



# COMS 493

AI, ROBOTS & COMMUNICATION

# Agenda

- ▶ Review
- ▶ Computational Creativity
- ▶ Preview

# Review - Social Robots



## 7

### Social Robots

A social robot is an artifact that is designed to interact with and respond to human users in a human like way. Whether they have a human-form (like the androids created by David Hanson or Hiroshi Ishiguro) or not (like the Paro seal robot used in elder care or Breazeal's Jibo, which looks like chubby desktop lamp), social robots are socially situated technologies that are able to communicate in a manner that is reasonably close to achieving what would be expected of another entity. This chapter will 1) define and characterize what is meant by the term "social robot," 2) survey the form and function of social robotics, covering the range of current configurations and morphologies; 3) examine the design and engineering challenges of creating mechanisms with human-level interaction capabilities; and 4) highlight the social opportunities and potential problems introduced by mechanisms that are deliberately designed to occupy the place of another person.

#### bots 101

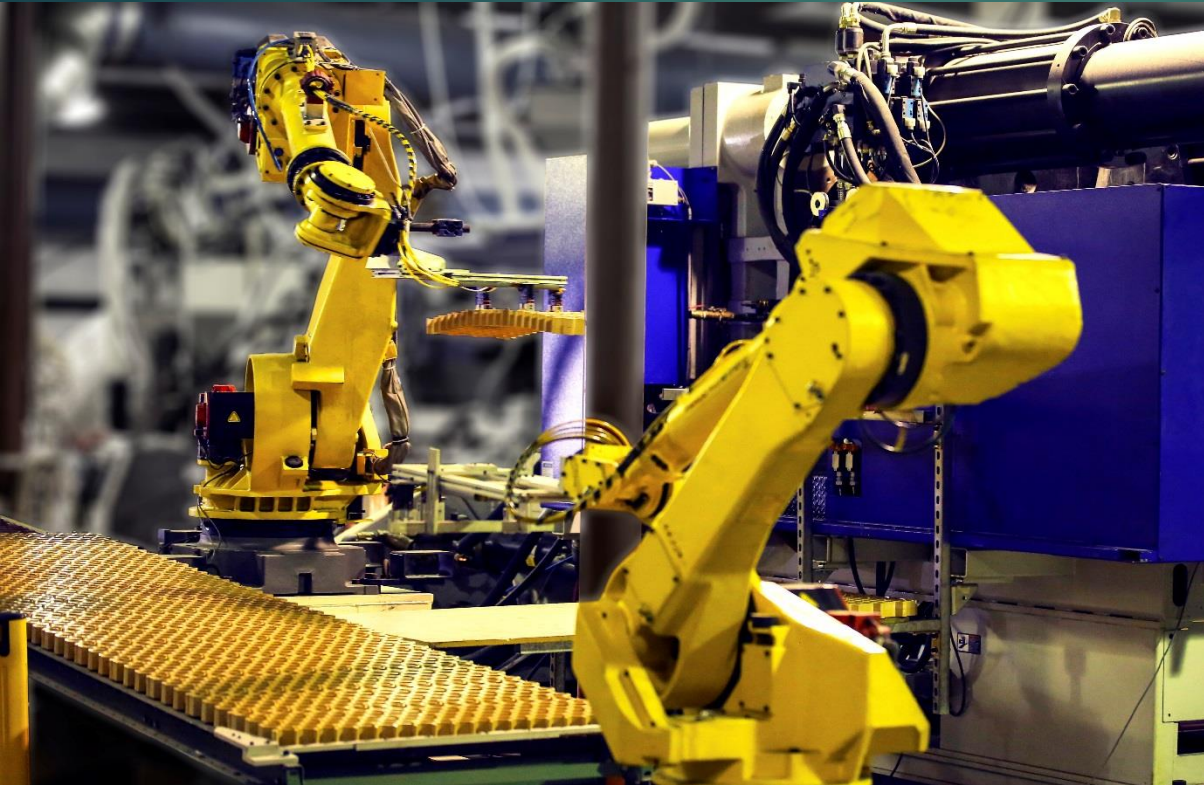
As we saw in chapter 1, was initially the product of fiction. Over the last half-century, there has been a noticeable proliferation in real-world robots. Let's look at some statistics: Industrial Robots (IRs) have slowly but steadily been invading our work lives since the mid-1970s and this infiltration has, in recent years, appeared to have reached impressive levels. As S. M. Solaiman (2017, 156) recently reported: "The International Federation for Robotics (IFR) in a 2015 report on IRs found an increase in the sales of IRs by 29% in 2014, which recorded the highest sales of 229,261 units for a single year (IFR 2015). IFR estimates that about 1.3 million new IRs will be employed to work alongside humans in factories worldwide between 2015 and 2018 (IFR 2015). IFR has termed this projected increase as 'conquering the world' by robots (IFR 2015)."

