

Schriften zum Strafrecht

Band 406

Artificial Intelligence and Legal Issues

**A Review of AI-based Legal Impasses
in Terms of Criminal Law**

Von

Müslüm Fincan



Duncker & Humblot · Berlin

MÜSLÜM FİNCAN

Artificial Intelligence and Legal Issues

Schriften zum Strafrecht

Band 406

Artificial Intelligence and Legal Issues

A Review of AI-based Legal Impasses
in Terms of Criminal Law

Von

Müslüm Fincan



Duncker & Humblot · Berlin

Der Fachbereich Rechtswissenschaften
der Friedrich-Alexander-Universität Erlangen-Nürnberg hat diese Arbeit
im Jahre 2022 als Dissertation angenommen.

Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in
der Deutschen Nationalbibliografie; detaillierte bibliografische Daten
sind im Internet über <http://dnb.d-nb.de> abrufbar.

D29

Alle Rechte vorbehalten
© 2023 Duncker & Humblot GmbH, Berlin
Satz: L101 Mediengestaltung, Fürstenwalde
Druck: CPI books GmbH, Leck
Printed in Germany

ISSN 0558-9126
ISBN 978-3-428-18716-4 (Print)
ISBN 978-3-428-58716-2 (E-Book)

Gedruckt auf alterungsbeständigem (säurefreiem) Papier
entsprechend ISO 9706 ☼

Internet: <http://www.duncker-humblot.de>

*I dedicate this book to my parents,
my sister and all my beloved ones whose support
I have felt throughout my life ...*

Acknowledgements

The topics explored in the thesis published in this book were first pondered many years ago as a curious child, wondering about technology and growing more and more fascinated with every innovative change. This curiosity blossomed with my first article on cybercrime at the university. Over time, the questions on legal interpretations became more complex, and they eventually evolved into the idea of pursuing a doctoral degree. This opportunity would allow me to delve into these topics head-on. The idea to execute a thesis on legal interpretations of artificial intelligence systems began in 2017 when a light bulb went on in my head in Istanbul. Through my academic activities, I comprehended how inadequate the literature on this topic is and that future generations can also appreciate the work on this matter. Nevertheless, seeing that this research field is entirely newfangled and unaccustomed in Turkish academia and especially among jurists, I decided to take my first steps towards the doctoral process in Germany to discover numerous approaches with very various perspectives in other parts of the world.

At the end of hundreds of e-mails, applications, efforts, and patience, which were not spectacular in process and form, I saw my doctoral advisor Professor Dr. Safferling's acceptance letter in my mailbox, and my doctoral adventure began. During this time, I perceived why supervisors in Germany were called Doktorvater/-mutter (Doctoral father/mother). First and foremost, I would like to express my sincerest gratitude to my supervisor, Doktorvater, for his invaluable guidance, Professor Dr. Christoph Safferling, LL.M. (LSE). In my four-year-doctorate-adventure, he became a father to me under the umbrella of the International Criminal Law Research Unit (ICLU) and the Friedrich Alexander University of Erlangen and Nuremberg, guided me with his wisdom in my academic progress and integration. In this journey, he did not let me feel "the other" for even a single minute in a language I do not know and in a culture I am unfamiliar with. I greatly appreciate his comments and ideas, from which I have learned a lot. I would also like to thank Professor Hans Kudlich, who functioned as the second supervisor and enlightened me on becoming a better academician with his valuable recommendations. Likewise, for her advice and contributions to making the thesis much more competent, I am grateful to Professor Patricia Wiater-Hellgardt. My supervisors have been the most inspirational persons in my academic life.

Furthermore, I would like to express my sincere thanks to Dr. habil. Hilde Farthofer, Dr. Gurgen Petrossian, Nicolas Dümmler, and all the members of the ICLU family, whose names I cannot mention one by one, who always made me feel at home and supported me both professionally and socially. Besides, I am indebted to Professor Dr. Dr. h.c. Hakan Hakeri for his guidance in becoming familiar with the differences between Turkish and German academia and his academic support. Creating this dissertation was not a personal experience but a collective one, and thus I owe gratitude to many people. Hence, I appreciate and acknowledge the financial support from the Hamburger Stiftung zur Förderung von Wissenschaft und Kultur, the executive board, and Martina Winkel. I could not have completed this journey and publish my doctoral thesis without their help. Besides, I would like to thank Duncker & Humblot publishing, and Diana Güssow and Larissa Szews for their support in publishing this dissertation.

