



Alan Winfield

# ROBOTICS

A Very Short Introduction

OXFORD

# Robotics A Very Short Introduction

**Clemens Wendtner**



## **Robotics A Very Short Introduction:**

**Robotics** Alan Winfield, 2012-09-27 Robotics is a key technology in the modern world Robots are a well established part of manufacturing and warehouse automation assembling cars or washing machines and for example moving goods to and from storage racks for Internet mail order More recently robots have taken their first steps into homes and hospitals and seen spectacular success in planetary exploration Yet despite these successes robots have failed to live up to the predictions of the 1950s and 60s when it was widely thought by scientists and engineers as well as the public that by turn of the 21st century we would have intelligent robots as butlers companions or co workers This Very Short Introduction explains how it is that robotics can be both a success story and a disappointment how robots can be both ordinary and remarkable and looks at their important developments in science and their applications to everyday life ABOUT THE SERIES The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area These pocket sized books are the perfect way to get ahead in a new subject quickly Our expert authors combine facts analysis perspective new ideas and enthusiasm to make interesting and challenging topics highly readable **Elements of Robotics** Mordechai Ben-Ari, Francesco Mondada, 2017-10-25 This open access book bridges the gap between playing with robots in school and studying robotics at the upper undergraduate and graduate levels to prepare for careers in industry and research Robotic algorithms are presented formally but using only mathematics known by high school and first year college students such as calculus matrices and probability Concepts and algorithms are explained through detailed diagrams and calculations Elements of Robotics presents an overview of different types of robots and the components used to build robots but focuses on robotic algorithms simple algorithms like odometry and feedback control as well as algorithms for advanced topics like localization mapping image processing machine learning and swarm robotics These algorithms are demonstrated in simplified contexts that enable detailed computations to be performed and feasible activities to be posed Students who study these simplified demonstrations will be well prepared for advanced study of robotics The algorithms are presented at a relatively abstract level not tied to any specific robot Instead a generic robot is defined that uses elements common to most educational robots differential drive with two motors proximity sensors and some method of displaying output to the user The theory is supplemented with over 100 activities most of which can be successfully implemented using inexpensive educational robots Activities that require more computation can be programmed on a computer Archives are available with suggested implementations for the Thymio robot and standalone programs in Python **The Robot Renaissance** Charles Nehme, Robotics a field that once belonged to the realm of science fiction has rapidly evolved into a transformative force shaping our world From the automated assembly lines of modern factories to sophisticated surgical robots that enhance medical precision robots are revolutionizing industries and redefining human capabilities This book is an invitation to explore the fascinating world of robotics delving into its fundamental principles diverse applications and profound impact on society

As you embark on this journey through the world of robotics you will discover the ingenuity and innovation that drive this field. You will gain insights into the intricate mechanisms that enable robots to perceive, move and interact with their surroundings. You will explore the diverse array of robots that have emerged from the industrial giants that power manufacturing to the nimble service robots that assist us in our daily lives. Beyond the technical aspects, this book delves into the societal implications of robotics. You will examine the ethical considerations surrounding the development and deployment of robots, addressing concerns about job displacement, safety and the potential impact on human autonomy. You will also explore the transformative potential of robotics to enhance human well-being, improve healthcare and expand our understanding of the world around us. This book is intended for anyone with a curiosity about robotics, whether you are a student, a professional or simply an inquisitive mind. It is designed to provide a comprehensive yet accessible introduction to this rapidly evolving field, equipping you with the knowledge to understand the impact of robotics on our world and to engage in informed discussions about its future. As you navigate through the chapters, remember that robotics is not merely a field of technology; it is a testament to human ingenuity and our relentless pursuit of innovation. It is an opportunity to reimagine the boundaries of what is possible, to enhance human capabilities and to shape a future where robots and humans collaborate to create a world of greater efficiency, safety and well-being. Welcome to the exciting and ever-expanding world of robotics.

*Robotics, AI and Criminal Law* Kamil Mamak, 2023-09-01. This book offers a phenomenological perspective on the criminal law debate on robots. Today, robots are protected in some form by criminal law. A robot is a person's property and is protected as property. This book presents the different rationale for protecting robots beyond the property justification based on the phenomenology of human-robot interactions. By focusing on robots that have bodies and act in the physical world in social contexts, the work provides an assessment of the issues that emerge from human interaction with robots, going beyond perspectives focused solely on artificial intelligence (AI). Here, a phenomenological approach does not replace ontological concerns but complements them. The book addresses the following key areas: Regulation of robots and AI; Ethics of AI and robotics; and philosophy of criminal law. It will be of interest to researchers and academics working in the areas of Criminal Law, Technology and Law, and Legal Philosophy.