Beyond these industrial applications, there are also "service robots," which are designed as machines involved in "entertaining and taking care of children and elderly people, preparing food and cooking in restaurants, cleaning residential premise, and milking cows (Solaiman 2015). There are, according to data provided by the Foundation for Service Robotics, 12 million service robot currently in operation across the globe, and the number is expected to reach an exponential rise with the population of service robots expected to reach 31 million by 2018 (Solaiman 2017, 156). "Social robots" a subset of service robots designed for human social interaction in the home, at school, and in the work place. The numbers of these socially interactive mechanisms exceed both industrial and service robots, with countries like South Korea aiming to put a robot in every home by 2020 (Lovgren 2006).

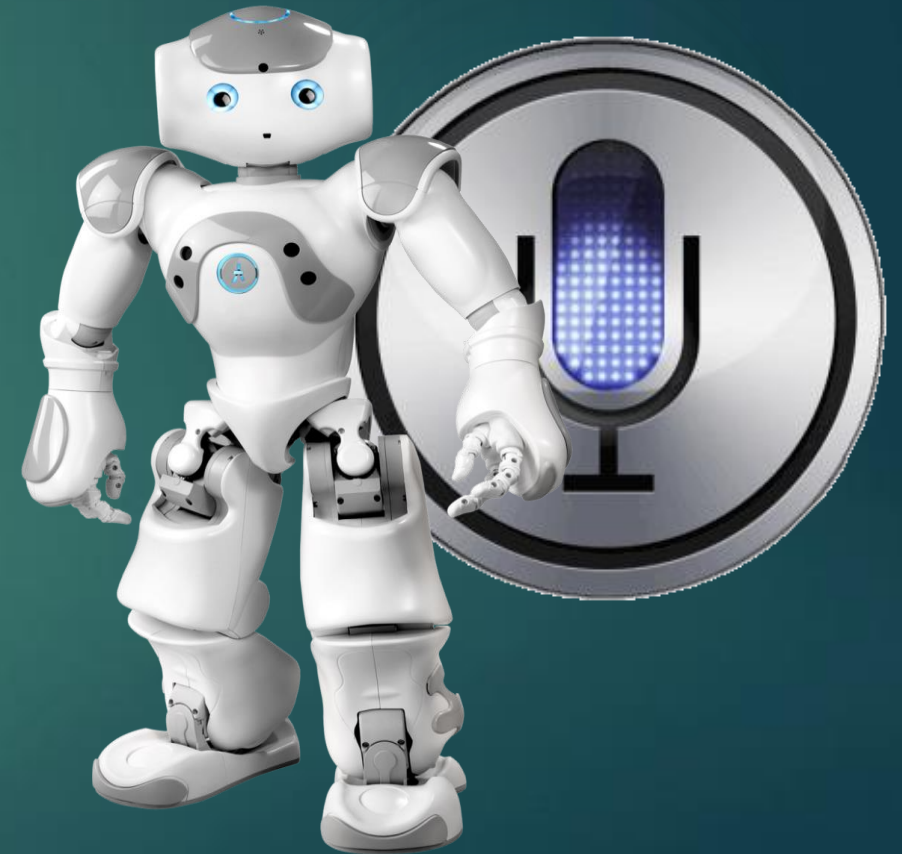


# Review

Industrial Robots



Social Robots



# Review

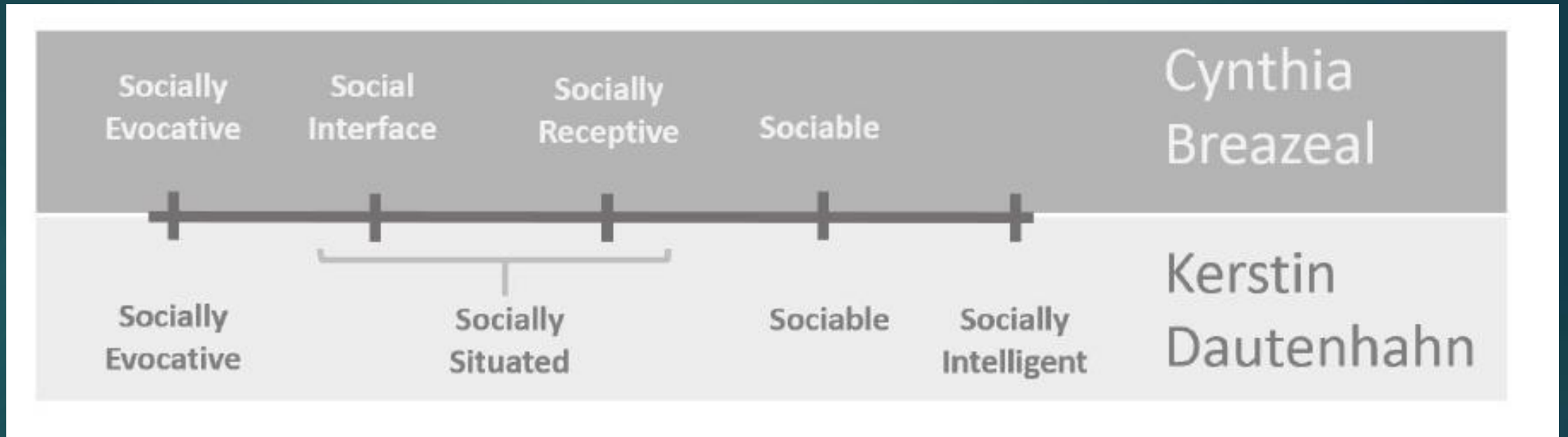
## **Sociable Robot (def.)**

“A sociable robot is socially intelligent in a human-like way, and interacting with it is like interacting with another person.”



# Review

## Social Robot Spectrum





# Review

## Sociable Robot (def.)

"A socially interactive robot is a robot that elicits social responses from their human users because they follow the rules of behavior expected by these human users. Robots designed for purposes in everyday environments must operate in spaces specifically designed for humans. To ease the communication with its users, robots are designed to evoke social interactions (or just reactions) following the rules of human social interaction behaviors."

Int J of Soc Robotics (2016) 8:589–598  
DOI 10.1007/s12369-016-0368-5



CONTINUING EDUCATION

### An Ethical Evaluation of Human–Robot Relationships

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Springerlink.com

knowledge about the emotional effects robots could elicit from their users. Understanding about this topic is an essential requirement for discussions about the social and ethical issues regarding what roles we (want to) allow robots to fulfill in our lives. Research in the area of human–robot interaction provides evidence that people can establish some kind of emotional or social bond with socially interactive robots [33,39,41,72,78]. A socially interactive robot is a robot that elicits social responses from their human users because they follow the rules of behavior expected by these human users [31]. Robots designed for purposes in everyday environments must operate in spaces specifically designed for humans. To ease the communication with its users, robots are designed to evoke social interactions (or just reactions) following the rules of human social interaction behaviors. It is commonly assumed that people prefer to interact with machines in a similar manner they are used to with other human beings [26]. Ideally, a social robot is capable of communicating and interacting in such a sociable way that the robot allows its users to: (1) understand the robot in human social terms; (2) relate to the robot; and (3) to empathize with the robot [14]. Researchers in social robotics aim to develop such sociable machines by making use of models and techniques generally used in human–human communication.

People interact with robotic or computer interfaces in a similar way they do with other human beings [41,56]. Along with this human tendency to respond socially to nonhuman objects, it has been argued that the fundamental human motivation of the 'need to belong' [8,17] not only induces ones desire for meaningful and enduring relationships with other social beings, but also facilitates the likelihood people may form emotional attachments to artificial beings [43]. This issue of bonding with nonhuman objects is likely to be enlarged when these objects possess lifelike abilities and are

