Artificial intelligence in Steven Spielberg's *Artificial Intelligence: A.I.*

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ABSTRAKT

Tato práce zkoumá populární vyobrazení umělé inteligence a robotů (zvláště pak humanoidních) v americké kinematografii. Zkoumá je poukazováním na společné, ale i rozličné rysy ve filmech, a porovnává je ve vztahu k přístupům k moderním technologiím reálného světa. Ponořením se do minulosti by mělo být možné vysvětlit, proč jsou jistá témata prezentována ve filmech tak populární. Práce se snaží pochopit souvztažnosti mezi fikcí a reálnými problémy, aktuálně řešenými ve Spojených státech amerických. Teoretická část se zaměřuje na vysvětlení základních pojmů a důležitých informací, nezbytných pro podrobný rozbor konkrétních problémů v dílech. Praktická část tyto poznatky na díla aplikuje, a s jejich užití se snaží odhalit spojitost mezi vývojem robotiky v Americe a humanoidními roboty na plátnech kin.

Klíčová slova: humanoid, umělá inteligence, robotika, robot, kino, film, Spojené státy, kultura

ABSTRACT

This work examines popular representations of artificial intelligence and robots (especially humanoid) in American cinematography. It does so by identifying common features among the films, as well as those which are different, and connecting them with the real-world attitudes towards modern technology. By delving into the past, it should be possible to explain why certain phenomena presented in the films are so popular. All in all, this work tries to understand the relations between fiction and the actual problems, currently discussed in the U.S. The background section focuses on understanding of basic terminology and covering important information, essential for further and detailed discussion of particular problems in the works. The practical section applies the previous information to the cinematic works and uses them to discover the correlations between the development in American robotics and the humanoid robots on cinema screens.

Keywords: humanoid, artificial intelligence, robotics, robot, cinema, film, United States, culture

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I hereby declare that the print version of my bachelor's thesis and the electronic version of my thesis deposited in the IS/STAG system are identical.

CONTENTS

INTRODUCTION

This work investigates the themes concerning artificial intelligence (AI) presented in American popular culture, particularly, in films. The main goal is to explain key topics connected to artificial intelligence, robotics, cybernetics etc. which are widely presented in contemporary society and film, especially in works by American filmmakers. Steven Spielberg's 2001 film *A.I.: Artificial Intelligence* will be used as a predominant material for an analysis. This film will be compared with other cinematic works in American popular culture, mainly *Blade Runner* produced by Ridley Scott in 1982, *Bride of Frankenstein* by James Whale from 1935, but also, mostly for explanatory reasons, with Mary Shelley's 1818 *Frankenstein; or, The Modern Prometheus*, a literary work that is generally connected with the resurgence of this theme in popular culture as the period of the Enlightenment was confronted with the emergence of Romanticism and the subgenre of Gothicism. These and further works will be analyzed in comparison to each other but also in relation with contemporary issues of the present–day U.S.

The analytical part of this thesis investigates a philosophical question presented in the majority of American films related to AI and robotics, e.g. 'what is human in the age of intelligent machines?' Another focus of this work is to investigate the changes of approach toward the intelligent machines both in respect to the history of film and the actual technological and political development in the U.S. The literary and philosophical movements of Romanticism and the Enlightenment will be discussed, in order to explain the position of robots in the American cinema, and the minds of the American public. By delving into these questions, it should be possible to track some interconnections between reality (the actual production of humanoid robots in the U.S.) and fiction (the presentation of AI in the American movie industry).

This topic will not merely be a study of the films, but rather a social and cultural analysis, as much of the terminology and many of the concepts are based on and inspired by the evolving understanding of what it means to be human. There are noticeable patterns used in American cinematography which must be revealed and analyzed in order to understand the development of AI, its emerging popularity, and the often-controversial issues involved. A list of abbreviations used in the thesis is featured at the end of the work.

1 DEFINITION OF RELATED TERMINOLOGY

In order to easily discuss the AI aspect in the film and related works, it is necessary to get familiar with the terminology related to the artificial intelligence, robotics and other disciplines. The following terminologies will be used for a proper discussion of the film and for a comparison of the film with other films in order to find their common features.

1.1 Artificial intelligence

Artificial intelligence (AI) is quite difficult to define in any exact way, simply because the technology is always changing at ever-increasing speeds. The pace of the ever-changing technological development may be demonstrated by the famous Moore's law which signifies the miniaturization of the technological devices which in the final consequence fill the core interior of intelligent systems. Moore noticed that the number of electronic units situated on a single integrated circuit increased by double each year since 1959 in average.[1] In addition, as it stands now, AI must be compared to human capabilities, and there is no clear agreement among scientists, (or philosophers) as to a definition of what human intelligence is. It is not wrong to say though, that AI is a process of creating programs that show comparable intelligence to that of humans', or, it can be also understood as a program or the capability to think as such. John McCarthy, who founded the term and discipline of artificial intelligence defined it as "that of making a machine behave in ways that would be called intelligent if a human were so behaving". There had been many attempts to define it, but neither the definition of AI nor human intelligence have been acknowledged as universal. What could be possibly regarded as a factor of human intelligence might be the ability and speed of calculation. However, this is certainly not applicable and comparable to robots or intelligent machines because that would mean that each and every calculator people daily use for their purpose is much more intelligent than humans. Which is obviously not true. Also, what needs to be considered as a human intelligence is not only the outcome of thinking but also the way humans deal with a certain problem.[2] We ought to keep in mind that intelligence is a very wide term and can be dealt with from different points of view. In 2019, in relation to a need of AI in healthcare, Jatinder Bali et al. described the essence of AI as a computer system which mimics "intellectual processes characteristic of humans, such

[1] John M. Shalf, "Computing beyond Moore's Law" *Computer* 48, no. 12 (December 2015): 14.
[2] Jerry Kaplan, *Artificial Intelligence: What Everyone Needs to Know* (New York: Oxford University Press, 2016), 1-2.

as the ability to reason, discover meaning, generalize, or learn from past experience."[3] Lastly, general intelligence can also be understood as "the capability of any system to take advantage of their environment to achieve a goal."[4] From the logical point of view, the definition of human intelligence should be similar to that of AI and indeed, the classical AI determines it as an imitation or duplication of human intelligence.[5]

The level of AI can be tested to certain degree by a famous Turing Test. The name of the test derives from the renowned mathematician Alan Turing who was interested in the machine's ability or inability to think. He introduced a famous Imitation Game which is the second name for Turing Test. It was the Imitation Game which spread the idea of connecting the cognitive abilities of machine and human and thus set the basis for *computationalism*.[6] The first mention of Turing Test is in Turing's seminal paper from 1950 where he ponders the question of whether machines are able to think. Even nowadays, Turing Test still represents a substantial part of the study on artificial intelligence. The test itself is based on a computer chat conversation where an interrogator (a human individual) is supposed to say whether he was chatting with a machine or a person. If the interrogator cannot recognize the machine from human, the machine passes the Turing Test and is therefore recognized as capable of simulating the human conversational habits. Turing's intention of this test was that if humans can imitate the human intelligence and apply it on robots, then it can be a cornerstone for its better understanding.[7] There have been some ideas on modification of the original Imitation Game, for example so-called Moral Turing Test which is, however, not aimed at imitation of human dialogues but at acting morally. Such an intention would be based on rules-following programs designed on the basis of what is morally acceptable for humans.[8]

The juxtaposition of the human and the machine could be one of the reasons why the popular anxieties about intelligent robots have come to be presented so often in American

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[3] Jatinder Bali, "Artificial Intelligence (AI) in Healthcare and Biomedical Research: Why a Strong computational/AI Bioethics Framework is Required?" *Indian Journal of Ophthalmology* 67, no. 1 (January 2019): 3.
[4] Camilo Miguel Signorelli, "Can Computers Become Conscious and Overcome Humans?", *Frontiers in Robotics and AI* 5, no. 121 (October 2018): 3.
[5] Kevin Warwick, *Artificial intelligence: the basics* (Milton Park, Abingdon, Oxon; New York: Routledge, 2012), 31-32.
[6] M. Beatrice Fazi, "Can a Machine Think (Anything New)? Automation Beyond Simulation," *AI & Society* (February, 2018): 1.
[7] Kevin Warwick, "Can machines think? A report on Turing test experiments at the Royal Society," *Journal of Experimental & Theoretical Artificial Intelligence* 28, no. 6 (2016): 989-990.
[8] Anne Gerdes and Peter Ohrstrom, "Issues in Robot Ethics seen through the Lens of a Moral Turing Test," *Journal of Information, Communication & Ethics in Society* 13, no. 2 (2015): 99-100.

cinematography, especially since the late 1970s. Key humanistic ontological questions have been reflected in the interest in AI and intelligent robots in contemporary American society and popular culture.[9]

Artificial intelligence is classified in two main streams:

1) Weak artificial intelligence (weak AI) – which is characterized as one that cannot take any further steps on its own than those which it was designed for by technologists and scientists.[10] In this case the intelligence can only be simulated and people are hoodwinked into believing that the robot is really intelligent.[11] This is the current level of development in artificial intelligence, that is, there is not a software that would have its own mind and consciousness yet.[12]
2) Artificial General Intelligence (strong AI) – which is able to think for its own and does anything to solve a certain problem or overcome an obstacle. The limitation is set through technological adjustment to perform physical movement determined by its architectural construction.[13] The possibility of creating an intelligent system is based on deep understanding of human brain's intelligent processes.[14] There have been some objections against the strong AI, as Alexey Melkikh points out in his work with reference to Kurt Gödel who claims that human thinking is not based on calculations and therefore, it cannot be simulated by machines.[15] The strong AI is the level of intelligence that is commonly presented in American cinematography. When looking at the main protagonist in Spielberg's film *A.I.*, David, we see that he is able to understand, love and chase his own dreams. He is capable of behaving as a real human.

