Social Robots

In the past, designers of electronics amazed the public with complicated robots that displayed lifelike physical features and behaviors. Science fiction authors further excited readers' imaginations with androids with superhuman qualities that had the ability to do great harm to human society. Later, the commercial and research fields began to focus more on practical applications on the factory floor, where robotics provided automatic operations for repetitive tasks, such as welding and painting. More recently, modern robotics has begun to return to its roots since advances in science and engineering are enabling the creation of "intelligent" machines that can interact directly with people. What was once science fiction is now a reality, and the future will probably bring robots and humans closer together.

The field of social robotics combines several fields outside engineering and computer science—namely, design, psychology, and sociology—with the aim of making interactions between robots and humans more natural. Creating robots with humanlike physical and emotional attributes opens possibilities for a social structure of human–computer interaction. Design helps to realize the physical, emotional, and expressive qualities of a social robot. Principles of cognitive psychology lend models for human learning and communication. Sociology provides an understanding of the social structure of human societies. Together the robot design team must attempt to present these intelligent and expressive behaviors on the part of the robot. With increasingly sophisticated technology, robotics engineers hope that the robots of the future will "feel" and express the full range of human emotions. Indeed, it is not unrealistic to predict that humans and robots will someday form true interpersonal relationships, that is, human–robot friendships.

Communication and dialogue

Natural interaction between robots and humans requires all modalities of human–human interaction to apply to robots as well. Basic abilities that are being developed for robots include gestures, facial expressions, and speech recognition. At the more advanced level, robots must be able to reason about human behavior and must learn to respond appropriately. However, given the time required for robots to process and react to information, some people believe that robotics researchers are never going to recreate the natural speed and spontaneity of human communication.

Social learning

Through a programming process called *online learning*, social robots are provided with a rich model of human social behavior and massive input concerning social interactions. Through this process, robots develop an internal database of responses for use in future interactions with humans. Various companies and universities are currently developing social robots, and the next several decades are going to bring a considerable number of social applications for robots. This includes teaching children with learning difficulties, and serving as companions for the elderly or for those who are confined to their homes due to illness.

Emotional intelligence

There is significant debate over the role of emotion in robotic systems. Some social roboticists argue that the path to effective interaction with humans is for robots to model internal human emotions as accurately as possible, in effect producing a human replica. Researchers continue to conduct experiments with the goal of developing social robots that model human feelings, such as frustration, happiness, and loneliness. Despite their best efforts, however, it is unlikely that robots will ever be able to reach the full level of complexity of human emotion.

—adapted from *Science, Technology, and Society*, edited by Sal Restivo

4 **IDENTIFY** Match the words to their definitions. Then identify the words in the article. Which definition, A or B, is being used?

☐ express	☐ conduct	☐ rich
☐ commercial	☐ models	☐ present

	Definition A	Definition B
1	noun: a television or radio advertisement	adjective: concerned with or engaged in commerce
2	noun: the manner in which a person behaves	verb: to organize and carry out
3	verb: to convey (a thought or feeling) in words or by gestures and conduct	adjective: operating at high speed
4	noun: examples to follow or imitate	noun: people employed to display clothes by wearing them
5	adjective: existing or occurring now	verb: to show or offer (something) for others to scrutinize or consider
6	adjective: having a great deal of money or assets	adjective: existing in plentiful quantities

5 **INTEGRATE** Read the article. Decide if the sentences are true (T) or false (F), or not given (NG).

1 Social robots that can interact at natural speed with humans already exist. ☐
2 Social robots learn about social interactions through exposure to a huge amount of data about human social behaviour. ☐
3 Researchers model human interactions which the social robots use to build up a database of responses they can use for future interactions. ☐
4 Potential uses for social robots include being companions for people who are old or too ill to leave their homes. ☐
5 Creating robots with emotions is incredibly challenging, but given time, it's probable that robots will eventually be able to express all human emotions. ☐