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# Review

## **Social Interaction**

Speech

Body Language

Paralanguage

Chronemics

Oculesics

Proximity



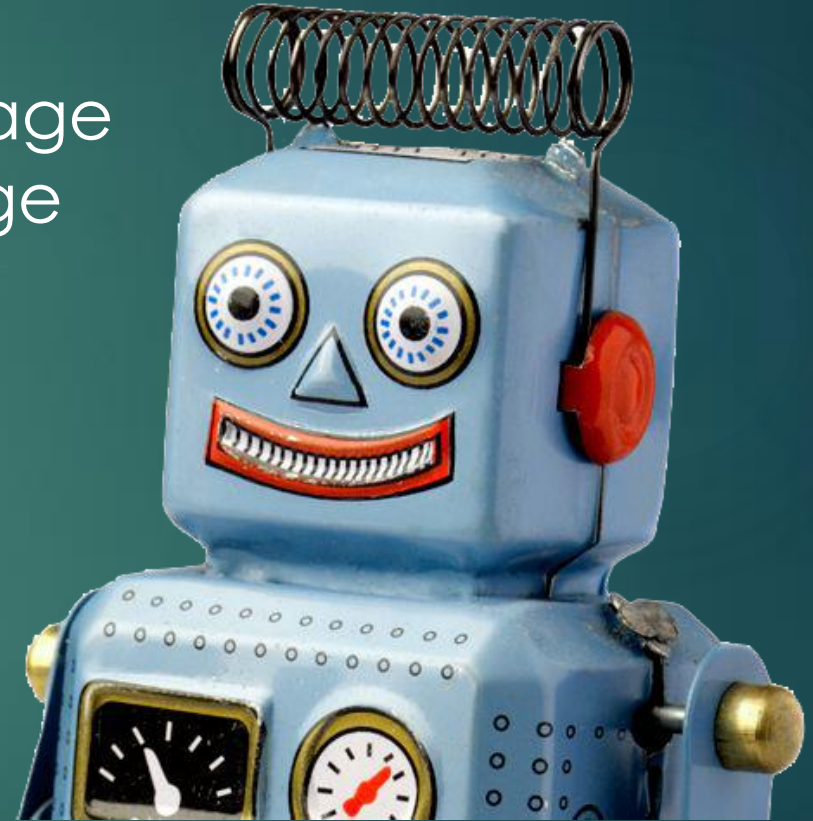
Interpersonal Communication



# Review

## Recognize & Simulate

Speech  
Body Language  
Paralanguage  
Chronemics  
Oculesics  
Proximity



Human Robot Interaction (HRI)

# Review



## **Types of Sociable Robots**

### Spoken Dialogue System (SDS)

“Siri was, and to an extent still remains, different from most widely available AI programs in that it interacts orally in natural language, follows the social norms of human-to-human communication, attempts to develop a rapport with users, and exhibits distinct personality traits (She is well-known for her sassiness).” - Guzman

# Review



## **Types of Sociable Robots**

Spoken Dialogue System (SDS)

## **Design Challenges**

Speech

Chronemics

Paralanguage

# Review

## Types of Sociable Robots

Embodied Conversational Agent (ECA)