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[9] Can Diker, "Digital Technology, Attraction and Cinema," in *New Approaches in Media and Communication*, ed. Ahmet Ayhan (Berlin: Peter Lang, 2019), 124.
[10] Roman Barták, *Co je nového v umělé inteligenci* (Prague: Nová beseda, 2017), 14-15.
[11] Brian Ross Duffy, "Anthropomorphism and the social robot," *Robotics and Autonomous Systems* 42, no. 3-4 (March 2003): 178-179.
[12] Bert Olivier, "Artificial Intelligence (AI) and Being Human: What Is the Difference?" *Acta Academica* 49, no. 1 (June 2017): 4.
[13] Roman Barták, *Co je nového v umělé inteligenci* (Prague: Nová beseda, 2017), 15.
[14] Brian Ross Duffy, "Anthropomorphism and the social robot," *Robotics and Autonomous Systems* 42, no. 3-4 (March 2003): 178.
[15] Alexey Melkikh, "Quantum Metalanguage and the New Cognitive Synthesis," *NeuroQuantology* 17, no. 1 (2019): 73.

David Gamez from the University of Sussex explains the difficulty of developing strong AI by the following words:[16]

> It could take hundreds or thousands of years to develop artificial systems with human levels of consciousness and intelligence. It might be impossible to build super-intelligent machines. Current discussion of these issues is little more than speculation about a distant future that we cannot accurately imagine.

On the other hand, with the ongoing technological and computational advancements, artificial intelligence has gradually become more complex and more human-like. One of the most interesting questions related to the research into artificial intelligence is the definition of human. In researching artificial intelligence and ways to construct AI to imitate human capabilities, the study of human intelligence itself becomes inevitable, i.e. scientists need to know how intelligence works and, in fact, what it actually is. One of the aspects of human intelligence is the ability to reason and understand. Besides much research in neuroscience and other psychological scientific disciplines, there are also those based on the theory that a human mind is a program. These theories then attempt to describe mental processes through models.[17] The American films that deal with the concept of artificial intelligence are very often concerned with the mentioned attempts to define a human. Spielberg's film, together with *Blade Runner* depict these thoughts by making the viewers actually ponder the differences between the AI and a human. This topic will be further, and in more detail, discussed in the analytical section.

Computationalism is one of the disciplines that build on these ideas. It is a research area that focuses on defining human cognitive phenomena through calculations. This area is also referred to as a *computational theory of mind*, as it deals with the features and processes of human mind (brain).[18] In his work, Marcin Miłkowski refers to Michael J. Apter, who defines the major similarities between human brain (mind) and machine:[19]

The first of these similarities is that both are intended for general usage and both are adaptable to various outer stimuli, a fact which might be a stepping stone to a definition of intelligence itself. The scale flexibility of the adaptations and their limits have not been yet defined properly, and even though the adaptability of the human mind is clearly obvious, it has not been proved that the adaptability is limitless. Secondly, both the human brain and

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[16] David Gamez, *Human and Machine Consciousness*, (Cambridge: Open Book Publishers, 2018): 147.
[17] Marcin Miłkowski, "From Computer Metaphor to Computational Modeling: The Evolution of Computationalism," *Minds and* Machines 28, no. 3 (July 2018): 516-17.
[18] Ibid., 517.
[19] Ibid., 518-522, 524.

the computer are able to process information, even though there are obvious differences related to the level of processing and many theorists reject the idea that human brain and computer process information in the same manner. Thirdly, both of these systems are able to model a reality. Milkovski also refers to Kenneth Craik, who claims:

> By a model we thus mean any physical or chemical system which has a similar relation-structure to that of the process it imitates. By 'relation-structure' I do not mean some obscure non-physical entity which attends the model, but the fact that it is a physical working model which works in the same way as the process it parallels, in the aspects under consideration at any moment. Thus, the model need not resemble the real object pictorially; Kelvin's tide-predictor, which consists of a number of pulleys on levers, does not resemble tide in appearance, but it works in the same way in certain essential respects.

Last but not least, another similarity is that both systems are constructed of various clusters of elements which, in the end, create a complex behavioral system. A basic hypothesis in the field of neuroscience is that all the electrical and chemical nervous signals bear computational information. All in all, this theorem is a direct scientific opinion on the imitability of human intelligence, i.e. it can be imitated, although this scientific area is relatively unstable in terms of theoretical union.[20]

Viewed from a philosophical perspective, these thoughts and ideas are the borderline of where humanism ends and posthumanism begins. Human brain begins to be looked at as a machine and instead of investigating the origin and the essence of being, we investigate how human brain and body function. Posthuman thinking implies that even the eternal mystery of human consciousness can be explained through computing and that thinking is nothing untouchable but a result of a materialistic processing.[21] There are already posthuman views among many scientists claiming that the uniqueness and exceptionality of human beings among other creatures on earth and maybe even in space is an old ideology. Humans build intelligent machines which are becoming more and more human-like. This process, however, raises many fundamental questions because the values that used to be relatively stable definition of what it means to be human are becoming vague and questionable. The intelligence of human beings is becoming to resemble the one of machines because of the

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[20] Marcin Miłkowski, "From Computer Metaphor to Computational Modeling: The Evolution of Computationalism," *Minds and Machines* 28, no. 3 (July 2018): 536;
Stephen Dougherty, "Culture in the Disk Drive: Computationalism, Memetics, and the Rise of Posthumanism," *Diacritics* 31, no. 4 (Winter, 2001): 86.
[21] Stephen Dougherty, "Culture in the disk drive: computationalism, memetics, and the rise of posthumanism," *Diacritics* 31, no. 4 (Winter, 2001): 85-86.

attempts to define human from a computational point of view.[22] *A.I.* is a film that directly opens the topic of human imitability. The film has a great understanding for David and other simulacra, as they are depicted with the same seriousness and capabilities as humans. Even the fact that the main protagonist is a robot itself, is a decent insight into the conceptualization of a human being through the computational ideas.

1.2 Social (humanoid) robots and anthropomorphism

So far, we have been speaking about software, a program, but in order to investigate the depiction of artificial intelligence in film, it is impossible to avoid the topic of robotics. It is impossible because every program (artificial intelligence) needs a physical machine that gives it the environment in which it can operate.[23] Hence, in Spielberg's *A.I.*, despite the name of the film which clearly states "artificial intelligence," the main protagonist is a child-like robot in which the AI is embedded.

There is a need to mention the origin of the robot's terminology, the coinage of the word "robot" by Karel Čapek, the Czech novelist, journalist and playwright. His renowned play *R.U.R.* presents a disastrous scenario for humankind and its utter annihilation. Čapek had quite different concept of a robot compared to today's perception of mechanical entity because his robots were biological machines. In *R.U.R.*, Čapek distinguishes robots from humans by the capacity to love.[24] In *A.I.,* the concept of love distinction is outdated by depiction of David who is designed to have the ability to love, in sense of relationship between mother and a child. Apart from the David's perfect outer appearance it is also love which gives David the credibility to be very similar to a human. It is important to say though, that it was Čapek who set the founding stone of the popular representations of humanoid robots in fiction and that the fiction inaugurated the idea of humanoid robotics, not science.[25]

1.2.1 Humanoid robots

Humanoid robots (humanoids) are defined as robots which generally behave as human beings.[26] They also look like humans and are therefore able to operate better in human

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[22] Gilles Bibeau, "What Is Human in Humans? Responses from Biology, Anthropology, and Philosophy," *Journal of Medicine & Philosophy* 36, no. 4 (April 2011): 355.
[23] Lee McCauley, "AI Armageddon and the Three Laws of Robotics," Ethics and Information Technology 9, no. 2 (July 2007): 156.
[24] Jim Clarke. "R.U.R.: Rossum's Universal Robots." *Foundation* 46, no. 128 (2017): 78.
[25] Kathleen Richardson, "Technological Animism: The Uncanny Personhood of Humanoid Machines," *Social Analysis: The International Journal of Social and Cultural Practice* 60, no. 1 (Spring 2016): 111.
[26] Malachy Eaton, *Evolutionary Humanoid Robotics* (Heidelberg: Springer, 2015): 33.

environment.[27] In their paper, Martina Mara and Markus Appel refer to the work of MacDorman & Ishiguro from 2006 called "The uncanny advantage of using androids in cognitive and social science research" where they claim that human-like appearing robots are more likely to be treated as real humans and only then can these robots behave socially in terms of proper communication with humans and justify their role as social partners.[28]

The most advanced humanoid robots in the U.S. are:

- Atlas – a humanoid robot developed by Boston Dynamics, excelling at orientation capabilities and movement in human space.[29] It has an advanced mobility, adaptable to various terrains and can even perform a back flip. Atlas is one of the top-level humanoid robots in the U.S.[30]
- Pepper – a Softbank Robotics' humanoid, capable of communicating through body language, voice and facial expressions. It can also analyze and react to people's facial expression. Its ability to move around is another reason this robot has many times been used in schools and homes for social purposes.[31]
- Valkyrie – a robot of humanoid form developed by NASA for assistive purposes on Earth and in space. The robot can move around using its wheels, manipulate objects and use various robotic addons.[32]
- Digit – a bipedal delivery robot designed by Agility Robotics that can manipulate objects with its hands and easily orientate in space thanks to its sensor system and agile legs.[33]

Malachy Eaton determines certain sublevels of humanoids based on their level of similarity to human (from the most similar to the least):[34]

- Replicant – such robots are indistinguishable from human beings. They show a very high level of intelligence and their motor functions are an accurate imitation of that

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[27] Lei Zhang et al., "Multi-Target Detection and Grasping Control for Humanoid Robot NAO," *International Journal of Adaptive Control and Signal Processing* 33, no. 7 (June 2019): 1225.
[28] Martina Mara and Markus Appel, "Effects of Lateral Head Tilt on User Perceptions of Humanoid and Android Robots," *Computers in Human Behavior* 44 (March 2015): 327.
[29] Ghassan Atmeh and Kamesh Subbarao, "A Neuro-Dynamic Walking Engine for Humanoid Robots," *Robotics and Autonomous Systems* 110 (December 2018): 125.
[30] Jung-Hoon Kim, "Multi-Axis Force-Torque Sensors for Measuring Zero-Moment Point in Humanoid Robots: A Review," *IEEE Sensors Journal* 20, no. 3 (February 2020): 1133.
[31] Amit Kumar Pandey and Rodolphe Gelin, "A Mass-Produced Sociable Humanoid Robot: Pepper: The First Machine of Its Kind," *IEEE Robotics & Automation Magazine* 25, no. 3 (September 2018): 41.
[32] Nicolaus Adam Radford et al., "Valkyrie: NASA's First Bipedal Humanoid Robot," *Journal of field robotics* 32, no. 3 (2015): 398.
[33] Jonathan Hurst, "Walk This Way: To be Useful Around People, Robots Need to Learn How to Move Like We Do," *IEEE Spectrum* 56, no. 3 (March 2019): 33, 50.
[34] Malachy Eaton, *Evolutionary Humanoid Robotics* (Heidelberg: Springer, 2015): 36-37.

of human's. They can be recognized only through ingestion and excretion of nourishment.

- Android – androids have a profound information of human morphology and show a very high level of intelligence. They can be distinguished from humans.
- Humanoid – these robots are similar to human but are easily recognizable as being robots. They show a high level of anthropomorphism in regard to their intelligence and motor functions.
- Inferior humanoid – they are constructed to perform limited number of tasks. They still remind of human body and human behavior.
- Human-inspired – such robots do not necessarily remind of human but still have quite wide information about human morphology.
- Built for human – robots which are designed to work in conditions that are designed for humans. No longer a human-inspired body.

One might ask: 'why humanoids? Why do people want to create artificial beings?' From the most philosophical point of view, the human desire to 'play gods' by creating (artificial) life can be dated a long time back in the history and one of the reasons for this desire to create artificial life in sense of building artificial humans e.g. humanoid robots is, as Tony E. Jackson, a professor at the English Department at the University of North Carolina at Charlotte argues, the inborn tendency to imitate outer impulses of others, be it voice, movements or facial expressions, on which has been done scientific research.[35] From a scientific point of view, development of humanoid robots enables an understanding of human intelligence, anatomical dynamics, and behavior.[36] Creating humanoid robots has also a practical meaning. There are some particular areas of usage for these anthropomorphic robots. One area of the possible applications is described as the so-called '3Ds' sector which represents an abbreviation of three words in terms of work conditions of a worker (in this case robot): dirty, dangerous, and dull. Another possibility is to associate these robots with some kind of aids with housework. The robots can also be used as entertainment or caregivers of elderly people or children.[37] A specific area of usage of care robots in the U.S. is the rising problem of an increasing number of elderly people, as opposed to the young.

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[35] Tony E. Jackson, "Imitative Identity, Imitative Art, and AI: Artificial Intelligence," *Mosaic: A Journal for the Interdisciplinary Study of Literature* 50, no. 2 (June, 2017): 48-49.
[36] Ludovic Righetti et al., "Growing the Humanoid Robotics Community [TC Spotlight]," *IEEE Robotics & Automation Magazine* 26, no. 4 (December 2019): 136.
[37] Malachy Eaton, *Evolutionary Humanoid Robotics* (Heidelberg: Springer, 2015), 34.

The prognosis is, that there will not be enough human employees to take care of these people. Social humanoid robots are considered to be the solution to this shortage.[38] The shortage of nurses in social services and medical facilities in 2020 is estimated at 400,000 which makes a lot of private companies and a government invest in humanoid robots that would help both the caregivers and their clients. Another huge area of investment is in the education sector. Robots are expected to be used as an interaction tool and may even replace human teachers at schools.[39]

An example of such a robot is the U.S. robot called Cody, able to autonomously wash human limbs and thus, help nurses with the patient's overall hygiene. Another useful humanoid is called PR2. This robot is able to move around in the human environment and help with chores in houses such as bringing objects, cleaning, or setting a table for dinners.[40]

1.2.2 Anthropomorphism and social robots

Anthropomorphism is "the tendency to attribute human characteristics to inanimate objects, animals, and others to help us rationalize their actions." Anthropomorphism aims to simulate the human appearance but most importantly the human behavior and make the robots capable of communicating with humans on an acceptable intelligent level or to make the robots react similarly to humans. The level of anthropomorphism is directly linked with the way we act with the robots. For example, the fact that a humanoid robot looks like a real person does not mean it has human qualities. If a robot does not have the human qualities it can barely be considered worthy of conversing with. The level of anthropomorphism is an instrument to meet the human requirements of socially interactive robots.[41] It also makes the social interaction between a human and a machine much easier since the robot is adapted to the communication styles of humans.[42]

A social robot is a specific type of robot, designed to naturally interact with humans. They are used as interactive tools, particularly in education, therapy, and health care sectors. Their design is often humanoid because it makes it easier for humans to interact with such

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[38] Samuel H. Kenyon, "Would You Still Love Me If I Was a Robot?" *Journal of Evolution & Technology* 19, no. 1 (September 2008): 3.
[39] Hector Gonzalez-Jimenez, "Taking the Fiction Out of Science Fiction: (Self-Aware) Robots and What They Mean for Society, Retailers and Marketers," *Futures* 98 (April 2018): 51-52.
[40] Azeta Joseph et al., "A Review on Humanoid Robotics in Healthcare," *MATEC Web of Conferences* 153 (2018): 1-2.
[41] Brian Ross Duffy, "Anthropomorphism and the social robot," *Robotics and Autonomous Systems* 42, no. 3-4 (March 2003): 180-181.
[42] Scott H. Hawley, "Challenges for an Ontology of Artificial Intelligence," *Perspectives on Science & Christian Faith* 71, no. 2 (June 2019): 88.

robots and anthropomorphize them, that is, to interact with them as if interacting with real humans.[43] This is exactly what is present in *A.I.* David seems to be so real both in behavior and in appearance that he makes it impossible for Monica to treat him otherwise than as a real boy. The communication with David is very persuasive, and even though, Monica knows he is a machine, she cannot resist being emotionally moved when David reassures her that he is a real boy by drawing pictures with written messages attached to them, to make Monica truly love him in return.

It has been proven in psychology and neuroscience that when interacting with other humans, certain cerebral mechanisms are being activated. Understanding these mechanisms and activities in the human brain can thereby make it possible to construct a robot, which is more human-like and augment the human-robot interaction onto a higher level.[44] In the film, the main protagonist is a humanoid robot called David who is designed to substitute a real child and thus help childless couples who had lost their child. The level of David's similarity to a human being is 'replicant' level since he is indistinguishable from a human being. David in *A.I.*, the replicants in *Blade Runner*, and the unembedded artificial intelligence in *Her*, they all represent the highest forms of anthropomorphic similarity. Due to this similarity, the machines are well accepted and communication with them is very natural and intuitive. The films represent the issues that are currently being discussed at the real-world laboratories of the U.S.

A great reason anthropomorphism is important to social robots is that the communication between a human and a robot can be more natural because the robot can, therefore, express emotions via its face.[45] Emotions play a crucial role in human social functionality. Concerning robots, emotions can be understood as an anthropomorphic ability that supports the robot's capability to be socially more acceptable and to perform better in ordinary communication with humans.[46] An example of a robot that can express and also recognize emotions is already mentioned humanoid robot Pepper, developed by Softbank Robotics.