From AI to Robotics Arkapravo Bhaumik, 2018-02-28. *From AI to Robotics: Mobile, Social and Sentient Robots* is a journey into the world of agent-based robotics, and it covers a number of interesting topics both in the theory and practice of the discipline. The book traces the earliest ideas for autonomous machines to the mythical lore of ancient Greece and ends the last chapter with a debate on a prophecy set in the apparent future where human beings and robots technology may merge to create superior beings, the era of transhumanism. Throughout the text, the work of leading researchers is presented in depth, which helps to paint the socio-economic picture of how robots are transforming our world and will continue to do so. This work is presented along with the influences and ideas from futurists such as Asimov, Moravec, Lem, Vinge, and of course, Kurzweil. The book furthers the discussion with concepts of Artificial

Intelligence and how it manifests in robotic agents Discussions across various topics are presented in the book including control paradigm navigation software multi robot systems swarm robotics robots in social roles and artificial consciousness in robots These discussions help to provide an overall picture of current day agent based robotics and its prospects for the future Examples of software and implementation in hardware are covered in Chapter 5 to encourage the imagination and creativity of budding robot enthusiasts The book addresses several broad themes such as AI in theory versus applied AI for robots concepts of anthropomorphism embodiment and situatedness extending theory of psychology and animal behavior to robots and the proposal that in the future AI may be the new definition of science Behavior based robotics is covered in Chapter 2 and retells the debate between deliberative and reactive approaches The text reiterates that the effort of modern day robotics is to replicate human like intelligence and behavior and the tools that a roboticist has at his or her disposal are open source software which is often powered by crowd sourcing Open source meta projects such as Robot Operating System ROS etc are briefly discussed in Chapter 5 The ideas and themes presented in the book are supplemented with cartoons images schematics and a number of special sections to make the material engaging for the reader Designed for robot enthusiasts researchers students or the hobbyist this comprehensive book will entertain and inspire anyone interested in the exciting world of robots

**Drone** Adam Rothstein, 2015-02-03 Drones are in the newspaper on the TV screen swarming through the networks and soon we re told they ll be delivering our shopping But what are drones The word encompasses everything from toys to weapons And yet as broadly defined as they are the word drone fills many of us with a sense of technological dread Adam Rothstein cuts through the mystery the unknown and the political posturing and talks about what drones really are what technologies are out there and what s coming next how drones are talked about and how they are represented in popular culture It turns out that drones are not as scary as they appear but they are more complicated than you might expect Drones reveal the strange relationships that humans are forming with their new technologies Publisher

**Ethics in Human-like Robots** Kamil Mamak, 2024-11-25 The idea of creating artificial humans can be found at the beginning of the human culture Ancient myths contain the stories of artificial humans brought to life by gods The word robot originates from a play that was about artificial humans made from artificial flesh that aims to serve real humans With advancements in robotics the materialization of this idea is more real than ever before We are witnessing attempts to create humanoid robots that might be deployed in many spheres of our life policing healthcare and even for love and sex The book focuses on the ethical issues of human likeness of robots and human tendency to anthropomorphize It is built on the assumption that design choices are not neutral and they need to be discussed to align robots with human values With robots operating in the physical world they bring ideas and risks that should be addressed before widespread deployment The book reviews specific issues and provides suggestions and recommendations for improving robots to serve humans better It draws on literature from Human Robot Interactions ethics of AI and robotics and the philosophy of technology **The De Gruyter**

**Handbook of Robots in Society and Culture** Leopoldina Fortunati, Autumn Edwards, 2024-09-23 The De Gruyter

Handbook of Robots in Society and Culture provides a comprehensive discussion of how social robots take form function and meaning for individuals relationships cultures and societies Through a path breaking integration of perspectives coming from sociology communication and media psychology cognitive neuroscience anthropology political science and science and technology studies it focuses on the critical and social meaning of present developments in social robotic technologies This book looks at artificial agents from voice based assistants to humanoid robots as their use transforms private and public contexts and gives rise to both new possibilities and new perils for human being and becoming organizations as well as social structures and institutions The handbook traces the consequences and key problems of social robotics across broad social contexts in both public and political as well as domestic and intimate spaces Further it attends carefully to the implications of social robotics for various human identity groups including those based on gender ethnicity culture class ability and age Deep attention to interdisciplinarity inclusivity ethics and socio cultural futures serves as the guiding inspiration behind each contribution within this handbook     *Routledge Handbook of the Law of Armed Conflict* Rain Liivoja, Tim

McCormack, 2016-04-28 The law of armed conflict is a key element of the global legal order yet it finds itself in a state of flux created by the changing nature of warfare and the influences of other branches of international law The Routledge Handbook of the Law of Armed Conflict provides a unique perspective on the field covering all the key aspects of the law as well as identifying developing and often contentious areas of interest The handbook will feature original pieces by international experts in the field including academics staff of relevant NGOs and former members of the armed forces Made up of six parts in order to offer a comprehensive overview of the field the structure of the handbook is as follows Part I Fundamentals Part II Principle of distinction Part III Means and methods of warfare Part IV Special protection regimes Part V Compliance and enforcement Part VI Some contemporary issues Throughout the book attention is paid to non international conflicts as well as international conflicts with acknowledgement of the differences The contributors also consider the relationship between the law of armed conflict and human rights law looking at how the various rules and principles of human rights law interact with specific rules and principles of international humanitarian law in particular circumstances The Routledge Handbook of the Law of Armed Conflict provides a fresh take on the contemporary laws of war and is written for advanced level students academics researchers NGOs and policy makers with an interest in the field     **Robot Rights** David J. Gunkel, 2024-03-19 A