## Design Challenges

Speech

Chronemics

Paralanguage

Body Language

Oculesics



# Review



## Types of Sociable Robots

### Embodied Social Robot

### Design Challenges

Speech

Chronemics

Paralanguage

Body Language

Oculesics

Proximity

# Review

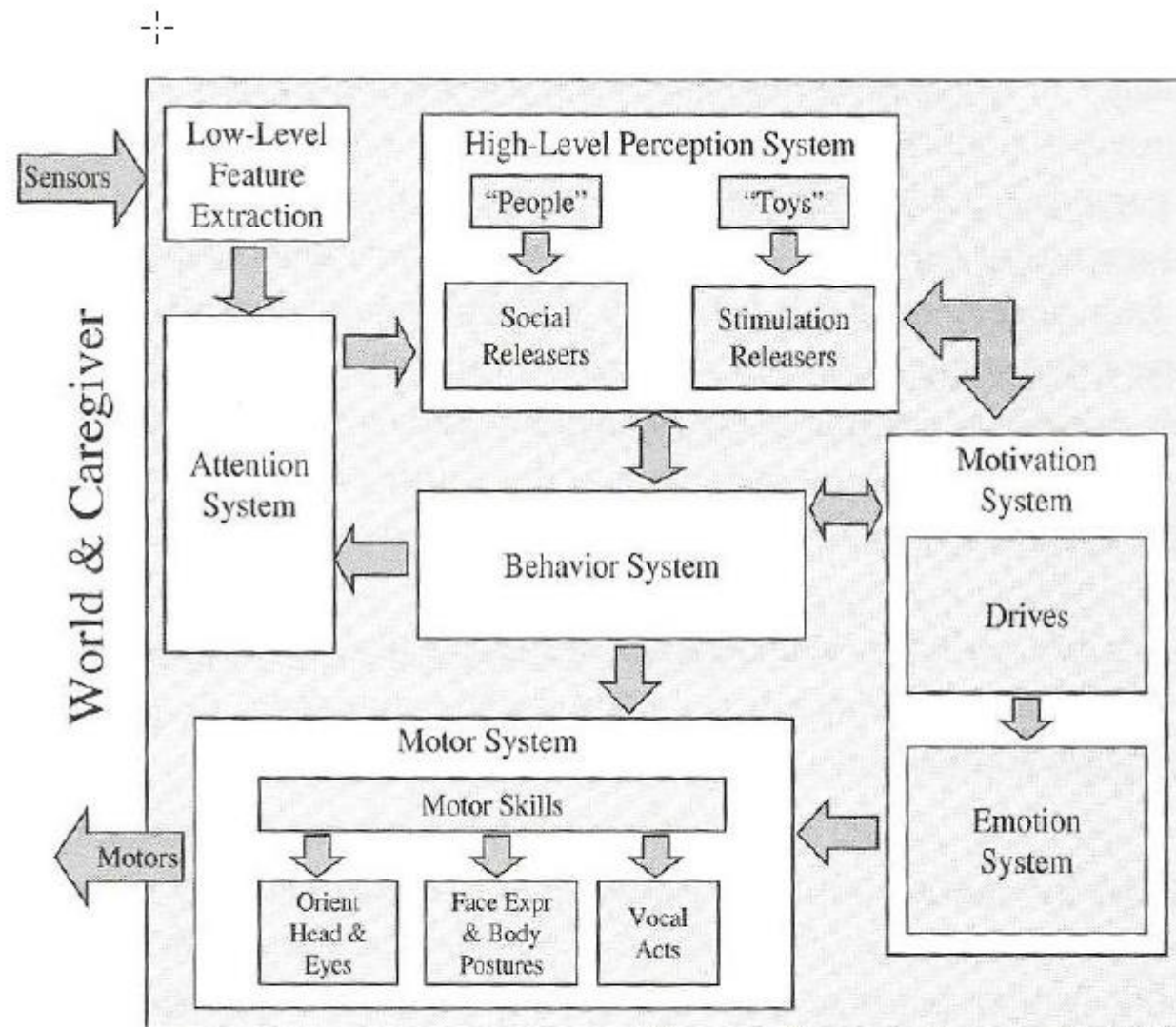


Figure 7-7 Block diagram of Kismet's "synthetic nervous system"  
Image by Conner Vagle based on and following Breazeal (2002, 44).

