



# LEARNING MATERIAL / ROBOTICS

PART 2  
SOCIAL ROBOTS AND EMOTIONS

Target audience: high schools / secondary education institutions

The learning material will examine robotics from five different viewpoints:

1. Social Robots and Ethics
2. Social Robots and Emotions
3. Sensors, Actuators and Power Sources – the Building of a Robot
4. Robots and Programming
5. Robotics, Economics and Society

Teachers can utilize the learning material for different course contents and for developing an extensive know-how: thinking and learning to learn, cultural know-how, interaction and expression, multi-literacy, information and communication technology skills, working life skills and entrepreneurship, involvement and influence.

The learning material is based on the project of building and programming a social robot. It was funded by Futurice's social responsibility fund, The Chilicorn Fund, <https://spiceprogram.org/chilicorn-fund/>. The work group consisted of Olli Ohls, Maxim Slivinskiy, Paul Houghton, Teemu Turunen, Markus Paasovaara and Minja Axelsson.

Digitalents Helsinki acted as a partner in the project. The premise of the learning material is to share the knowledge obtained through the project. The InMoov-robot was 3D-printed according to the open source model of the French designer and visual artist Gaël Langevin. <http://inmoov.fr>

**The material and the related content is downloadable for free from:**

<https://spiceprogram.org>

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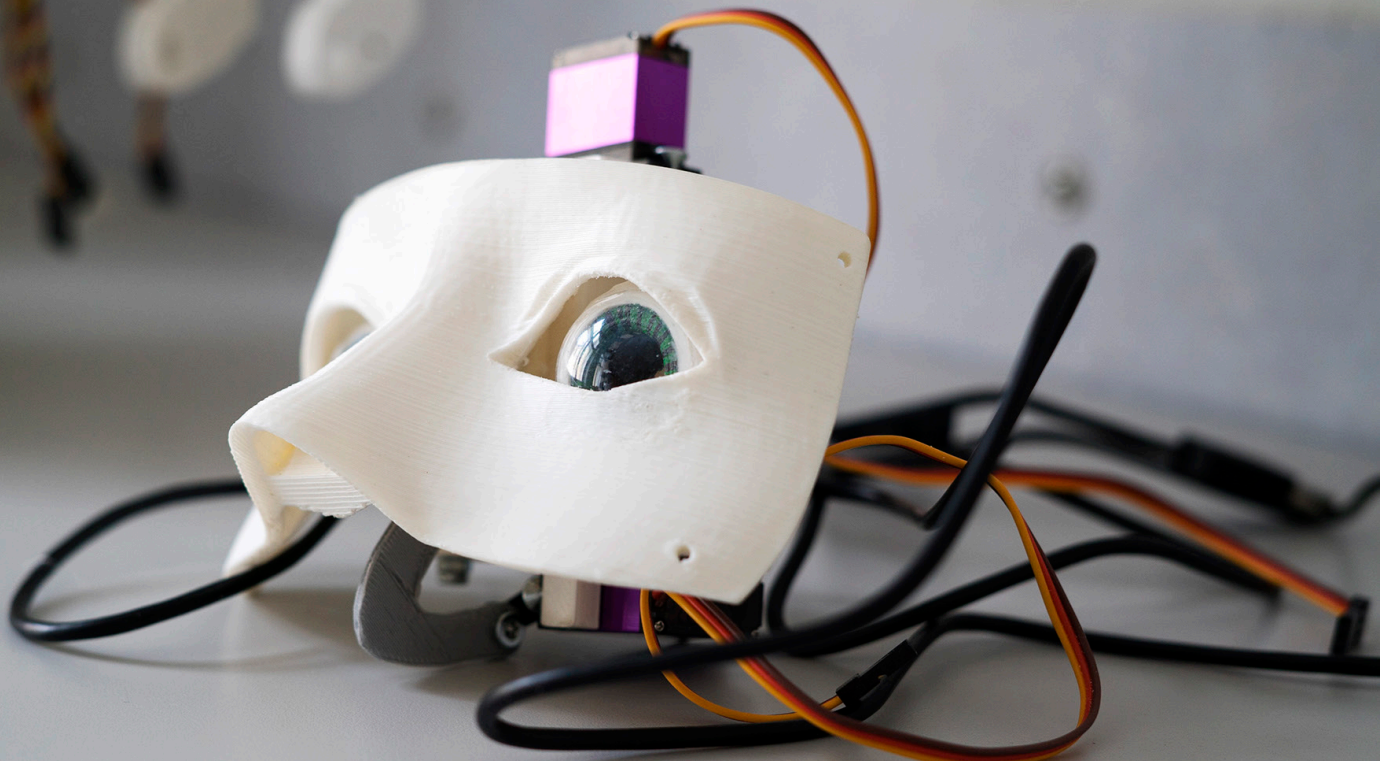
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The logo for Futurice, featuring the word "futurice" in a bold, green, lowercase sans-serif font.The logo for Digitalents Helsinki, featuring a stylized icon of a person with arms raised, followed by the text "DIGITALENTS" in a bold, uppercase sans-serif font, and "HELSINKI" in a smaller, uppercase sans-serif font below it.

