

# IN5480 Individual assignment fall 2019

## Concepts, definition and history of interaction with AI

### History of AI

John McCarthy was the American mathematician and logician who, in 1956, first introduced the term artificial intelligence, when inviting to a workshop called Dartmouth Summer Research Project. The term sprung from the area of “thinking machines”, in which the mentioned workshop had its focus. The concept of thinking machines were perceived as utterly divergent, and the term of AI was reasoned to represent a sort of neutrality in the field. (Grudin, 2009)

### Defining AI

One of many definitions for AI is following:

*“Artificial Intelligence (AI), broadly (and somewhat circularly) defined, is concerned with intelligent behaviour in artifacts. Intelligent behaviour, in turn, involves perception, reasoning, learning, communication, and acting in complex environments.”* (Nilsson, 1998)

This definition is by the American computer scientist Nils Nilsson from 1998, who is considered one of the founding researchers of AI. While McCarthy was responsible for the basic idea of using logical reasoning to decide on actions, Nilsson was in a group who first embodied it in a complete agent.

A decade later than Nilsson’s definition, Russel and Norvig define AI in their book ‘Artificial Intelligence: A modern approach’, published in 2009, being as follows:

*“In computer science, artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans. Colloquially, the term “artificial intelligence” is often used to describe machines (or computers) that mimic “cognitive” functions that human associate with the human mind, such as “learning” and “problem solving”.”* (Russel and Norvig, 2009)

In extension of their definition of AI, they also present four approaches of AI, being the following: 1. Think like a human, 2. Act like a human, 3. Think rationally, and 4. Act rationally.

As a third definition of AI I want to mention the misquoted statement by Larry Tesler, later known as the Tesler's Theorem, being: *"AI is whatever hasn't been done yet."*

This is the misquotation where the real statement was the following: *"Intelligence is whatever machines haven't done yet."*

The belief that intelligence happens exclusively from machines and computers, and of AI not being *real* intelligence, is known as the AI effect. (Haenlein, Kaplan, 2019)

After reading several definitions on AI, I will try to sum up its significance in a new proposed definition. With a focus on simplicity, a definition can be:

*Artificial intelligence is human intelligence adopted to an artificial environment.*

The definition focuses on the environment of for instance a machine or a computer to be able to perform tasks that originally require and aspire from human intelligence.

### **AI in 'Uber'**

The contemporary company Uber uses both ML (Machine Learning) and AI. Uber uses AI in everything from fraud detection, risk assessment, safety processes, marketing, in addition to matching drivers to customers and routes.

Uber is considered an AI-first company, as opposed to a mobile-first company where mobile is the core in an operating environment. Uber uses instead AI as their core, and apply it to a majority of their areas and elements.

An example being Uber Eats, which is a platform where users can order food and get it delivered to their front door. Here ML is used to make models of predictions to optimize the food experience, in which is done every time the app is opened, where arrival time is estimated, and restaurant and items on the menu is suggested. (Uber, 2019, url <https://eng.uber.com/michelangelo/>) (Uber, 2019, <https://www.uber.com/no/nb/uberai/>)

### **AI in 'Black Mirror'**

Black Mirror is a Netflix series exploring the future in technology, and where it will take us. Human interaction with AI is portrayed creatively and exaggerated, even though several elements are believable. It is believable in the way that a combination of several elements presented are in some ways already a reality today, even though the overall portray is far-off.

The series raises ethical questions in a frightening manner, where each episode present one digital trend that is affecting society and the environment. AI is one trend that is presented in several episodes, essentially where its negative effects is being explored.

## **Robots and AI systems**

### **Robotics emerging**

The word robot originates from the Czech word “*robotá*”, that means “forced labor”. The word first appeared in 1920 in the context of a drama play by the Czechoslovakian writer Karel Čapek. The science fiction play was called R.U.R., an abbreviation for *Rossum’s Universal Robots*. The robots, or workers, in the play were made for one purpose only, which was to replace human workers. (Bassetti, 2005)

Robotics have been categorized into three different categories. These are industrial robotics, professional service robotics, and personal service robotics. These categorizations can be looked at in an historic way, where each represent different periods in the time of robotics development. (U.N. and I.F.R.R., 2002)

Industrial robots represent an early stage of the development in robotics, having commercial success and a wide distribution. The company Unimate sold the world’s first commercial manipulator in the early 1960s, which represent the years of where industrial robotics commenced. The three elements represented in an industrial robot are the following; it is controlled by a computer, it manipulates its physical environment, and it operates within an industrial setting. (Thrun, 2004)

Professional service robots represent a later category of robotics. In addition to the robots manipulating and navigating their physical environments, such as industrial robots, professional service robots are assisting people in pursuing professional goals while doing so.

Out of the three categories, personal service robots have the highest growth rate expected. Personal service robots has the task of assisting or entertaining people, happening in a domestic setting or in recreational activity. (Thrun, 2004) For instance, this can be robot vacuum cleaners or lawn mowers.

### **Defining robots**

Robotics addresses a great area, that is and has been developing rapidly over time, and therefore consisting of several robots with different aims. I will try to find some representative definitions, that is explained below.

Robot Institute of America defined in 1979 to a robot as the following:

*“A reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks”.* (Robot Institute of America, 1979)

With this definition being formed at a considerably early stage of robotics, it is clear that it mostly covers the category of industrial robots. This can be seen since the description of robots are centering around the idea of the task of moving different objects through motions. This type of working task can further be compared and found in a setting of industrial factories.

