

# Emotionally Intelligent Robots: More Human than Human?

Thursday, October 24, 2019, at 3 p.m.  
Doheny Memorial Library 240  
University of Southern California



## KNOW BEFORE YOU GO

- Jonathan Gratch is a world leader in the study of emotions in human-machine interactions and the director of virtual human research at the USC Institute for Creative Technologies.
- Rachel Severson studies the social and moral consequences of attributing emotional states and other human qualities to technologies—including voice assistants such as Siri and Alexa—and is the director of the Minds Lab at the University of Montana.
- Sidney D'Mello is a professor at the Institute of Cognitive Science and Department of Computer Science at the University of Colorado Boulder, where he develops educational technologies that show emotional intelligence while adapting to boredom, confusion, and other emotional states.

## MEET THE ROBOTS

At the interactive showcase, you will be able to interact with several robots.

The **iPals** Kai and Lu are humanoid robots created by AvatarMind. They are currently being used to teach children with Autism Spectrum Disorder about empathy. They have been programmed separately, so they have different skills. Kai can respond to tablet commands, and Lu can speak both English and Chinese.

**Kiwi** is a small robot designed to help children learn, especially children with Autism Spectrum Disorder. She plays educational math games and gives social support to children.

**Kuris** are mobile, pet-able, in-home robots. Their names are Gerald and Denise, and they have been programmed by different people and have different abilities.

## ARTIFICIAL INTELLIGENCE: A BRIEF, NON-COMPREHENSIVE HISTORY

**Antiquity:** Greek myths include intelligent robots and artificial beings; an ancient Chinese text refers to an engineer presenting a mechanical man to a king; ancient Egyptian and Greek mechanical statues are believed to be capable of wisdom and emotion; and so forth across cultures and centuries.

**1st–19th century CE:** All over the world, inventors, theologians, philosophers, and others create, theorize, and imagine machines capable of intelligence.

**1914:** Spanish engineer Leonardo Torres y Quevedo introduces the first chess-playing machine.

**1923:** The word *robot* is introduced to the English language via the Czech play *Rossum's Universal Robots* by Karel Čapek. It comes from the word *robota* (work).

**1943:** William Grey Walter builds some of the first electronic autonomous robots.

**1944:** Game theory is introduced in a paper by John von Neumann and Oskar Morgenstern.

**1945:** Vannevar Bush's essay "As We May Think" envisions a future in which computers assist humans in many things.

**1949:** Publication of Edmund Berkeley's *Giant Brains: Or Machines that Think*

**1950:** *I, Robot*, a collection of stories by Isaac Asimov, is published, including Asimov's "Three Laws of Robotics"; Alan Turing invents the Turing Test standard for an intelligent machine—defining it as one that can fool a human into thinking they are talking to another human.

**1951:** A checkers-playing program and a chess-playing program are written for the Ferranti Mark 1 computer at the University of Manchester; Marvin Minsky and Dean Edmunds build the first artificial neural network (SNARC).

**1956:** The term *artificial intelligence* is coined by John McCarthy for a conference at Dartmouth.



**1966:** Shakey the Robot, called “the first electronic person,” is capable of animal locomotion, perception, and problem solving.

**1968:** Stanley Kubrick’s film *2001: A Space Odyssey* features the intelligent computer HAL.

**1970s:** With millions having been spent on research and little to show for it, funding is slashed for AI research, leading to the “AI winter.”

**1981:** Realizing its commercial potential, business investors start putting money behind AI, ending the AI winter and ushering in a new era of AI research.

**1990:** Publication of Rodney Brooks’s essay “Elephants Don’t Play Chess,” arguing for a bottom-up approach to AI, in which computers learn from interacting with their environment (as opposed to a top-down approach, in which computers were pre-programmed with rules of human behavior).



**1997:** Chess game between the computer Deep Blue and world chess champion Garry Kasparov. The computer wins.

**2002:** Launch of the Roomba, the first robot for the home to be a commercial success. It cleaned carpets.

**2005:** The U.S. military invests in autonomous machines such as BigDog and PackBot.

**2008:** Google pioneers a new approach to speech recognition that quickly becomes ubiquitous on smartphones.

**2009:** Google starts developing a driverless car.

**2011:** A computer called Watson beats top human contestants on *Jeopardy!*.

**2011–2014:** Launch of smartphone apps like Siri, Google Now, and Cortana.

**2015:** Thousands of researchers sign an open letter calling for a ban on the development and use of autonomous weapons.

**Present:** Research, theorization, speculation, and invention continues . . .

## VOCABULARY CORNER

**AI (artificial intelligence):** the capability of a machine to imitate intelligent human behavior

**emotional intelligence:** the ability to identify and manage one’s own emotions, and to recognize and respond to others’ emotions in a way that allows for judicious and empathetic relating

**intelligence:** the ability to learn, to apply knowledge, and to think abstractly

**robot:** a machine that resembles a living creature; the term is often used to describe machines that can move independently and perform complicated tasks