# Review

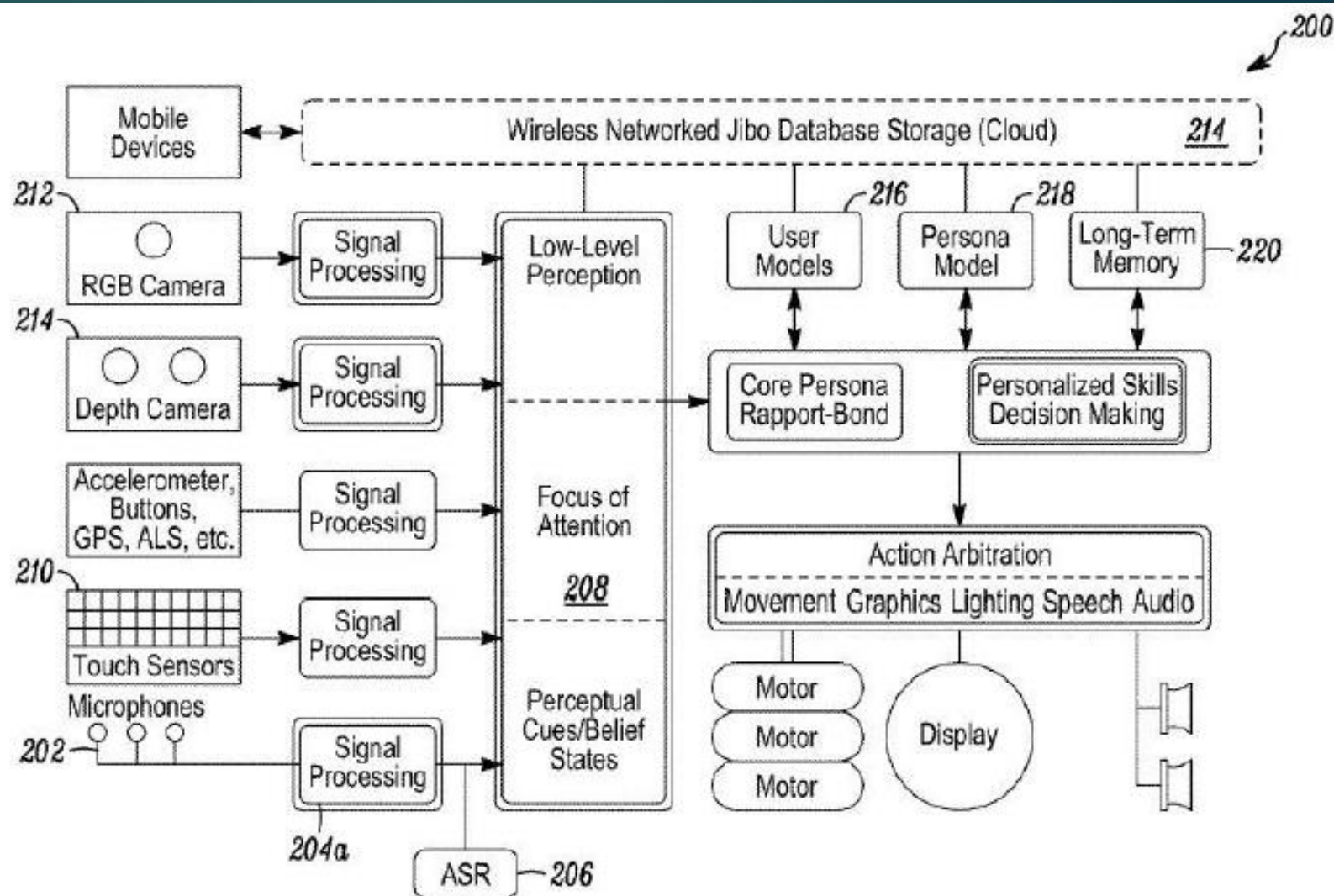