David in Spielberg's film is primarily special due to his ability to not only express emotions but to feel them. It serves as a counter-strike to the previous visions of dangerous creations seen in James Cameron's *Terminator*, Ridley Scott's *Blade Runner*, Karel Čapek's

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[43] Bruno Siciliano and Oussama Khatib, *Springer Handbook of Robotics* (Berlin: Springer 2016): 1935-1936.
[44] Eva Wiese, "Robots as Intentional Agents: Using Neuroscientific Methods to Make Robots Appear More Social," *Frontiers in Psychology* 8, no. 1663 (October 2017): 4-5.
[45] Ibid., 3
[46] Brian Ross Duffy, "Anthropomorphism and the social robot," *Robotics and Autonomous Systems* 42, no. 3-4 (March 2003): 183-184.

R.U.R., Mary Shelley's *Frankenstein; or, the Modern Prometheus*, and the following cinematographic adaptations. Spielberg's David is not against humans here but for them. Even though there are still echoes of anxieties about robots in *A.I.*, love, as Coeckelbergh claims, may be considered as some kind of redemptive motive that facilitates the robot's acceptance by eliminating the thoughts of dangerous Frankenstein's monster, as will be further discussed in more detail. The integration of love in robots is accomplished by the fusion of the Enlightenment and Romanticism, providing a basis for a better and more acceptable understanding of humanoid robots in the film.[47]

Javier Movellan, head of the Machine Perception Laboratory at the University of California, develops robots that are supposed to communicate with children and make them smile. These robots are able to register the emotions of children through their facial expressions. The robots learn to behave following the response of the children. Their learning progress is based on the neural processes of the human brain. The structure of the artificial networks inside the robot changes according to the received responses of the child and thus imitates the neural processes in the brain.[48]

1.3 Development of AI and robotics in the U.S.

The previous chapters were focused on the definition and explanation of basic terminology needed for further discussion of the topic of artificial intelligence and robotics in general. This chapter tries to put the terminologies into historical, literate, and cinematic context. Contextualization of the terminology should facilitate the upcoming analysis in the analytical section of this work where various common and distinct concepts among the cinematographic works will be discussed.

1.3.1 Frankenstein Complex

What seems to interweave many of Hollywood but also the general Western culture representations of robots is the so-called "Frankenstein Complex". It is a widely used phenomenon introduced by Isaac Asimov, the author of a series of stories about robots. The phenomenon depicts advanced (usually) humanoid robots turning against humans or even the whole of humanity.[49]

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[47] Mark Coeckelbergh, *New Romantic Cyborgs: Romanticism, Information Technology, and the End of the Machine* (Cambridge: MIT Press, 2017): 178.
[48] Jean Thilmany, "The Emotional Robot. Cognitive Computing and the Quest for Artificial Intelligence," *EMBO Reports* 8, no. 11 (11, 2007): 992.
[49] Lee McCauley, "AI Armageddon and the Three Laws of Robotics," *Ethics and Information Technology* 9, no. 2 (July 2007): 153-154.

Nonetheless, as the name of this complex implies, its nature is derived from the renowned novel *Frankenstein; or the Modern Prometheus* written by Mary Shelley. In the novel, Victor Frankenstein, the main protagonist, creates a humanoid monster which is composed of pieces of dead bodies' flesh. Victor is furiously obsessed with putting life into an inanimate object and after some time he reaches his victorious achievement. This achievement becomes, however, fatal for him. His monster is an intelligent being and blames its creator for its miserable position in the world and for cursing the creature by its horrid appearance which does not allow it to live happily. In the end, the monster turns against him by taking revenge on Victor's beloved family and killing them all.

This topic of the turning of an intelligent antagonist against the creator has been adapted numerous times in American popular culture. Ironically, what ought to be a familiarizing entertainment about intelligent robots often results in spreading fear and anxiety among American people.[50] There has been made research on the public perception of autonomous robots in the U.S., and what it suggests is that the public is afraid of the real-world autonomous robots and that the source of this fear might be Hollywood popular representations of robots. However, the research proved that the American public, for whatever reason, is afraid of autonomous robots. What is also observed is that when introduced to a new series of robots, which participants reckon as being autonomous, they perceive the robots as a threat. The threat regards human jobs, safety, and the uniqueness of humankind. Participants therefore, tend to oppose further robotic research.[51]

However, these perceptions are also intensified by the claims of famous specialists and thinkers such as Ray Kurzweil, Kevin Warwick, and Hans Moravec, who anticipate intelligent robots to eventually replace humans.[52] Stephen Hawking, a renowned American mathematician warned that "the development of full artificial intelligence could spell the end of the human race." Elon Musk, a founder of Tesla and SpaceX corporations said: "If I had to guess what the biggest threat to our existence is, it's probably artificial intelligence." It is no surprise then, that the public attitude towards artificial intelligence and autonomous robotics in North America is a bit skeptical.[53]

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[50] Ibid., 154.
[51] Jakub Złotowski et al., "Can We Control It? Autonomous Robots Threaten Human Identity, Uniqueness, Safety, and Resources," *International Journal of Human-Computer Studies* 100 (April 2017): 51-52.
[52] Lee McCauley, "AI Armageddon and the Three Laws of Robotics," *Ethics and Information Technology* 9, no. 2 (July 2007): 154.
[53] Jakub Złotowski et al., "Can We Control It? Autonomous Robots Threaten Human Identity, Uniqueness, Safety, and Resources," *International Journal of Human-Computer Studies* 100 (April 2017): 48.

1.3.2 Historical background and understanding of the approach

The depictions of artificial intelligence and computers in American cinema have been rather negative due to the yet introducing, fascinating but also very concerning computing power and thus, a new unknown phenomenon that has the potential of replacing human brains. An example is the American film *Metropolis* from 1927 where the topic is gradual enslavement of humans by factory machinery and industrialized society itself. One of the examples is also *Bride of Frankenstein* from 1935, a film adaptation of a subplot of Mary Shelley's gothic novel from 1818. Because of the ever-growing autonomy of machinery, a lot of films depicting human-like robots gave rise to questions about the motivations for further technological progress and the possible danger of intelligent artificial agents.[54] These thoughts were also presented in the renowned classic *Terminator* from 1984, presenting a humanoid robot whose purpose is to destroy humanity and *Blade Runner* from 1982, depicting replicants turning against its human creator.

Depictions of killer robots in the American cinema were likely influenced by the hot topic of serial killers in the U.S. at that time. The danger of present killers was combined with the growing concerns about artificial intelligence, especially after catching a serial killer Ted Bundy in 1977. As Kristi Brown Montesano, Chair of the Music-History Faculty at the Colburn Conservatory of Music in Los Angeles explains, "public anxiety about technology has always been about more than the possibility of circuit boards becoming sentient; the real fear was that they would manifest and magnify the worst behavior of human beings."[55] Michael Szollosy, a Research Fellow at the Department of Psychology and Computer Science at the University of Sheffield, further develops the idea by directly pointing at our humanity in robots. He particularly examines the connections between popular representations of robots in science fiction and Frankenstein. The monster's creator in Shelley's novel could be understood as being the monster himself because he created it. On the same level, the popular culture's robots could be understood as reflections of humans. The fear of robots being evil and serial killers is the fear of human's darkest corners of the psyche and the robots themselves, according to Szollosy, need to be understood as some kind of projection matter. In this sense, the robots project human fears of becoming equally

[54] Brown-Montesano Kristi, "Terminal Bach: Technology, Media, and the Goldberg Variations in Postwar American Culture," *Bach* 50, no. 1 (2019): 101-104.
[55] Ibid., 108-110.

soulless and calculated as are the intelligent humanoids in films. Looking at the robots of humanoid form is, therefore, looking at our evil selves (humans) in the mirror.[56]

The idea of humans possessing the robot capacities by being "rational, efficient, cold, mechanical, soulless and, ultimately, destructive" has been inaugurated in Karel Čapek's play *R.U.R.* It was a response to the problems of dehumanization due to the industrialization in the early 20th century. Čapek reacted to the mechanized killing during The Great War and the general concept of industrialized humanity at that time.[57] The robots in the play are therefore a metaphorical depiction of humans.

After the popularization of the concept of serial a killer, there has been much more attention paid to humans and Hannibal Lecter has become the new portrait of the cold and rational behavior that had been attributed to robots in films.[58] The overall concerns about machine takeover and evil depictions were on the mind of the American public until the arrival of first personal computers to homes in the 1980s when people began to familiarize themselves with the scapegoating electronic devices, and the fear of the unknown faded a bit. Androids and other humanoid robots in films have begun to be seen as friendly partners to humans since then.[59] Examples of the new robot depiction are our central material– Spielberg's *A.I.* from 2001 and *Her* from 2013.

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[56] Michael Szollosy, "Freud, Frankenstein and Our Fear of Robots: Projection in Our Cultural Perception of Technology," *AI & Society* 32, no. 3 (August 2017): 434-437.
[57] Ibid., 437.
[58] Brown-Montesano Kristi, "Terminal Bach: Technology, Media, and the Goldberg Variations in Postwar American Culture," *Bach* 50, no. 1 (2019): 111-112.
[59] Ibid., 109.

2 ANALYSIS OF ARTIFICIAL INTELLIGENCE IN THE FILM

The background section was dedicated mainly to the definition of terminologies and concepts. The analytical section will deal with the implementation of these concepts into the film and the comparison with other literary and film works. This section will also track the significance of the present developments and enhancements in artificial intelligence and robotics and its implications on human values. There are some common ideas presented within the selected films which should provide deeper insight and understanding of the American popular culture's representations of artificial intelligence and most importantly, artificial humans.

