g., Dr Mansouri will use the framework in some of her future research)

Existing tools



Robot Operating System

- open-source framework for robotics
- message passing and service calls (topics)



ROS4HRI

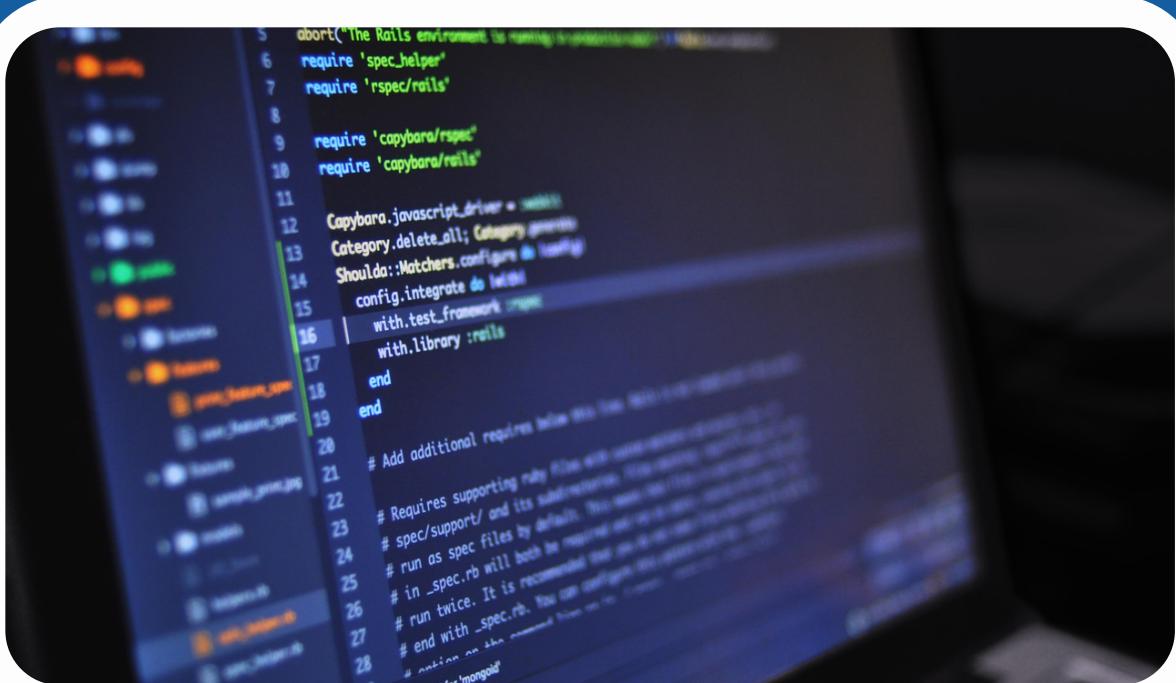
- announced in Oct 2022
- defines topics and convention for HRI
- face detection, body tracking etc