I also greatly appreciate Yunus Gültekin, Nasip Dagli, Mustafa Y. Iyiyapici, E. Serra Kaya, and M. Sait Fincan, who encouraged me to resolve the knotted ideas and supported me, especially morally, and their friendship. I am obliged to Satnam Singh, David Kopyto, and Edgar Suarez for their assistance and companionship from an engineer's perspective in consolidating my ideas for my doctoral thesis. I would also like to express my sincere thanks to Lara Toymann for her contributions and revisions during the proof-reading process of the dissertation. Also, I express my very profound gratitude to Merve Canan, Okan Demir, Berk Caliskan, and Rumeysa Aydemir Ulus. They have helped me feel less of the adverse social effects of the ongoing Covid-19 pandemic since the beginning of 2020.

Last but not least, I am deeply beholden to my parents, sister, and family for their endless altruism and support, who I always felt by my side during my difficult doctoral journey and throughout my life. I dedicate this dissertation to them.

Erlangen, May 2022

Müslüm Fincan

Table of Contents

Introduction	15
A. Introduction to Artificial Intelligence	17
I. Descriptive Examination of Artificial Intelligence	17
1. Notions Related to Artificial Intelligence	17
2. Definitive Obstacles of AI Technologies and the Determiner Test ..	27
II. The Evolution and Historical Background of Artificial Intelligence ...	34
1. Pretechnological Era Developments	35
a) Myths and Tales	35
b) Automatons	36
2. Modern Age Advancements	40
a) The Growth of AI Technologies	40
b) New Actors of AI Technologies in the Recent Era	45
c) Autonomous Vehicle Technologies from Past to Future	52
B. Legal Personhood of Artificial Intelligence Entities	64
I. Legal Personhood's Pathway	65
1. The Concept of Legal Person and Legal Regulations Related to Personality	65
a) Definitions	66
b) Non-Human Entities with Legal Personhood	69
2. Legal Personhood Criteria	70
a) Soul	71
b) Consciousness and Self Awareness	73
c) Communication Skills	76
d) Intelligence	78
e) Feelings	81
f) Free will	82
g) Intentionality	85
h) Empathy	88
i) Biological Body	89
j) Mortality	92
k) Conclusion	92
II. Legal Personhood of Artificial Intelligence Entities in the Future	93
1. Possible Grantable Legal Status in the Near Future	93
2. Probable Legal Status in the Far Future	95

C. Criminal Law Issues Related to Artificial Intelligence Technologies . . .	104
I. Fundamental Elements of the Criminal Law System	105
1. The Journey of Punishment from Past to Present	105
a) The Impact of Punishment as a Power Instrument	105
b) Penal Policies in the Historical Process	108
2. Purposes of Punishment	113
a) Retribution	116
b) Deterrence	117
c) Rehabilitation	118
d) Conclusion	119
3. Types of Punishment	119
a) Death penalty	120
b) Confinement	128
c) Monetary Sanctions and Public Service	131
d) Alternative Sanctions	132
II. Solutions for Liability Issues Related To AI Technologies in the Con- text of Criminal Law	133
1. Modern Day and Near Future Issues	134
a) Punitive Issues by and against AI Entities	134
(1) The Most Recent Technological Method of Committing an Offense: The Usage of Artificial Intelligence Systems as Tools in Crime	136
(2) Negligent Culprits of Foreseeable Potential Problems	140
(3) Potential Suspects and Legal Solutions in the Absence of Foreseeability	143
b) Legal Issues Related to Autonomous Vehicle Technologies	152
(1) Current Legal Regulations	153
(2) Liability Issues and Exemplificative Solutions to Theoretical Impasse	156
(3) Dilemmas and Solutions	159
2. Futuristic Elucidations for the Far Future Problems	172
a) Purposes of Punishment for AI Entities	173
b) Types of Punishment for AI Entities	175
Conclusion	184
References	188
Index	212