2.1 Romanticism vs the Enlightenment

In *A.I.*, robots are naturally integrated in the human society. Also, the sociality of the robots is on a very high level since the robots communicate with humans on the same intellectual level as do humans communicate with each other. These characteristics are what we described in the background section as anthropomorphism. The higher the anthropomorphism is in a robot, the higher is the chance that it will be accepted in human society.[60] The reason the humanoid robots are built serially in the film is explicitly apocalyptical. Humanity is endangered by the disastrous impact of melting icebergs and the following flood. The majority of people are killed by the consequences of this disaster. Humanoids serve in many aspects of life from sexual pleasure, e.g. Gigolo Joe, to love-emitting robot children such as David. Generally, all the humanoid robots presented by Spielberg are social and are designed as already mentioned representations of socially interactive/social partners. Their function is, however, very economical as well. It is said at the beginning of the film that there had been some population limitations acquired which may suggest that there is a lack of food for humans, lack of space to live, and other social problems. These problems are implicitly claimed in the film by the huge production of androids. Such robots are economically relieving since they do not need to eat, drink, nor they have any special requirements of 'life'. They are designed to serve humans and be their companions. The situation related to the lack of people and increased production of robots is quite present in America, even though, under different circumstances. We discussed in the background section that humanoid robots are being produced in the U.S. that serve as social

[60] Brian Ross Duffy, "Anthropomorphism and the social robot," *Robotics and Autonomous Systems* 42, no. 3-4 (March 2003): 180-181.

partners. Specifically, there is a need for the development of social robots that would help to take care of an increasing number of elderly people who need to be taken care of.[61] It might be yet another sign that the production of humanoid robots and artificial intelligence, and their application in society has been on the minds of American people for a long time.

The Enlightenment idea of serial production of robots in *A.I.* stands as a contradiction to the Romantic idea of an emotional individual. On one side, David is one of many upcoming robots and pure technological progress of humankind that has been rationally applied and implemented to solve social and economic problems introduced in the film. On the other side, we can see the irrational, emotional, and internal individualism of David's who wishes to be exceptional and worthy of his 'mother's' love. A film about technology thus evolves deep and sentimental atmosphere.

In *Blade Runner*, the situation is a bit different. The replicants, as the humanoid robots are called here, are designed primarily for slavery. They are sent to space to discover new planets to colonize them and do dangerous explorations in which, they have a daily threat of death, as it is implied at the end of the film by the leader of the Nexus 6 squad Roy Batty. His last words before death capture and highlights his individualism as a robot in the film: "I've seen things, you people wouldn't believe. Attack ships on fire off the shoulder of Orion. I've watched c-beams glitter in the dark near the Tannhauser Gate. All those moments will be lost in time like tears in rain. Time to die." Roy shows an extreme power of individualism in this situation and mainly, he shows a great deal of humanism. His speech is emotional and powerful which signifies his humanity in the film. He shows that he is not only an empty mechanical shell people consider him to be.

2.2 The Enlightenment and Romanticism in Works Dealing with the Artificial Human

Let us delve into the meaning of an artificial human more deeply. We could do so by looking into the past because the phenomenon of creating artificial life is much older than Spielberg's androids in *A.I.* from 2001 or Ridley Scott's *Blade Runner* from 1983. The beginning of the topic of creation of an artificial life could be traced back in the age of Mary Shelley and her renowned literary piece *Frankenstein; or, The Modern Prometheus* from 1818. There was a great interest in life sciences in the era of Mary Shelley, especially in galvanism. Most

[61] Samuel H. Kenyon, "Would You Still Love Me If I Was a Robot?" *Journal of Evolution & Technology* 19, no. 1 (September 2008): 3.

importantly, these sciences gave rise to the usage of resuscitation techniques, as a result of the huge interest in the usage of electricity. There were also numerous experiments done on animals, demonstrating the possibility to breathe life into already dead bodies which would, allegedly, be able to walk around for a certain period.[62]

The scientific background during Shelley's life is well reflected in *Frankenstein*. Victor Frankenstein's motivation to design an artificial human in the original book story is a pure obsession with science and knowledge. As he proceeds with reading and studying, he suddenly appears in a situation when he reveals the possibility to animate an inanimate object. From this moment on, his obsession to create an artificial life is even deeper and more intense than the whole previous process of studying:

> My temper was sometimes violent, and my passions vehement; but by some law in my temperature they were turned, not towards childish pursuits, but to an eager desire to learn, and not to learn all things indiscriminately. I confess that neither the structure of languages, nor the code of governments, nor the politics of various states, possessed attractions for me. It was the secrets of heaven and earth that I desired to learn; and whether it was the outward substance of things, or the inner spirit of nature and the mysterious soul of man that occupied me, still my inquiries were directed to the metaphysical, or, in it[s] highest sense, the physical secrets of the world.

What we see in the modern cinematography is a merging of Romantic and Enlightenment thoughts. Even though the ideas are completely different, they seem to correlate naturally in the cinematic depictions of modern technology. In his book, Mark Coeckelbergh calls this phenomenon 'cyberromanticism' or 'material romanticism'.[63]

The merging of the Enlightenment and Romantic movements is visible in all three selected films. We can see an emotional David in *A.I.* surrounded by heaps of other humanoid robots in the world, and what is more, we can see him surrounded by other Davids at the end of the film. The romantic David is contrasted by the economically desired production of humanoid robots, a reasonable solution to the outcomes of the apocalypse presented at the beginning of the film. We can even see the conflict within David himself–his emotions and his love are real but he is not. He is a machine. It is presented by his urge to become a real boy, implemented by a Pinocchio story told by his 'mother' Monica. He can infinitely love Monica but she is unable to return this love to him because he is just a robot, not a real person.

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[62] Silvia Micheletti, "Hybrids of the Romantic: Frankenstein, Olimpia, and Artificial Life," *Berichte zur Wissenschaftsgeschichte* 41, no. 2 (June 2018): 147-149.
[63] Mark Coeckelbergh, *New Romantic Cyborgs: Romanticism, Information Technology, and the End of the Machine* (Cambridge: MIT Press, 2017): 3, 5.

Similarly, in *Blade Runner*, the Nexus 6 replicants who seem to be, as the motto of Tyrell's Corporation says: "More human than human," are confronted with the Enlightenment idea of calculated production that shall serve as an expanding tool for humanity. The replicants indeed seem to be more human than humans in the film. The test that is used by Blade Runners for identifications of replicants, is preliminarily based on triggering an emotional response. The emotional capacity that is considered to be the essence of being a human in the film and which is visible in replicants, is somewhat elusive to human interrogators, emotionlessly following the points of their questionnaires.

Mary Shelley's gothic novel, an important exemplar of the Romantic movement in England, is a perfect reaction to the Enlightenment in the eighteenth century, emphasizing reason and rationality.[64] Looking at *Bride of Frankenstein*, the scenario is quite similar. The monster Frankenstein has created is, as well as David, abandoned in woods, not receiving any sort of love or solidarity. On the contrary, David, the monster, and the replicants in *Blade Runner*, they all are hunted by humans. They all are, in a way, depicted as victims. Now, this common feature shared among these cinematic works presents people as equally evil as robots. In all the three selected works, the robots are put in a position of separation, enslavement, and discard. The films generally offer the viewpoint of humans resembling the machines in a way of giving them those attributes that have been so often assigned to the revolting dangerous androids in the popular film representations in American cinema. And vice versa, the fundamental elements which used to define human beings, are being applied to always empty technological shells. The argument that is provided here is, that by blurring Romantic and Enlightenment principles in science fiction narratives, the films also blur the borderline between a human and a machine, and thus the imagery of machine as a mere technological construct ceases to exist.[65]

In the background section of this work, we discussed the term anthropomorphism and its usage for the facilitation of human-robot interactions. However, it is also a key ingredient for the dehumanization of humans. [66] On one hand, robots can deputize for humans in many needed situations. On the other hand, anthropomorphizing robots results in anxieties about human identity because it makes it more difficult for humans to clearly distinguish

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[64] Lee Mackinnon, "Artificial Stupidity and the End of Men," *Third Text* 31, no. 5-6 (2017): 610.
[65] Mark Coeckelbergh, *New Romantic Cyborgs: Romanticism, Information Technology, and the End of the Machine* (Cambridge: MIT Press, 2017): 136.
[66] Scott H. Hawley, "Challenges for an Ontology of Artificial Intelligence," *Perspectives on Science & Christian Faith* 71, no. 2 (June 2019): 88-89.

themselves from machines.[67] This problem has been many times presented in popular depictions of humanoid robots in American films. With the ever-evolving technological progress and human dependence on them, these anxieties are likely to gradually strengthen.