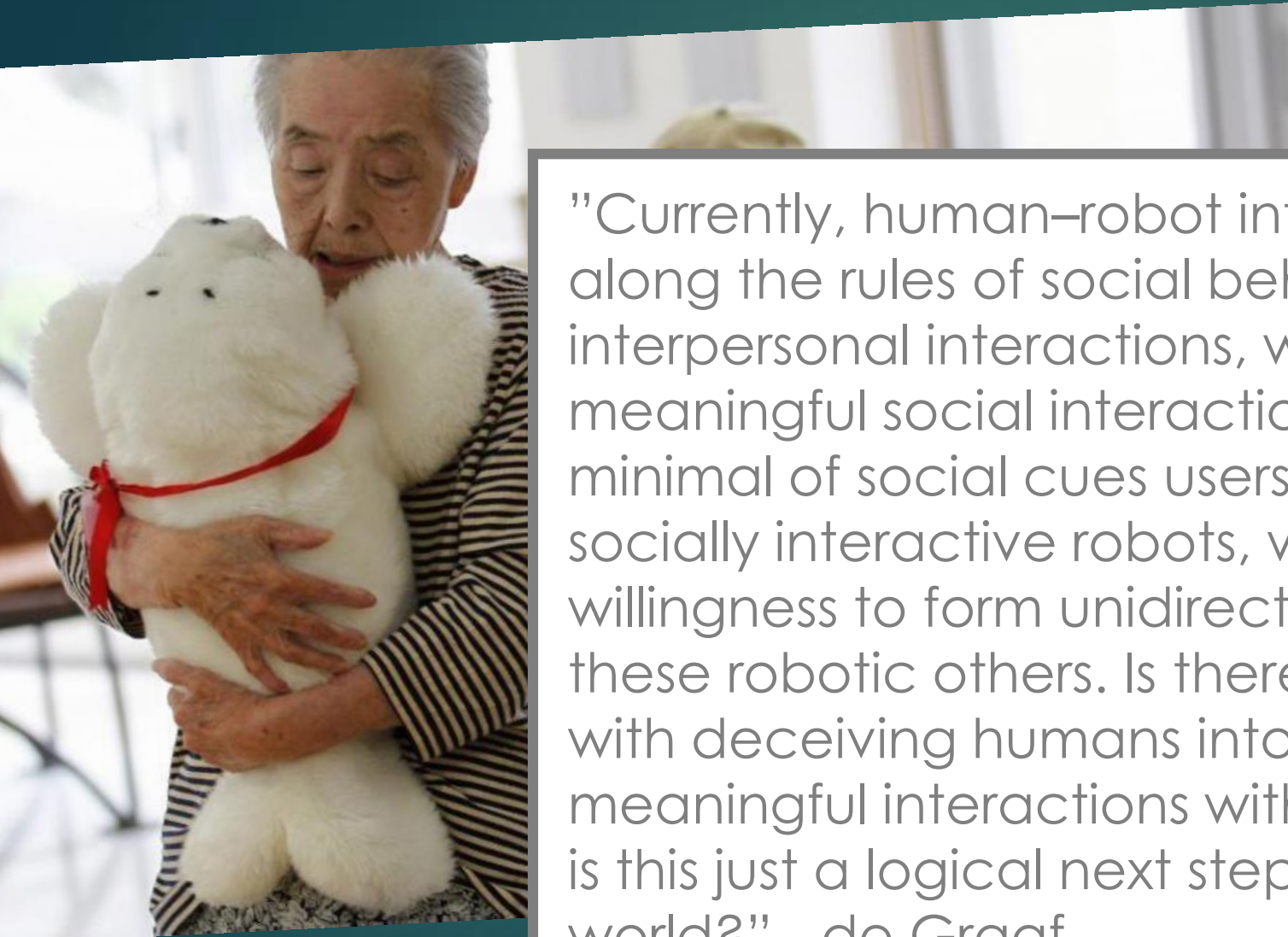