List of Illustrations

Figures

Figure 1: AI-ML-DL Summarisation	24
Figure 2: AI Technologies Milestones	41
Figure 3: The Crash Schema of Tesla’s Accident	56
Figure 4: The Chinese Room Thought Experiment	87
Figure 5: The Trolley Dilemma – Extended	151
Figure 6: The Trolley Dilemma – Simplified.....	160
Figure 7: The Bus Scenario on the Edge of the Cliff.....	169
Figure 8: The Criminal Sanctions Pyramid	177

Tables

Table 1: Autonomosity Levels of (Driverless) Vehicles	60
---	----

List of Abbreviations

AGI	Artificial General Intelligence
AI	Artificial Intelligence
ANI	Artificial Narrow Intelligence
ASI	Artificial Super Intelligence
BASt	Bundesanstalt für Straßenwesen, German Federal Highway Research Institute
BC	Before Christ
BGB	Bürgerliches Gesetzbuch, German Civil Code
BtMG	Betäubungsmittelgesetz, German Narcotics Law
CAA	Civil Aviation Authority
CEDR	Conference of European Directors of Roads
COMPAS	Correctional Offender Management Profiling for Alternative Sanctions
DARPA	Defense Advanced Research Projects Agency
DL	Deep Learning
EASA	European Union Aviation Safety Agency
ECHR	European Convention on Human Rights
ed.	Edition/Editor
eds.	Editors
EQ	Emotional Quotient
et al.	and others
ETSC	European Transport Safety Council
E.U.	European Union
FAA	Federal Aviation Administration of the United States
ff.	and the following
GG	Grundgesetz für die Bundesrepublik Deutschland, Basic Law for the Federal Republic of Germany
GM	General Motors
GPS	Global Positioning System
ICAO	International Civil Aviation Organization
IQ	Intelligence Quotient
ISO	International Organization for Standardization
LIDAR	Light Detection and Ranging

MES	Mandatory Ethical Settings
ML	Machine Learning
NHTSA	National Highway Traffic Safety Administration of the United States
no.	Number
PES	Personal Ethical Settings
Pseud.	Pseudonym
RL	Reinforcement Learning
SAE	Society of Automotive Engineers
SL	Supervised Learning
SQ	Spiritual Quotient
StGB	Strafgesetzbuch, German Penal Code
TCK	Türk Ceza Kanunu, Turkish Penal Code
U.K.	United Kingdom
U.N.	United Nations
USA	United States of America
USL	Unsupervised Learning
vol.	Volume

Introduction

Humanity, which had a lifestyle focused on meeting some basic needs such as hunting, shelter, and reproduction thousands of years ago, has reached the level of designing robotic systems that include meeting similar needs with different methods and aiming to facilitate daily life, as of the 21st century, and is advancing confidently on the same path. Robots, androids, and fictional characters made of metal and coded on harming human beings have made a place in our minds, especially in science fiction novels and movies. Many different figures, such as RoboCop, Terminator, Jarvis from Iron Man, Wall-E, the Matrix, or HAL 9000 from the Space Odyssey series, have created a robot perception in the collective minds of people and inspired many young scientists over the years or caused mass refrainment. All these systems we encounter in these works of art have guided and directed today's technologies. As a result of these technological developments, which are generally referred to as the notion of artificial intelligence, enhancements similar to the levels of fictional characters that we meet in books and movies have occurred, especially in the 21st century.

The transformational effect created by artificial intelligence-based systems, whose use in many areas of social life is increasing day by day, has become an inseparable part of people's daily lives. In particular, algorithmic designs that suggest music that users might like on Spotify, virtual personal assistants such as Siri or Alexa, systems that can create literary works, humanoid robots such as Sophia, robot soldiers in which many countries have invested heavily, alias lethal autonomous weapon systems, or driverless cars such as Tesla Autopilot. Artificial intelligence and such examples prove how much of a place artificial intelligence has gained in society. Hence, social life is deeply affected as a natural consequence of all these developments. In the past, many new problems, such as computer crimes, the establishment of contracts, or copyright issues that people did not confront before, have become a necessary solution due to this technological progress and its integration into social life. As a natural consequence, legal systems and regulations became involved in solving the problems. The legal system also has limited experience with artificial intelligence technologies and is in its infancy.