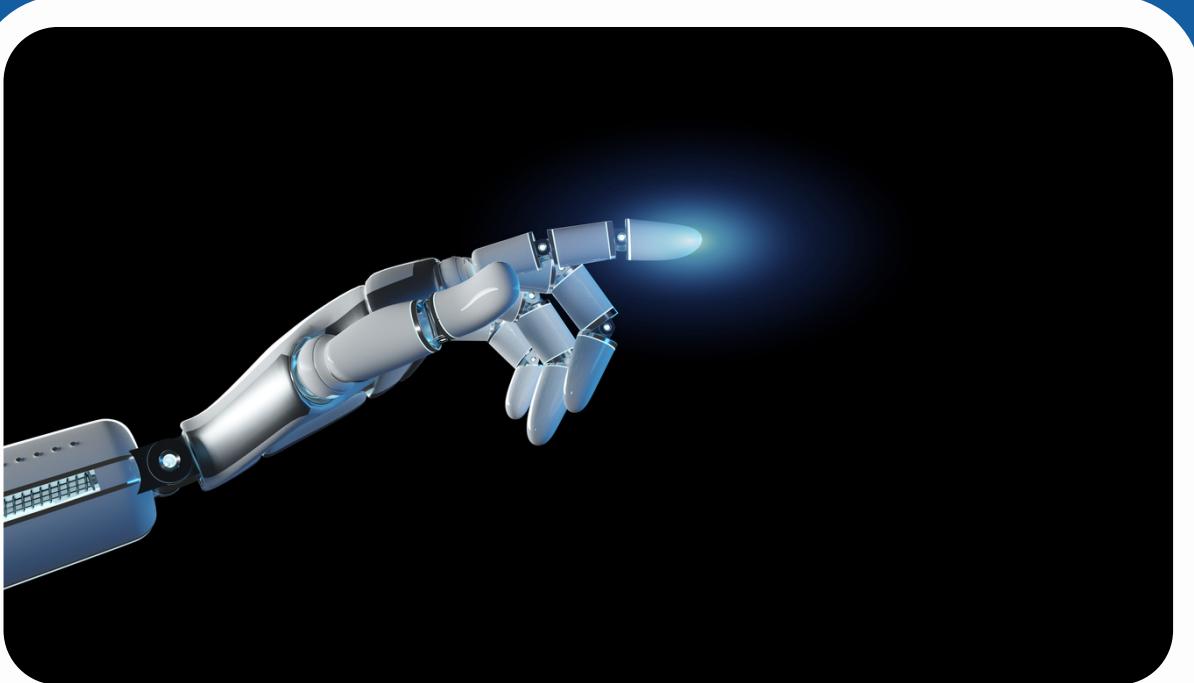
OfficeBots

- a 3D simulated game to support HRI research

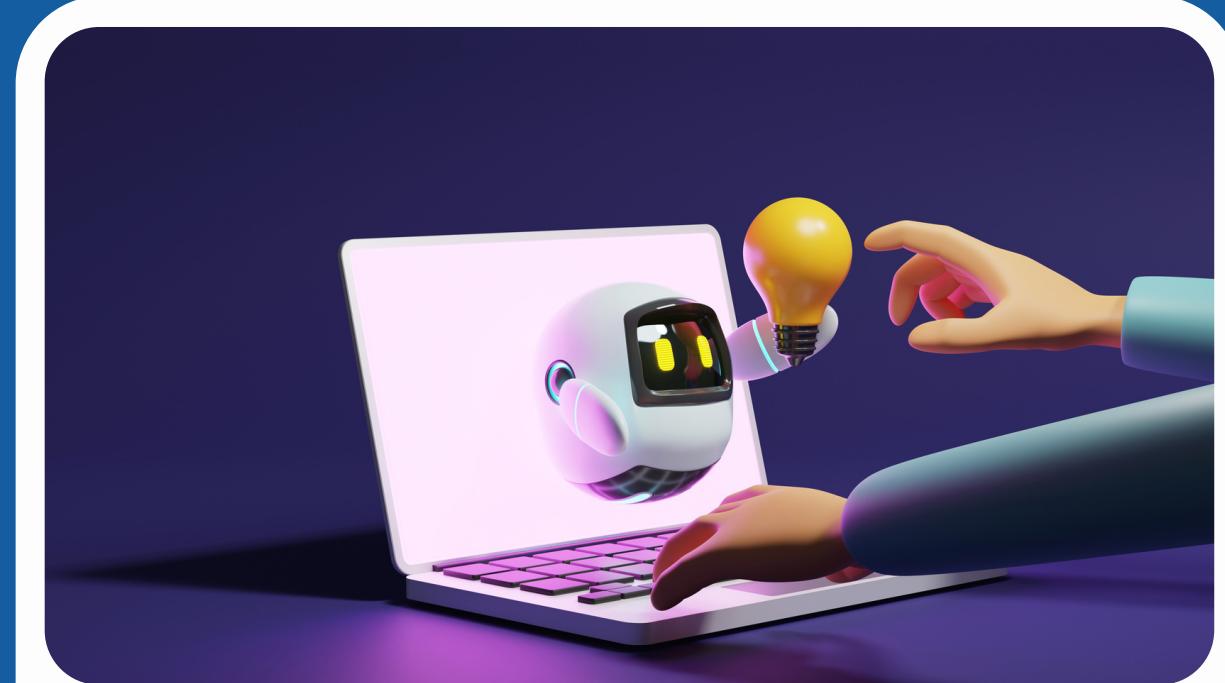
My Contribution



To produce a **general framework** to enable the study of robotics in relation to cultures



To **extend ROS4HRI to cultures**: nationality/national culture as case study



A **general** simulation program enables researchers to **modify parameters** to suit their studies.