Figure 7-8 Software architecture for Jibo (Jibo, Inc. 2017)

# Question #1 – Deception or Delusion



"Currently, human-robot interactions are constructed along the rules of social behaviors in humanlike interpersonal interactions, which invites people to have meaningful social interactions with robots. With a minimal of social cues users tend to personify these socially interactive robots, which fosters a human willingness to form unidirectional emotional bonds with these robotic others. Is there something morally wrong with deceiving humans into thinking they can foster meaningful interactions with a technological object? Or is this just a logical next step in our technological world?" - de Graaf



## Question #1 – Deception or Delusion

"Therefore, it seems nothing is intrinsically wrong with human-robot relationships as long as we can develop robotic systems that effectively deliver what user's believe to be appropriate care behavior. Considering socially interactive robots unethical because their effectiveness relies on deception just oversimplifies the issue. The currency of all human social relationships is performance, and rather than it being a bad thing, this is simply how human social interactions work. People have always been performing for other people and now the robots too will perform." - de Graaf

## Question #1 – Deception or Delusion

**No Deception, No AI**  
**Know Deception, Know AI**

## Question #2 – Social Position

### Master-Slave

“The interaction between user and Siri is designed to mimic an employer-to-employee relationship, or master-to-servant, with Siri working for and controlled by the user. When speaking with Siri, we are presented with a communication setting in which we are interacting one-on-one with an entity that we control.” - Guzman



## Question #2 – Social Position

### Robots should be slaves

Joanna J. Bryson

Robots should not be described as persons, nor given legal nor moral responsibility for their actions. Robots are fully owned by us. We determine their intelligence and behavior, either directly or indirectly through specifying their intelligence or how their intelligence is acquired. In humanising them, we not only further dehumanise real people, but also encourage poor human decision making and allocation of resources and responsibility. This is true at both the individual and the institutional level. This chapter describes both causes and consequences of these errors, including consequences already present in society. I make proposals for best incorporating robots into our society. The potential of robotics should be understood as the potential to extend our own abilities and address our own goals.

In this chapter I focus on the ethics of building and using non-human Companions. The primary topic of this book is digital Companions, but conventional robots, but both pragmatically and ethically the issues are the same. A robot is any artificial entity situated in the real world that transforms perception into action. If a digital assistant listens and talks to a human, it is a robot – it is an agent, an actor, living in and changing the world. My thesis is that robots should be built, marketed and considered legally as slaves, not Companion peers.

Digital agents not only change the world by affecting the people they converse with. They may also communicate what they learn to others – directly or indirectly through shared databases or others' agents. Agents transmit, create and may even destroy information, including human opinions and reputations. Digital agents may use the Internet to actively purchase goods or services, thus causing the movement of physical objects as well as ideas. Finally, some Companion agents really are conventional metal robots with legs and wheels. Such robots can do all the things a digital robot can do, and also produce direct physical impact on the world – from holding hands or washing windows to breaking dishes and

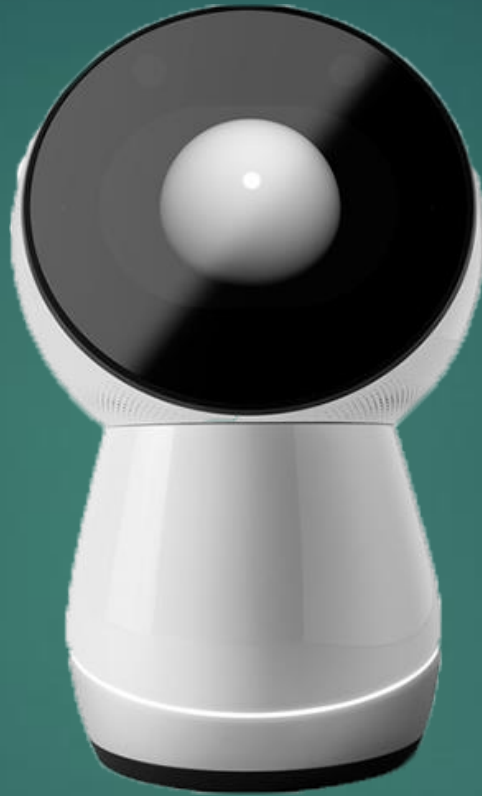
“My thesis is that robots should be built, marketed and considered legally as slaves, not companion peers.” – Bryson 2010