At the end of every innovation that has occurred, each social change that has befallen, and all systemic revolutions that have transpired from history to the present, the rules of law have been adapted. While this adaptation was

sometimes fast, it was sometimes relatively slow and did not find a complete solution to the problems at first. The legal world has an opportunity to solve the possible problems brought by artificial intelligence systems now and even in the future. How efficiently this opportunity can be used depends on the quality and quantity of scientific discussions, the abundance of legal and philosophical dictums, and collective solution-oriented approaches.

This scientific research, particularly with a focus on criminal law and in the light of punitive theories, includes suggestions for the solution of legal problems that artificial intelligence technologies have already fomented and may create without fully adhering to legal perspectives that are tightly bound to traditional approaches. In discussing current problems and possible solutions, three chapters have made step-by-step progress. Accordingly, a distinction was made as Introduction to Artificial Intelligence (*A.*), Legal Personhood of Artificial Intelligence Entities (*B.*), and Criminal Law Issues Related to Artificial Intelligence Technologies (*C.*).

In the context of the Introduction to Artificial Intelligence chapter, there are several suggestions for the descriptive examination of the concept of artificial intelligence and the explication of definitive and identification issues. In the continuation of this, the historical evolution of artificial intelligence technologies will be examined separately in the context of literary outputs and technological advances. The Legal Personhood of Artificial Intelligence Entities chapter, on the other hand, focuses on the future attributability of legal personhood and different legal status to entities with artificial intelligence. First of all, the concept of a legal person will be examined, and examples of non-human entities with legal personhood will be discussed. Then, it will be focused on what kind of legal status artificial intelligence systems can have in the future. Finally, under the title of Criminal Law Issues Related to Artificial Intelligence Technologies, the concept of punishment from history to the present and its possible reflections on the present and the future will be discussed over the purpose and types of punishment. Afterward, current approaches to solving the problems created by artificial intelligence technologies in criminal law will be the focal point of the dissertation. Subsequently, there will be discussions on the punishability of ‘advanced artificial intelligence’ entities of the future.

A. Introduction to Artificial Intelligence

Artificial intelligence technologies, which we have witnessed develop rapidly and fully scale in recent years, increasingly show their effects in many areas of life. Both several companies make significant investments in these technological advances, and our society has great expectations about the future of these technologies. Nevertheless, many different legal problems arising from these uses inevitably occur as the use of artificial intelligence systems increases. These problems are encountered in many other branches of law, such as contract law, tort law, labor law, and criminal law. Thus, these impacts and rapid changes need to be examined judicially to find legal solutions to the problems that may occur. This development process started long since with science fiction books, including autonomous entities.

Besides that, this trend continued with movies due to advances in engineering, from autonomous cars, drones, defense technologies, intelligent home systems, and health services to company management. This enormous development remains in a way that strongly affects society's habits. In this respect, before discussing and researching possible solutions to the problems that individuals of artificial intelligence technologies may arise, clarify some fundamental concepts of AI technologies. In addition to the conceptional explanations, some technical details, historical processes, and grammatical approaches play a significant role in this research – however, the technical details are not as much as the level of an engineer's knowledge. Therefore, before making in-depth legal discussions on theoretical issues, I will address these issues superficially.

I. Descriptive Examination of Artificial Intelligence

1. Notions Related to Artificial Intelligence

Before evaluating artificial intelligence and terms from the relevant linguistic perspective, we should discuss and clarify some issues related to the concept of artificial intelligence. From my perspective, these discussions are pivotal for a better understanding of these issues. If I separate the word artificial intelligence and examine its definitions with its singular meanings, I will start with what the notion '*artificial*' is. First, when examining the definition of '*artificial*' in dictionaries, the Cambridge Dictionary described it as