A strong aspect of Romanticism in the films is the ability to love or to feel any emotions from the side of robots. As was mentioned in the background section, love in particular, is a tool to make plain technological progress more interesting and Romantic. It is also considered to be a tool to prevent perceiving robots as killing machines, as it is so often when imagining the phenomenon of Frankenstein monster.[68] When seeing an emotional child-like David in *A.I.*, it will likely not be seen as negatively as, for example the killer robot in *Terminator* from 1984. Due to the aspect of emotions, it is possible to understand the deeds of the machines throughout the fictional narratives and cinematographic works of fiction. Because of the embedded emotional perception and expression, we understand why David drags his real brother Martin into the water. It is because he is afraid of other boys who test his pain perception. He wants Martin to save him, defend him, and in this situation, we not only understand David, we feel pity for him. Even though, David almost drowns Martin, due to an extensive lasting of his defensive reaction, we understand why he does that. The most important emotion in David is love. He is able to attach to another person and this ability makes him more human.

The humanness in *Blade Runner* is defined by having emotions as well. The replicants would probably be perceived as being nothing more than killing machines if they did not have the emotional aspect in them. It is visible in the film that there is a romantic relationship between the replicants Roy Batty and Pris. They kiss each other; smile on each other. In more general terms, emotionality in robots is a powerful feature that adds to the humanness of robots presented in the films. This effect might result in better acceptance of robots in real life or, on the contrary, cause even deeper anxieties about personal identity because the robots look and behave like humans.[69]

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[67] Francesco Ferrari et al., "Blurring Human–Machine Distinctions: Anthropomorphic Appearance in Social Robots as a Threat to Human Distinctiveness," *International Journal of Social Robotics* 8, no. 2 (2016): 289.
[68] Mark Coeckelbergh, *New Romantic Cyborgs: Romanticism, Information Technology, and the End of the Machine* (Cambridge: MIT Press, 2017): 178.
[69] Min-Sun Kim and Eun-Joo Kim, "Humanoid Robots As "The Cultural Other": Are We Able to Love Our Creations?" *AI & Society* 28, no. 3 (2013): 310.

2.3 Robots, God and humans

The posthuman ideas blurring machines with humans and the computational principles of explaining human capacities by pointing at electric circuits of computers are visibly presented in Spielberg's *A.I.* and Ridley Scott's *Blade Runner*. In both films the humanoids' level of anthropomorphism is very high. They are not only on the 'replicant' level of visual similarity, as was introduced in the background section about humanoids with the reference to Malachy Eaton.[70] They also possess other strikingly similar features to humans. The film's idea that even human feelings can be constructed by computer programming is directly asking the question of what it means to be human in the modern world of ever-advancing technology. In the most elementary view, the films are asking about human ontology and the essence of life. These questions are further developed and intensified by the God references throughout the stories, suggesting that, there is no clear answer for both who we as humans are, and also, what the difference between humans and robots is. Especially if it is possible to completely imitate our human capacities.

2.3.1 God and machines

The God discussed here is understood in the Christian context of the Bible and the doctrine of Trinity, that is, the Father, the Son, and the Holy Spirit. Researches ponder the possibility of religious origin of the computational theory of mind. The eagerness of creating intelligent machines and strong artificial intelligence which is typical of American researches might be directly connected to the historical Euro-American Christian tradition of assigning divinity to inanimate objects and technology. The image of God is present in the fictional representations of humanoid robots which could supposedly redeem human minds and keep them immortal.[71]

At the beginning of *A.I.*, the Promethean figure of Professor Hobby proposes an idea of creating a child-like robot that would have the ability to love, to feel human emotions. There is a moment when one of the Hobby's colleagues asks an ethical question: "If a robot could genuinely love a person, what responsibility does that person hold toward the 'mecha' in return? It is a moral question. Isn't it?" Professor Hobby refers to the Christian concept of

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[70] Malachy Eaton, *Evolutionary Humanoid Robotics* (Heidelberg: Springer, 2015): 36.
[71] Fryderyk Kwiatkowski, ""Let Us Make ROBOT in Our Image, According to Our Likeness". An Examination of Robots in Several Science Fiction Films through the Christian Concept of the "Image of God"," *Zeszyty Naukowe Uniwersytetu Jagiellonskiego. Studia Religiologica* 49, no. 3 (2016): 220-221; Min-Sun Kim and Eun-Joo Kim, "Humanoid Robots As "The Cultural Other": Are We Able to Love Our Creations?" *AI & Society* 28, no. 3 (2013): 316.

God by saying: "The oldest one of all. But in the beginning, didn't god created Adam to love him?" Hobby's motivation to create such a humanoid robot is partially justified by "filling a great human need" in the sense of providing childless couples with a child, even though, an artificial one. In this way, Hobby promises to open a new market. However, his motivations were partially driven by his obsession with science. As we discover later in the film, David is made in the image of his own dead son whom he wants to recreate in this way. What is important in the film is the fact, that the presented humanoids show the ideal and best qualities of humans. David's infinite and perfect love seems to devaluate humans in the film. While David and all the other androids are innocent, good, and perfect at what they do, humans are emotionally unstable and imperfect. David's 'mother' Monica is unable to return his love to him and could even be seen as cruel when leaving small David alone in the dark woods. If we think about David's characteristics, we find that he is (almost) immortal, as he lives for 2000 years and he never stops loving Monica. Immortality, ever-lasting love, and the fact, that David is described as the opposite of sinful and chaotic humans[72] at least marginally invokes the image of God. Understanding robots as divine creatures, is in accord with the American historical tendency to perceive knowledge and therefore also technology as a possible salvation for humanity.[73]

The madness of scientific obsession is visible in *Bride of Frankenstein* as well. Frankenstein is obsessed with science and exactly as professor Hobby, he wants to play God by creating life. He regrets delving into the matter of life and death by saying: "I've been cursed for delving into the mysteries of life. Perhaps death is sacred, and I've profaned it. For what a wonderful vision it was! I dreamed of being the first to give to the world the secret that God is so jealous of. The formula for life." In spite of being punished for his audacity, he still hears his ambitious voices inside himself, as he continues: "Think of the power to create a man. And I did. I did it! I created a man. And who knows? In time I could have trained him to do my will. I could have bred a race. I might even have found the secret of eternal life." A former university professor Doctor Pretorious visits Henry Frankenstein and persuades him to go with him because he, too, was successful in creating life as he says. Pretorious refers to the Bible when he tells Henry to cooperate with him and create even

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[72] William Beard, "A.I. or, The Agony of Steven Spielberg," *CineAction* no. 66 (2005): 10.
[73] Fryderyk Kwiatkowski, ""Let Us Make Robot in Our Image, According to Our Likeness". An Examination of Robots in Several Science Fiction Films through the Christian Concept of the "Image of God"," *Zeszyty Naukowe Uniwersytetu Jagiellonskiego. Studia Religiologica* 49, no. 3 (2016): 221.

more perfect masterpieces. He says: "Male and female created He them." Thus, he refers to the creation of Adam and Eve at the beginning of humankind depicted in Genesis.[74]

Blade Runner touches the topic of divinity as well by illustrating the same Promethean figure as in *A.I.* and *Bride of Frankenstein*. Doctor Tyrell plays God in the same amount as Henry Frankenstein (Victor in the original book) and Professor Hobby do. The leader of the Nexus 6 group, Roy Batty, comes to meet his maker. When Roy and Tyrell meet each other, an interesting conversation takes place between the two. Roy says: "I want more life, father." The way he addresses his creator seems like Roy is speaking to the Holy Father. After Tyrell's explanations about the impossibility of prolonging Roy's life, Roy determines to kill his creator for his mistake of giving him the four-year lifespan, and says: "I've done questionable things… Nothing the God of biomechanics wouldn't let you in heaven for." Roy kills Tyrell after these words. He basically says that Tyrell is worth nothing as God and that his death is of the same value. *Blade Runner* also deals with the emulation of emotions in robots as well as in Spielberg's film. Nonetheless, while David has his emotions activated via a series of words and by pressing a button on his neck, the replicants in Scott's film have a pre-set of artificially implemented memories. It is the memories that enable the replicants to evolve their emotional capacities.

However, it is not only the Romantic heroism of the creators that is referred to God. David, similarly to his creator, turns into God. Nonetheless, while Professor Hobby attributes the divine powers to himself, David is a believer and a God-like creature at the same time. When he overhears Monica reading a book story of *Pinocchio* to her human son Martin, David believes that the mysterious Blue Fairy, known as changing a wooden puppet into a real boy in the story, is his only hope to receive Monica's love in return. David in the film captures some of the most fundamental characteristics defining human beings. He is a good partner, loyal friend, loving person, is able to chase down his dreams and what is more, his hopes of fulfilling the dreams are driven by faith. Having all these qualities sets him as an android even closer to a human level, if not the same. The common idea of God blurs the differences between a human and a machine even more but it also plays another role in the film. David might be understood as a mirror to humanity's belief in God. He spends 2000 years praying to Blue Fairy in the hope to fulfil his deepest dream, that is, to become a real boy, similarly to humans praying for their own deepest dreams 2000 years after Christ.

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[74] Fryderyk Kwiatkowski, ""Let Us Make Robot in Our Image, According to Our Likeness". An Examination of Robots in Several Science Fiction Films through the Christian Concept of the "Image of God"," *Zeszyty Naukowe Uniwersytetu Jagiellonskiego. Studia Religiologica* 49, no. 3 (2016): 224.