Development

The programming languages used in this project are primarily

01

Python

-ROS, RASA conversational AI & Flask

02

JavaScript

-Frontend and Backend

03

SQL

-Postgres database

04

C#

-GoDot game engine:
mainly multilanguage
support



Development

ROS
general
framework

ROS4HRI
framework for
motion tracking
and body
movement



Development

ROS
general
framework

ROS4HRI
framework for
motion tracking
and body
movement

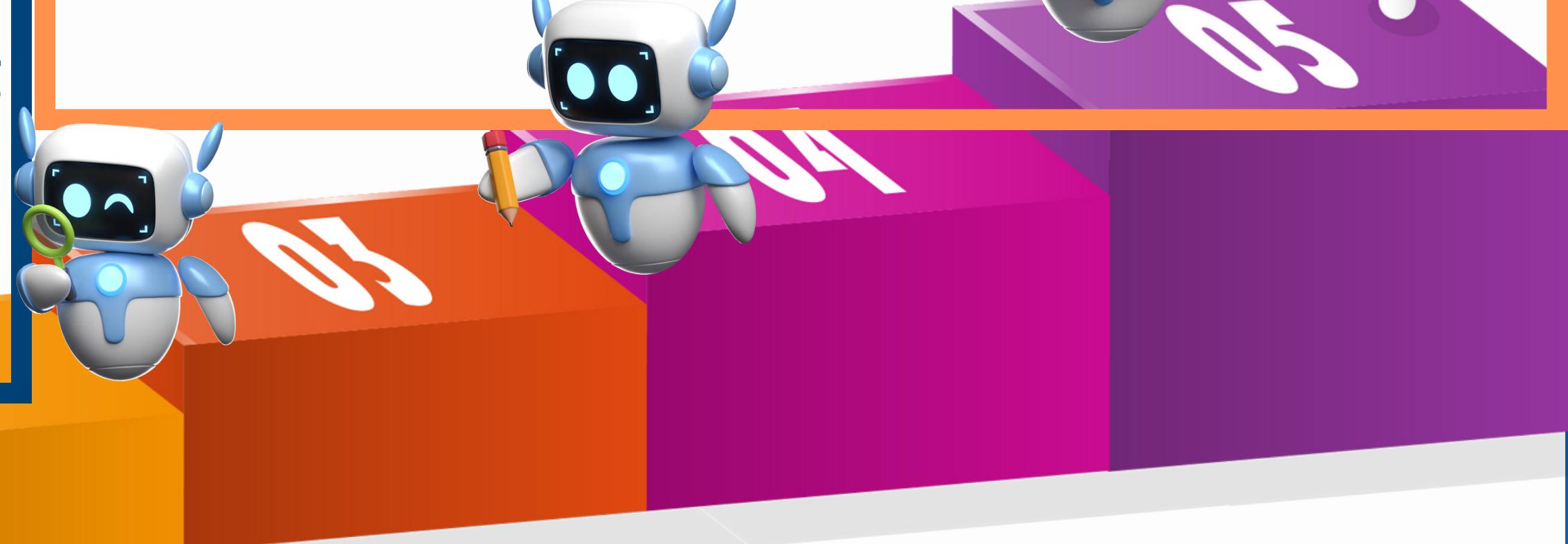


***(my input)**

**Pre-experiment
survey**
• focusing on
cultural
difference

**Changing Robot
behaviours**

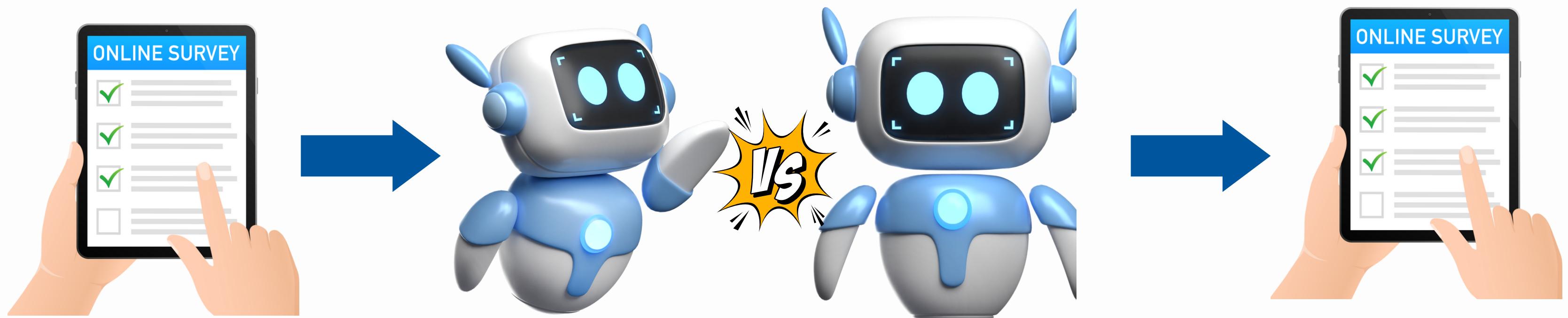
- language
- proximity
- drink offer



User Study

- to investigate
the importance
of cultures in
robotics

Methodology



Pre-experiment
survey

Behaviour
change

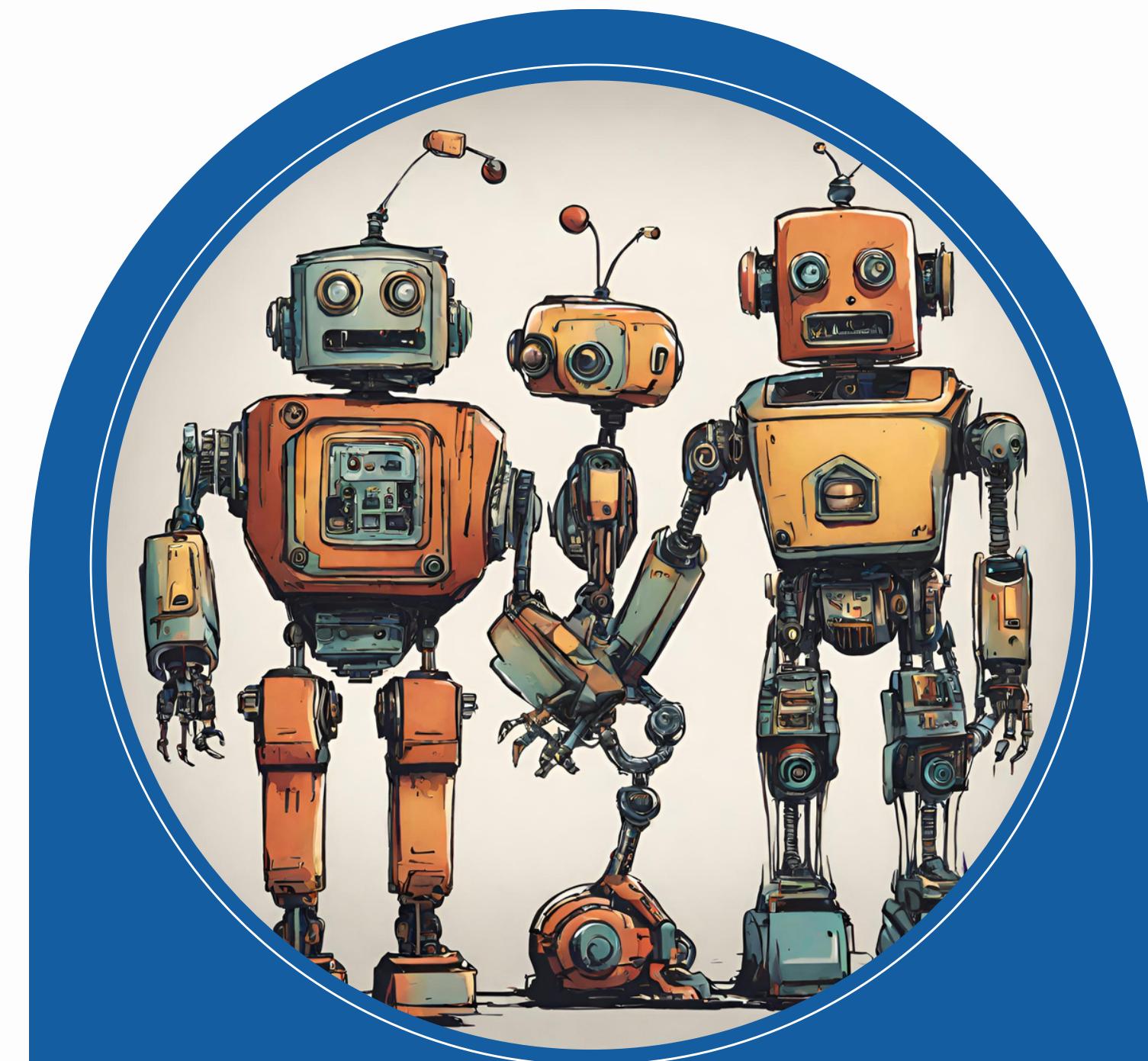
- language
- proximity
- drink offer

Default robot

Post-experiment
survey

Scenarios

- 3 robots are deployed
 - Based on “nationality” (user input)
 - China, Hong Kong, and the UK
- Each nationality associate with one set of robot behaviour
 - language
 - China: Simplified Chinese
 - Hong Kong Traditional Chinese
 - UK: British English
 - Drinks
 - Proximity



DEMONSTRATION

Limitations & Future Development

- National identity as case study
 - other forms of cultural identities?
 - gender
 - racial
 - ethnicity etc
 - The framework is designed to be adjustable to different cultural contexts to suits researchers' needs
 - To be published on GitHub after finalisation
 - open-source, fostering relevant research



THANK YOU!



Reference

Lim, V., Rooksby, M., & Cross, E. S. (2020). Social robots on a global stage: Establishing a role for culture during human–robot interaction.
<https://doi.org/10.31234/osf.io/be2p6>