Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2025

Human-robot Interaction

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SHORT COURSE DESCRIPTION

What happens when robots meet humans? How do we decide the rules of human-robot interactions? What impacts humans' trust in robots? In this course, we will delve into the depths of the interdisciplinary field that studies how humans and robots communicate and work together. It involves designing, evaluating, and understanding robotic systems that can interact naturally, safely, and effectively with people. HRI draws from robotics, psychology, design, and computer science.

READING MATERIALS

- Human–Robot Interaction: A Survey
- A Primer for Conducting Experiments in Human–Robot Interaction
- A Meta-Analysis of Factors Affecting Trust in Human-Robot Interaction
- A Survey of Socially Interactive Robots: Concepts, Design, and Applications
- Local Issues, Local Uses: Tools for Robotics and Sensing in Community Contexts
- Robots That Express Emotion Elicit Better Human Teaching
- Fostering Common Ground in Human-Robot Interaction
- Social robots for education: A review
- How to build robots that make friends and influence people
- Power in HRI
- The Uncanny Valley
- The Power to Persuade: a study of Social Power in Human-Robot Interaction
- Affective personalization of a social robot tutor for children's second language skills
- Growing growth mindset with a social robot peer
- Social robots as creativity eliciting agents
- Can robots be teammates? Benchmarks in human-robot teams
- Older adults living with social robots
- Design Patterns for Sociality in Human-Robot Interaction
- The march of the robot dogs
- Human-Robot Proxemics: Physical and Psychological Distancing in Human-Robot Interaction
- Robot Ethics
- Who Do We Become When We Talk to Machines?.

COURSE REQUIREMENTS AND GRADING

Students in this course will gain an understanding of socially assistive robotic systems, prototype a virtual or physical robotic system, conduct a human experiment with a robotic system, and report findings from their human-robot interaction study. Students are expected to read the course materials, engage with their peers on critical reflections on seminal HRI readings, prototype digital or physical robot tools, set up human research experiments, and present their findings to their peers.

Per SKKU's regulations, students are required to attend at least 80% of all classes. We will use the following grading rubrics for this class:

- Reading reflections: 20%
- Mini HRI assignments: 20%
- Classroom participation: 20%

- Final projects (group): 40%

Grading evaluation criteria:

- **90-100 = Excellent** This work demonstrates comprehensive and solid understanding of course material and presents thoughtful interpretations, well-focused and original insights and well-reasoned analysis. "A' work includes skillful use of source materials and illuminating examples and illustrations. "A" work is fluent, thorough and shows some creative flair.
- **70-90 = Good** This work demonstrates a complete and accurate understanding of course material, presenting a reasonable degree of insight and broad level of analysis. Work reflects competence, but stays at a general or predictable level of understanding. Source material, along with examples and illustrations, are used appropriately. "B" work is reasonable, clear, appropriate and complete.
- **60-70 = Adequate/Fair** This work demonstrates a basic understanding of course material but remains incomplete, superficial or expresses some important errors or weaknesses. Source material may be used inadequately or somewhat inappropriately. The work may lack concrete, specific examples and illustrations and may be hard to follow or vague.
- **Below 60 = Unsatisfactory** This work demonstrates a serious lack of understanding and fails to demonstrate the most rudimentary elements of the course assignment. Sources may be used inappropriately or not at all. The work may be inarticulate or extremely difficult to read. Class work may not be submitted on time, or not at all.

COURSE SCHEDULE

– WEEK I –

Monday (30 June)

Introduction to human-robot interaction. Introducing the course expectations, learning objectives, and sample HRI projects that students may pursue.

Tuesday (1 July)

What is Human-robot Interaction?

History and evolution of HRI. Emergence of the field, interaction with human psychology, computational HRI, and evolution of HRI. Exploring key concepts in HRI: autonomy, embodiment, social interaction, and human-centered design.

Wednesday (2 July)

Can a robot be social?

Emergence of socially assistive robots (SARs) and personal robots. Why sociality matters. Robots in science fiction. Students will write about the social characteristics and perceived personality of a chosen robot from sci-fi.

Thursday (3 July)

How does one build robots?

Robot systems. Physical prototyping. Basics of prototyping embodied interactions. Students will present their initial project interests to form project groups.

– WEEK II –

Monday (7 July)

What should one consider while building robots?

Robot design: form, appearance, anthropomorphism, sensing and perception, actuation and

movement, speech, and natural language interaction

Tuesday (8 July)
When and why do humans trust robots? What impacts their human trust?
Human psychology: trust, reliability, and social perception of robots. Emotional perception and expression.

Wednesday (9 July)
What will the robot do?
Interaction design: Common ground. Verbal and non-verbal communication, Gesture, gaze, and facial expressions, Touch and haptics, Multi-modal interaction

Thursday (10 July)
Project check-in: Students present their HRI research question, robot design plan, and related background work.

– WEEK III –

Monday (14 July)
How will humans interface with a robot?
Conducting experiments in Human-robot Interaction. Scientific experiment design, data collection, and evaluation.

Tuesday (15 July)
Can robots make art with people?
Human-robot collaboration. Creativity and robots. Robots as learning partners. Social emulation of robots.

Wednesday (16 July)
Can robots do harm? How do we prevent the harm?
Robot ethics. Power in HRI. Uncanny valley. Robot policy design.

Thursday (17 July)
Project check-in: Student groups to present their prototype design, experiment design, data collection plan, and discussion of ethical implications.

– WEEK IV–

Monday (21 July)
Where is the field of HRI moving?
Emerging trends in HRI: social learning and adaptation, integration of LLMs in robots, cultural perspectives in HRI

Tuesday (22 July)
What's next in HRI?
Living with robots: Looking ahead at the future of HRI in the wild. Speculating on robotic futures for human flourishing.

Wednesday (23 July)
Final Presentations: Students discuss