## 2. Rights



Things or Instruments  
“What”

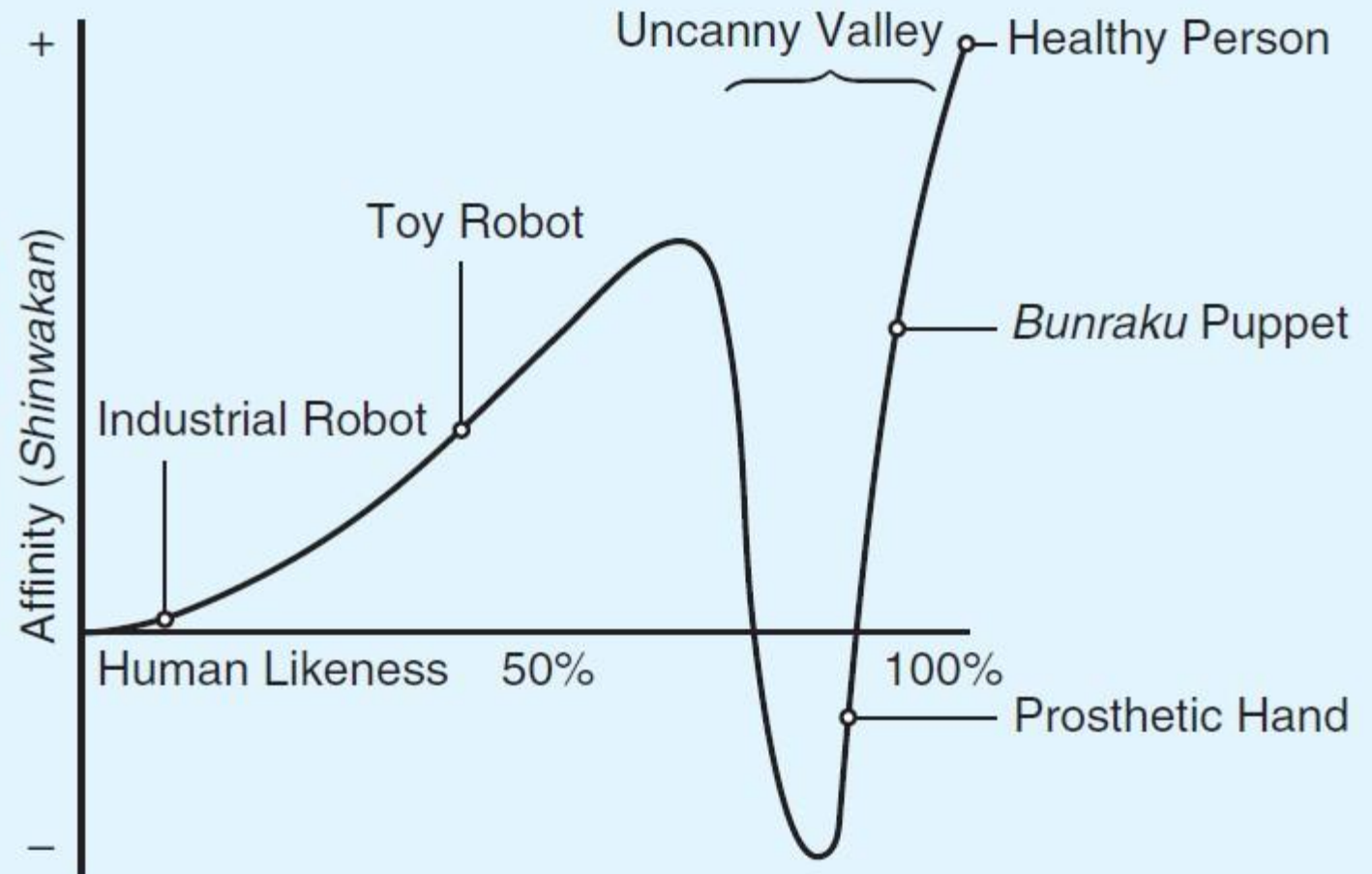


Jibo  
“Quasi-Other”



Other Persons  
“Who”

# The Uncanny Valley



# Today

- ▶ Technological Unemployment
  - ▶ Kaplan - AI: What Everyone Needs to Know - ch. 6 & 7
  - ▶ Halpern - How Robots are Taking Over
  - ▶ McAfee - Are Droids Taking Our Jobs? (video)
  - ▶ PBS - Will Your Job Be Done by a Machine?



# Preview

## ► Social Issues

- Crawford & Whittaker - AI Now Initiative (video) / (transcript)
- Knight - The Dark Secret at the Heart of AI
- Gunkel - Mind the Gap