## ISAAC ASIMOV’S THREE LAWS OF ROBOTICS

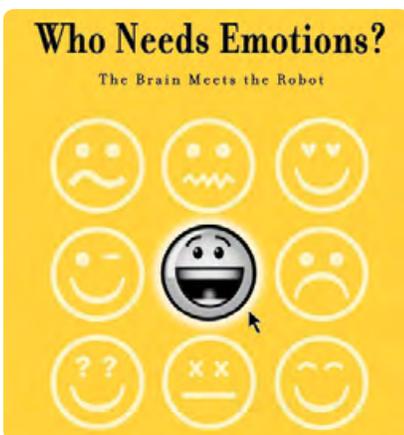
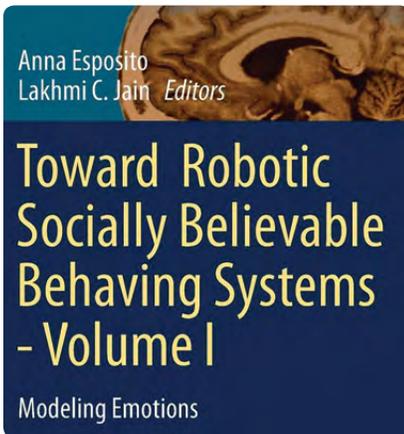
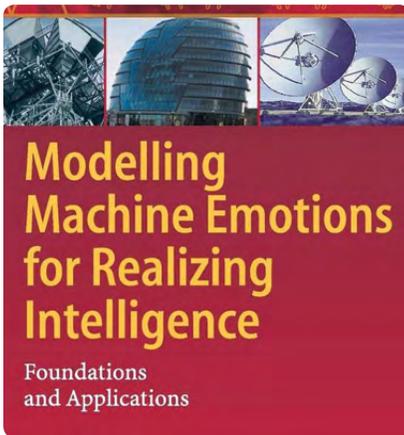
- ⦿ A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- ⦿ A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
- ⦿ A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

## FOR FURTHER REFLECTION

- ⦿ What do you think—can robots be more human than humans?
- ⦿ What does it mean to feel emotions?
- ⦿ Do you think machines are capable of emotional intelligence? If so, is it the same as human emotional intelligence or is it different in some way?
- ⦿ What are some implications of emotionally intelligent machines?

## IF YOU LIKED THIS EVENT, YOU MIGHT WANT TO CHECK OUT:

- ⦿ The USC Institute for Creative Technologies  
[ict.usc.edu](http://ict.usc.edu)
- ⦿ Artificial Intelligence Los Angeles  
[joinai.la](http://joinai.la)



## DISCOVER MORE AT THE USC LIBRARIES

**DANIELLE MIHRAM** of the USC Libraries selected the following resources to help you learn more about today's event. Those with a call number (e.g., books) are physical items which you can find in our campus libraries. Those without a call number (e.g. journal articles and databases) are electronic resources, which you can access through the search bar on the USC Libraries homepage at [libraries.usc.edu](http://libraries.usc.edu).

### BOOKS

- Bekey, George A., *Autonomous Robots: from Biological Inspiration to Implementation and Control*. Boston: MIT Press, 2005.  
Grand Depository Bookstacks, TJ211.495 .B45 2005
- Dumouchel, Paul, and Luisa Damiano (trans. M. B . DeBevoise), *Living with Robots*. Cambridge, Massachusetts : Harvard University Press, 2017.  
Doheny Memorial Library Bookstacks, TJ211 .D85513 2017
- Esposito, Anna, and C. Lakhmi (eds), *Toward Robotic Socially Believable Behaving Systems - Volume I - Modeling Emotions*. Springer, 2016. (Available Online at USC Libraries)
- Fellous, Jean-Marc, and Michael Arbib (eds), *Who Needs Emotions? The Brain Meets the Robot*. New York/Oxford: Oxford University Press. 2005. (Available Online at USC Libraries).
- Kappas, Arvid, ed., *Oxford handbook of affective computing*. New York: Oxford University Press, 2015. (Available Online at USC Libraries).
- Nichida T., L.C. Jain, and Colette Faucher, *Modeling Machine Emotions for Realizing Intelligence Foundations and Applications*. New York: Springer, 2010. (Available Online at USC Libraries)

### ARTICLES OR CHAPTERS

- Hoorn, J. et al. "Dating a Synthetic Character is Like Dating a Man." *International Journal of Social Robotics* 11, no. 4 (2019): 235–253. (Open Access)
- Fan L. et al. "Do We Need Emotionally Intelligent Artificial Agents? First Results of Human Perceptions of Emotional Intelligence in Humans Compared to Robots." In: Beskow J. et al. (eds), *Intelligent Virtual Agents*. IVA 2017. Lecture Notes in Computer Science, vol 10498. Springer, Cham, 2017.
- Lim, A. and H.G. Okuno. "The MEI Robot: Towards Using Motherese to Develop Multimodal Emotional Intelligence." *IEEE Transactions on Cognitive and Developmental Systems* 6. No. 2 (2014): 126–138.
- Samani, H. A. and E. Saadatian. "A Multidisciplinary Artificial Intelligence Model of an Affective Robot." *International Journal of Advanced Robotic Systems* 9, 2012. (Open Access)
- Vitale, J., M.-A. Williams, and B. Johnston. "Socially Impaired Robots: Human Social Disorders and Robots' Socio-Emotional Intelligence." In Beetz M. et al. (eds), *Social Robotics*. ICSR 2014. Lecture Notes in Computer Science, vol 8755. Springer, 2016.

### DATABASES

**Academic Video Online Premium**  
Select this database, and then type the following key words:  
*emotionally intelligent robots*

**AAAI Digital Library**

**ACM Digital Library**

**arXiv Computer Science**

**Engineering Village 2**

**Xplore (IEEE Electronic Library)**