In the wider context, the creators can be understood as the Father in the context of Christianity, and their creations as Son(s). There is a similarity in the depiction of humanoid robots in the films with the concept of Jesus Christ, going through a long hard road on Earth to reach a higher status afterlife and more importantly, to save humanity. What we see at the end of Spielberg's *A.I.* are likely some highly evolved androids approaching David and fulfilling him his wish. Humanity in the film is understood as sinful creatures, as it is many times presented in the film. Monica leaves her 'child' alone in the woods. Martin is full of trickery and deception, as he constructs the fall of David. The people at the Flash Fair are destructive and reckless. In one scene, Joe comes to meet his female customer and finds out, that his customer had been killed out of jealousy. The robots are, on the contrary, innocent, kind, loving, and ever-helping creatures. At the end of the film, humanity is outlived by the machines, symbolizing the salvation of humanity by transforming them into better creatures– the evolved android machines.

2.3.2 Robots as humans

As was proposed in the background section, the films concerning artificial intelligence very often deal with the most important ontological questions.[75] These questions are primarily applied by highlighting the similar characteristics of a man and a machine. Questioning the ontology of humans in the films concerning AI is attributed to the attempts to define us from the computational point of view which is based on the thought that the human brain is essentially a computer.[76] Regarding the similarities between machines and humans, it would be interesting to apply the notions of projections humans make through androids, robots, and monsters, as was introduced in the 'Historical background and understanding of the approach' chapter of the background section. These projections capture human fears of becoming equally cold, rational, and evil as the machines depicted in popular science fiction films.[77] Spielberg's film goes as far as asking who is more human–a mother, (Monica) who leaves her 'child' (David) alone in dark woods, or, a robotic child, whose love never ends and who never gives up fighting for love? The problem of separation is also depicted in *Bride of Frankenstein*. Both David's and Frankenstein's monster's lives are threatened in

[75] Can Diker, "Digital Technology, Attraction and Cinema," in *New Approaches in Media and Communication*, ed. Ahmet Ayhan (Berlin: Peter Lang, 2019), 124.
[76] Gilles Bibeau, "What Is Human in Humans? Responses from Biology, Anthropology, and Philosophy," *Journal of Medicine & Philosophy* 36, no. 4 (April 2011): 355.
[77] Michael Szollosy, "Freud, Frankenstein and Our Fear of Robots: Projection in Our Cultural Perception of Technology," *AI & Society* 32, no. 3 (August 2017): 437.

the woods when trying to find a way through their state of rejection and pain. David is chased by the robot hunters in the woods as well as is the monster hunted by the revengeful city people. There is a blind man, living in a cottage in the woods. This man represents the monster's hope and the only possible friendship for it is, for the very first time, not subjected to prejudice. This situation could be compared to David's meeting with his artificial companion Joe in an otherwise completely hostile world of people.

The artificial characters in all three stories are not understood by society, not accepted and they all are put in a position of being dangerous and threatening for society. Frankenstein's monster is considered dangerous in the moment of killing a few people. The replicants in *Blade Runner* are dangerous for the same reason. David in *A.I.* is considered dangerous because he cuts a hair-lock off Monica's head and because he hugs and drags Martin under the water of a garden swimming pool in a desperate attempt to save himself. As we can see, *A.I.* is no more occupied with killer robots.

The question of humanity in robots and vice versa, mechanical in humans, is well presented in *Blade Runner* too. The Tyrell Corporation's motto 'more human than human' is best presented by the possibility of the main protagonist Deckard being one of the replicants he hunts. This possibility is created by a small hint in the film. At the beginning of the film, Deckard is invited to the Blade Runner Police Office because he is considered to be the best of the squad. A Japanese police officer makes origami at his desk. When looking at photos later in the film which should give Deckard some clue about where the replicants might be found, he imagines a scene where a unicorn runs through woods. After finishing his job, he returns home and finds an origami in the shape of a unicorn in front of his flat. It seems that the officer and maybe even the captain of the Blade Runners know that Deckard is a replicant too. That would explain why he is so good at identifying 'other' replicants. This idea of the main protagonist being a replicant literally provokes viewers to think about the boundaries.

2.4 Understanding of pop-culture robots

It is crucial to understand that fictional representations of robots preceded the real-world design of anthropomorphic robots. The cinematic background and its consequences on the public perceptions of the intelligent robots had put the American robotic researchers and developers into difficulties of designing humanoids in a hostile climate. Therefore, the U.S. researchers have had to be cautious about designing humanoid robots in an acceptable way, as the topic was and still is a sensitive one. The influence of popular culture's representations of artificial intelligence in the U.S. is best visible in comparison to other countries. For example, in Japan, robots are viewed as positively integrated into the future of their society. They are not considered evil, they are social partners and friends to humans which is likely a reason for their success in the field of robotics.[78] Japanese popular culture presents robots and humans as equals in the sense of being evil or good which is not the case in American, and generally, Western popular culture.[79]

As was already said in the background section, the 'Frankenstein Complex' relates to the tendency to describe humanoid robots in films as having revenge on people, the robots' creators.[80] As we will see, this concept has been adopted in many American films concerning the topic of artificial creations. The selected three works of fiction will be discussed here predominantly in the hope of a better and more detailed description of the common features.

The *Bride of Frankenstein* presents the further consequences of the prequel. After throwing the main protagonist, the monster's creator Henry Frankenstein, off a windmill, local villagers burn the mill in order to kill the monster trapped inside. Henry survives because his fall is luckily slowed down by one of the windmill arms but the horrid creation survives as well and manages to escape the debris. On its way out, it manages to kill the villager Hans, who, together with his wife, wanted to make sure the monster is dead. The film could be considered to be an adaptation of the second part of the original novel, even though, certain circumstances have been changed. For example, the main protagonist, who was Victor Frankenstein in the novel, is named Henry Frankenstein in the film. Most importantly, the horrid killing of the Frankenstein's monster is a result of a corrupted brain embedded into the head of the monster. In the novel, the reason for murdering humans was

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[78] Kathleen Richardson, "Technological Animism: The Uncanny Personhood of Humanoid Machines," *Social Analysis: The International Journal of Social and Cultural Practice* 60, no. 1 (Spring 2016): 111-112.
[79] Glenda Shaw-Garlock, "Looking Forward to Sociable Robots," *International Journal of Social Robotics* 1, no. 3 (May 2009): 255.
[80] Lee McCauley, "AI Armageddon and the Three Laws of Robotics," *Ethics and Information Technology* 9, no. 2 (July 2007): 153-154.

the monster's desperation and anger of the fundamental rejection by humans. For this reason, both the film and the novel will be discussed here. Most importantly, the novel explains the most important features of the 'Frankenstein Complex', that is, the motivations of the actions of both the creator and the creation.

Even though, many years had passed since *Bride of Frankenstein* was filmed, and even more, since the original gothic novel, there is a strikingly similar approach towards the artificial creations in the more recent fictional works about robots and artificial intelligence. In the novel of *Frankenstein; or, the Modern Prometheus*, the monster is thrown into the world without concern about its own feelings and destiny. The horrid creature is desperate to find love, and, specifically, it hopes to receive this love from humans. However, nothing similar happens. Upon the encounter of Victor, the monster tells him its story and refers to the happy lives of other people:[81]

> But where were my friends and relations? No father had watched my infant days, no mother had blessed me with smiles and caresses; or if they had, all my past life was now a blot, a blind vacancy in which I distinguished nothing. From my earliest remembrance I had been as I then was in height and proportion. I had never yet seen a being resembling me, or who claimed any intercourse with me. What was I? The question again recurred, to be answered only with groans.

The case is exactly the same in *A.I.* and in *Blade Runner*. David in *A.I.* searches to fit in the human society in order to receive Monica's love. But in the end, David ends up abandoned in the woods by Monica and is left alone. He is discarded by his family because he is considered to be dangerous. The danger for the family stems from David's desire to be like Martin, the real son of Monica's, and from Martin's successful attempts to get rid of David out of rivalry and a feeling of the threat of being replaced by David. It is impossible for David to ever receive his 'mother's' love because he is not a living human, and as such, he is not worthy of human love. This is even explicitly said in the film when Joe tries to convince David not to seek the love of his mother anymore:

> She loves what you do for her, as my customers love what it is, I do for them. But she does not love you David, she cannot love you. You are neither flesh, nor blood. You are not a dog, a cat or a canary. You were designed and built specific, like the rest of us. And you are alone now only because they tired of you, or replaced you with a younger model, or were displeased with something you said, or broke.

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[81] Mary Shelley, *Frankenstein* (London: Harper Press, 2010), 105.

The only hope for consolation to David is Joe, who does not see his inhumanity because he is not human himself. When we look at Frankenstein, the novel, we see a similar circumstance. The only hope for the monster in the miserable world is a blind man who does not see his inhuman form. This situation is depicted in the film *Bride of Frankenstein* as well. Both David and the monster are rejected by humans because neither of the two is a real human. Similarly, in *Blade Runner*, the replicants are only used for slavery. When seen on the planet Earth, where they are forbidden, they are shot to death, retired, as the film says.