Today, Merriam Webster Dictionary explains the term robot as the following:

*“Robot is a machine that resembles a living creature in being capable of moving independently (as by walking or rolling on wheels) and performing complex actions (such as grasping and moving objects).”* (Merriam Webster, 2019)

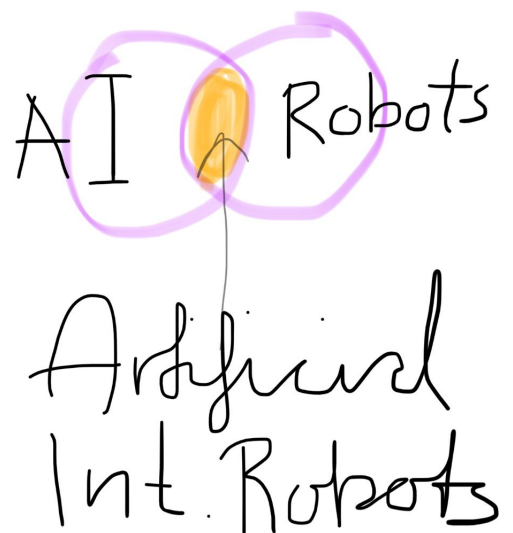
This definition stresses that a robot has some sort of resemblance to a living creature, as can both be interpreted to refer to robot pets as well as robots with resemblances to humans such as tasks in the everyday life.

Considering the width coverage of the robotics field, I will suggest a rather wide definition of the word robot, focusing more on inclusion rather than an in-depth specification.

The suggestion is the following:

*“A robot is a physical embodied machine performing a task driven by automation or a remote control.”*

In my understanding, I think requirements for a robot cover that it should be physical embodied in some way, meaning that the machine should be presented with a physical user interface.



## **Connection of AI and Robots**

AI and robots can be connected. For instance, a robot can consist of AI elements, though it is not a requirement. Robots exist in a variety of ranges, where some have AI implemented and where some do not. The amount of AI in a robot depends on the executing program. AI can be found in several different environments, not only in the physical world of a robot. I will claim that both AI and robotics are two different fields of interest, in which both ones are broader than the part they have in common. Please see the Venn diagram suggesting an illustration of this, where the parts that are overlapping is representing robots that are integrated with AI.

## **Ollie the Baby Otter**

One example on a contemporary robot is Ollie the Baby Otter. This is a therapy robot that aims to help people who is suffering, including patients with cancer, dementia, or post-traumatic stress. It was built for Animal Assisted Therapy, which entrust in animals to help people in their healing process. It builds on studies that shows people's relationships with animals can affect our health, in order of create feelings of safety and security. For instance, being around dogs and cats can have positive effects on people's wellbeing on a social, emotional, as well as a on a cognitive level.

The baby otter is able to understand how it's being interacted with through a sensor boards and a custom motor. It understands interaction through touch, in order to make a response consisting of movement and sound. The robot will hug a patient's hand and purr when being rubbed on the belly. This encourages the users to hold and cuddle Ollie like a baby pet. (Mental Floss, 2019, url: <https://mentalfloss.com/article/62548/ollie-baby-otter-robot>)

# **Universal Design and Interaction with AI**

## **Understanding Universal Design**

Ronald Mace was the first to coin the term "universal design" when wanting to describe the concept of designing products to be usable and aesthetic to the highest extent possible by everyone, regardless of age, ability, or their status in life. Universal design aim for a design of buildings, products, and environments to be made accessible to all people. The author of Designing for the Disabled, published in 1963, Selwyn Goldsmith took big part in establishing the concept of free access for people with disabilities. (The Center for Universal Design, 2019, url [https://projects.ncsu.edu/ncsu/design/cud/about\\_us/usronmace.htm](https://projects.ncsu.edu/ncsu/design/cud/about_us/usronmace.htm))

In the book “Designing for People of all Ages & Abilities” the definition of universal design is defined as “*the design of products and environments to be usable to the greatest extent possible by people of all ages and abilities*”. (Goldsmith, 1963)

An average group of people doesn't exist, which unfortunately is the group designers are trained to design for. The world as it is designed is not perfectly suited for anyone, and it's doubtful that one product could be used by everyone and under all conditions. (Story, Mueller, Mace, 1998).

Universal design proposes 7 principles for the concept and its application, being the following presented.

*Equitable use* refers to that the design should be useful for people having diverse abilities. *Flexibility in use* aims for the design to facilitate the wide range of individual abilities and preferences. *Simple and intuitive use* talks about that design should be easy understandable, independently of the experience of the user, their language skills, and their level of concentration. *Perceptible information* aims for the design to communicate information to the user in an efficient way, here regardless of the user's environment and sensory abilities. *Tolerance for error* aims to minimize errors and accidents to occur in the design. *Low physical effort* refers to the design to be accessible in a comfortable way regardless of a minimum fatigue. *Size and space for approach and use* aims to that an appropriate size and space is provided through the design, regardless of user's age, size or mobility. (Story, Mueller, Mace, 1998)

### **The potential of AI**

AI implemented robots creates a potential to develop a whole new kind of user interface. Robots have today been developed to be able to recognize language. (Thrun, 2004) AI implemented robots, such as therapy robots described earlier, has the potential to help the healing process of patients.

AI has potential both to include and exclude people. Whatever target group a system aims at, AI can strengthen these limits. Universal design argues for inclusion for all, no matter circumstances of the user and their current environment. Equal inclusion of people is a challenge, but applying the framework for universal design into AI can support this. For instance, AI for inclusion can be discussed where speech recognition is applied. This will help inclusion for visually impaired, or simply people in busy situations and environments.



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