PART 2

# SOCIAL ROBOTS AND EMOTIONS



# Background

Social robots are designed to perform tasks in which they have to interact with humans. Such tasks include guiding jobs, assistive chores in care work or performing other simple tasks. For the interaction to be efficient, the robot should have awareness of social situations, including the ability to perceive people's needs, emotions, and the objectives of human actions. However, many social robots still lack these abilities, due to the complexity of human emotion recognition.

Robots with algorithms that utilize camera feed can identify six basic emotions with a fairly high probability (86–99%). The basic emotions are joy, astonishment, anger, disgust, fear, and sorrow. In the future, robots might recognize human feelings so effectively that they could be useful in professional emotion management. Robots do not catch human emotions because they are machines and they do not have a mirror neuron system. Therefore, they can be used in situations where you need to be able to ignore emotions like anger or fear.

Human emotions are meant to communicate needs and to drive human action. The robots' operations could be controlled according to the facial recognition data it collects. When a robot detects a smile, it could change its behaviour and even increase its own motion and speed up its speech. Robots' way of emulating human emotions and expressions may help people accept social machines more easily. Robots can help people deal with difficult emotions such as loneliness through interaction and communication.

The characteristic features of a robot can be modified in a desired way by programming, in order to support its social function. For example, a robot might be curious. A curious attitude helps children to learn. The robot can also be a memory bank for the whole family, making everyday life easier, such as waking the children up with suitable music at the right time of day. If the robot has access to the weather forecast via the internet, it could even suggest the kids what to wear.

A robot's influence as a social actor is a subject of interest to researchers. The physically alive-like robot has significant psychological effects that differ, for example, from a 2D virtual character on a computer screen. Psychologists carried out a version of the Asch Compliance Test with the robots, and the results showed that robots were able to influence children's ability to reason, causing them to give the wrong answer to the question. The same test did not have the same results with adults. Experiments of this type help to understand the complex relationship between robot and human.





# Experience

When it comes to Futurice's InMoov robot, emotions and intelligence were considered from the perspective of people's reactions and impressions towards it. People that met the robot reacted to it in different ways and humanized the interaction. The robot doesn't feel emotions but is instead programmed to imitate them computationally. For example, the programming can include 59% joy, 30% curiosity etc. Different functions commence depending on the emotional state of the situation. When a person talks to a robot the interaction can increase its happiness and make the robot move faster. The InMoov robot was designed to have code that supports dialogue. It would have a pre-programmed name, interests, humour and other possible features.

## Cynthia Breazeal's model on programming emotion

Leading researchers around the world have created different models for programming emotions. Cynthia Breazeal, a researcher from the Massachusetts Institute of Technology, created a model in the 90s that reflects the robot's cognitive capabilities as information processing. The first social robot built by Cynthia's team is called Kismet. Familiarize yourself with the model and evaluate how it resembles human thinking.

Kismet: <http://www.ai.mit.edu/projects/sociable/kismet.html>



# Tasks

1/ The media makes use of human emotions. News stories are written so that the readers identify with the people featured in them and stick around for the follow up. Interesting events aren't always the ones that teach us about the world, but those that generate an emotional response. Browse through the Internet or your social media feed. Choose one news story that captures your attention. What emotions does the article bring forth and what means have been used to do that? How could a social robot help people see through the tools media uses to influence emotions? Could a social robot influence the news we read? How?

2/ Dalai Lama and the psychologist and doctor Paul Ekman have created a website that analyses emotions. The website helps explore different situations and the emotions that the reaction to that situation might evoke.  
<http://atlasofemotions.org/#introduction/>

Explore through examples of different emotions and their varying intensities. Which parts of the information are useful when designing a social robot? What consequences could it have if social robots could read your emotions better than other humans? Justify your position.

3/ Emotions can be viewed as a model of inner and outer reactions. The Finnish sayings "love is felt in your chest" and "pride goes to your head" are not completely false. Researchers have found that different emotional states are universal, common experiences to the whole humanity. Emotional states are located and felt in different parts of the body. Study the following research made in the Aalto University and think about where the emotion might be felt in the body. <http://www.pnas.org/content/111/2/646.full.pdf>  
Can a robot feel emotions? Justify your position.

4/ In an interaction, a person's emotional state influences the other person as well. This happens because we have mirror neurons. Mirror neurons react to different facial movements and convey emotional information to the brain. Using facial recognition technology, a robot can identify a person's emotional state but since a robot doesn't have mirror neurons, it acts according to its programming instead of engaging in aggressive behaviour, for example. How could society benefit from a robot not catching people's feelings? What professions would a robot be suitable for and why?





# Sources

## Sources:

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