All of the artificial humans presented in the concerned works of fiction face their creators in the end. The Frankenstein's monster decides willingly, as it considers it to be its only hope for any kind of resolution from its miserable position in the world. In the novel, the monster explains its motive to seek Frankenstein: "I learned from your papers that you were my father, my creator; and to whom could I apply with more fitness than to him who had given me life?"[82] David comes to meet his creator unwillingly, under the circumstance of seeking the Blue Fairy, the embodiment of his long prayers. This fictional figure had, upon his own realization at the end of the film, presented a prepared way to meet his creator, Professor Hobby. Roy Batty in *Blade Runner* found his way to his creator on purpose, similarly to the monster from *Frankenstein*. We might see all of these artificial characters as believing in a better future, and ultimately, in their creators, and all the creators disappoint their creations in the creators' inability to satisfy the dreams, wishes, and needs of their own creations.

The final resolution of killing in the *Frankenstein* novel is when the monster reckons there is no possibility for it to be ever loved or at least accepted by anyone. After saving a small girl, drowning in a stream of water, he is once again misunderstood and repulsed by the girl's father. When telling its story to Frankenstein, he exclaims: "Inflamed by pain, I vowed eternal hatred and vengeance to all mankind." The monster then commands the creator to make a female for it, so it can have someone to live with. After Victor refuses, the creature replies: "Have a care: I will work at your destruction, nor finish until I desolate your heart, so that you shall curse the hour of your birth."[83] Frankenstein's best friend Henry Clerval is killed and later at their wedding night, his beloved cousin Elizabeth with whom he was to be married. Frankenstein is condemned to hunt the beast for the rest of his life.

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[82] Mary Shelley, *Frankenstein* (London: Harper Press, 2010), 122.
[83] Ibid., 128.

A great example of this tendency is also the film *Blade Runner*. The creator in this film is The Tyrell Corporation, more precisely, Doctor Tyrell, the producer of the newest series of replicants called The Nexus 6. In the film, the purpose of these humanoid robots is to explore other planets and colonize them for humans. The humanoid robots are called 'replicants' here for a good reason because one could easily mistake them for real people and there is no other way to distinguish them from a human than to subject them to a sort of 'identification test'. The Blade Runners is a team of special police that hunts these replicants for they become a serious risk for humans, as they start killing people on other planets. These killings result in the illegality of replicants on earth under the death penalty. The Blade Runners are obliged to kill every replicant on detection. This quest is easily said than done because the replicants are built equally intelligent as humans and equally apparent as them. Some of the replicants from the newest series indeed come to earth. They arrive because they are not satisfied with their destiny of four years long life. They are aware of approaching their own death and that is the reason they meet their creator, Doctor Tyrell. The replicants want to live a longer life and come for an initially decent conversation about the possibility to prolong their life, or ideally, to stop their countdown. When their creator explains it is not possible, the alleged leader of this replicant squad, Roy Batty, kills his creator in anger and desperation.

Spielberg's *A.I.* is different. Even though David destroys a copy of himself in David xerox, he does not really revolt against his creator by physically hurting him or anyone else. He, as well as Roy Batty and the monster, confronts his creator though. After Professor Hobby explains David that he had been designed to return to the company where he was constructed and that the Blue Fairy was just a means to an end, David is devastated: "I thought I was the one of a kind." Hobby then answers: "My son was one of a kind. You are the first of a kind." David does not hurt a single human being but he rather revolts against his creator by trying to kill himself. He sits on the edge of the building of the Cybertronics corporation and with his last word "mommy" throws himself into the now–flooded Manhattan.

In this sense, Spielberg tries to rebel against the accustomed viewpoint of the intelligent, anthropomorphic machines and tries to look at the problematics from a different angle, and, as William Beard points in his article, *A.I.* is, therefore "one more contribution to the culture-wide working out of anxieties about personal identity in the contemporary American

world."[84] As was already said in the background section, humanoid robots have begun to be seen as friendlier since the 1980s[85] and *A.I.* is an example of this approach. In this context, we might say that *Blade Runner* and other films such as *Terminator*, *Westworld* TV series, and especially the older cinematic pieces such as *Frankenstein*, *Bride of Frankenstein*, and even *Metropolis* from 1927, at least partially, do the opposite.

In the film, David is designed as a small boy, approximately at the age of 11. This attitude of creating child-like robots is present in the American laboratories where humanoids are being developed. This is because fictional and religious contexts are being taken seriously as a basis for the design of humanoid robots. Roboticists are aware of and try to adapt to this context. As a result, there is a tendency to develop adorable child-like robots in order to avoid negative perceptions caused by the possible imagination of popular culture's representations of autonomous machines. Examples of this attitude are humanoid robots Kismet and Mertz developed at the Massachusetts Institute of Technology, or Bandit developed at the University of Southern California. A more detailed depiction of the reality is best described by Kathleen Richardson, a research fellow in the Ethics of Robotics at the Centre for Computing and Social Responsibility (CCSR) at the De Montfort University in Leicester:[86]

> During fieldwork in North American and British laboratories, I repeatedly found that robotic labs look more like kindergartens. Even when the US DARPA (Defense Advanced Research Projects Agency) was funding projects, labs were filled with toys, children's books, and machines deliberately designed to look adorable…The robotics professor told me it was necessary to design robots to appear cute and childlike in order to counteract popular notions that robots are threatening to humanity and hyper-sophisticated.

A common feature for all of these films, though, is the message that science and technology are dangerous. Even though David in *A.I.* is a lovely child who does not intend to hurt any human in the film, there still is a message of the human fear of robots. It is very obvious during the scenes at the Flesh Fair, where robots are being serially destroyed. The audience is having fun during the show which, on its own, shows a strong hostility towards robots. This approach is also evident from Joe's speech when he claims: "They made us too smart, too quick and too many. We are suffering for the mistakes they made because when

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[84] William Beard, "A.I. Or, the Agony of Steven Spielberg," *Cineaction* no. 66 (2005): 11.
[85] Brown-Montesano Kristi, "Terminal Bach: Technology, Media, and the Goldberg Variations in Postwar American Culture," *Bach* 50, no. 1 (2019): 109.
[86] Kathleen Richardson, "Technological Animism: The Uncanny Personhood of Humanoid Machines," *Social Analysis: The International Journal of Social and Cultural Practice* 60, no. 1 (Spring 2016): 112-115.

the end comes, all that will be left is us. That's why they hate us." Despite the fact that the film is quite naïve and sentimental, Stephen Spielberg, together with Stanley Kubrick presented commonly perceived anxieties about artificial intelligence, robotics, and human simulations contemporarily present in American society.[87]

[87] William Beard, "A.I. Or, the Agony of Steven Spielberg," *Cineaction* no. 66 (2005): 11.

CONCLUSION

The study of the historical background of the development of computers and cinematographic approaches toward technology in the U.S. revealed some evident connections. It has been found that the popular representations of killer robots in films have a direct impact on the perception of real-life technology and AI. Consequently, there is an effort to build humanoid robots in a way, that would prevent people from perceiving them as dangerous.

The historical tradition of depicting autonomous machines, especially the ones with humanoid form as evil, seems to stem from the classic horror story of Mary Shelley's which already in 1818 warned of the dangers of science. The phenomenon, known as the 'Frankenstein complex' has influenced many later filmmakers. There seem to be intuitive imaginations of evil robots in the general public of the U.S. when facing an intelligent machine. These imaginations refer to the artificial creations depicted in *Blade Runner*, *Terminator*, *Frankenstein*, and other works of science–fiction.

The approach toward technology has changed to be more positive in the more recent cinematic pieces, such as in *A.I.: Artificial Intelligence* from 2001, featuring artificially intelligent agents as social partners or even lovers. Stephen Spielberg, together with Stanley Kubrick, depicted common and still present anxieties about intelligent robots in *A.I.* However, the film also tries to reduce the fear of intelligent machines by presenting an innocent child-like robot. What used to be a question of killing and violence, especially by robots toward humans in the older films, is not present in *A.I.* anymore. The problematics in Spielberg's film is of rather ethical and moral character, and most importantly, it is about the distinction of a human being from a machine.

Blurring the boundaries between a human and a machine is another common feature shared among many filmmakers and a source of anxiety about human identity. Some researchers who try to define a human, and especially, the human brain, from a computational point of view say that human brains are essentially computers. This idea has been many times adapted in recent American films.

The creation of an artificial human is also very often associated with a religious, Christian context. There is a historical background in which Western culture, including the U.S., tends to perceive robots and other inanimate objects as divine. The religious themes are presented in all three selected works as well. Involving God in the posthuman ideas that are based on the fusion of Romanticism and Enlightenment in the narratives, might suggest

that there is no real practical purpose for the creation of artificial humans and that the desire to do so, stems from something more sophisticated than the regular development of technology. God has always been considered the knower of the unknown in the Christian doctrines, and in this context, humans are playing Gods when they seek to create artificial life. After all, one of the arguments for the research of AI and robotics is to better understand the essence of what it means to be human.

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LIST OF ABBREVIATIONS

AI	Artificial intelligence
U.S.	United States
NASA	National Aeronautics and Space Administration
CCSR	Centre for Computing and Social Responsibility
DARPA	Defense Advanced Research Projects Agency
R.U.R.	Rossum's Universal Robots