provocative attempt to think about what was previously considered unthinkable a serious philosophical case for the rights of robots We are in the midst of a robot invasion as devices of different configurations and capabilities slowly but surely come to take up increasingly important positions in everyday social reality self driving vehicles recommendation algorithms machine learning decision making systems and social robots of various forms and functions Although considerable attention has already been devoted to the subject of robots and responsibility the question concerning the social status of these artifacts

has been largely overlooked In this book David Gunkel offers a provocative attempt to think about what has been previously regarded as unthinkable whether and to what extent robots and other technological artifacts of our own making can and should have any claim to moral and legal standing In his analysis Gunkel invokes the philosophical distinction developed by David Hume between is and ought in order to evaluate and analyze the different arguments regarding the question of robot rights In the course of his examination Gunkel finds that none of the existing positions or proposals hold up under scrutiny In response to this he then offers an innovative alternative proposal that effectively flips the script on the is ought problem by introducing another altogether different way to conceptualize the social situation of robots and the opportunities and challenges they present to existing moral and legal systems

**Humans and Robots** Sven Nyholm, 2020-03-09 Can robots perform actions make decisions collaborate with humans be our friends perhaps fall in love or potentially harm us Even before these things truly happen ethical and philosophical questions already arise The reason is that we humans have a tendency to spontaneously attribute minds and agency to anything even remotely humanlike Moreover some people already say that robots should be our companions and have rights Others say that robots should be slaves This book tackles emerging ethical issues about human beings robots and agency head on It explores the ethics of creating robots that are or appear to be decision making agents From military robots to self driving cars to care robots or even sex robots equipped with artificial intelligence how should we interpret the apparent agency of such robots This book argues that we need to explore how human beings can best coordinate and collaborate with robots in responsible ways It investigates ethically important differences between human agency and robot agency to work towards an ethics of responsible human robot interaction

*Hallo Robot* Bennie Mols, Nieske Vergunst, 2018-10-11 Some fear that robots could do half our jobs and even wipe us out But is that likely *Hallo Robot* shows how clever machines could chauffeur us teach our children rescue survivors from collapsed buildings and boost the global fight against hunger and pollution Welcome to a realistic vibrant view of our robot future With 60 colour photos Topics covered From dolls to industrial workers a history of robots How robots respond to their surroundings What robots learn about human speech Why self driving cars are safer and greener The possibilities of robots in education Meet the cyborgs who learn to walk again Why evolution designs the best robots Will rogue robots take over the world Using robots as weapons and drones What the future holds 2100 a Robot Odyssey

**Introduction to the Mechanics of Space Robots** Giancarlo Genta, 2011-10-27 Based on lecture notes on a space robotics course this book offers a pedagogical introduction to the mechanics of space robots After presenting an overview of the environments and conditions space robots have to work in the author discusses a variety of manipulatory devices robots may use to perform their tasks This is followed by a discussion of robot mobility in these environments and the various technical approaches The last two chapters are dedicated to actuators sensors and power systems used in space robots This book fills a gap in the space technology literature and will be useful for students and for those who have an interest in the broad and highly

interdisciplinary field of space robotics and in particular in its mechanical aspects      *Scientific Methods in Mobile Robotics* Ulrich Nehmzow, 2006-04-10 Aims at a theoretical understanding of the operation of autonomous mobile robots This book presents the research on the application of chaos theory parametric and non parametric statistics and dynamical systems theory in this field Practical examples and case studies show how robot behaviour can be logged analysed interpreted and modelled      **Robot Ethics** Fouad Sabry, 2025-01-22 Explore the profound intersection of technology morality and robotics in Robot Ethics an essential read in the Robotics Science series This book provides an indepth examination of ethical considerations and regulations surrounding robotics with each chapter building toward a comprehensive understanding of how ethics and robotics converge Perfect for professionals students and enthusiasts Robot Ethics offers valuable insights for all who are curious about the evolving role of technology in our world Chapters Brief Overview 1 Robot ethics Explores core ethical principles guiding the development of robotics 2 Robot Discusses robots roles in society and their ethical implications 3 Military robot Examines the ethical challenges of deploying robots in warfare 4 Friendly artificial intelligence Analyzes AI designed to prioritize human safety and ethics 5 Laws of robotics Reviews the classic laws and their modern interpretations 6 Human robot interaction Considers ethical dimensions in robothuman relationships 7 Neurorobotics Introduces the ethics behind integrating robotics with neuroscience 8 Ethics of artificial intelligence Delves into ethical frameworks for AI advancements 9 Ronald C Arkin Profiles Arkin s contributions to ethical robotics research 10 Machine ethics Investigates ethical algorithms guiding machine behavior 11 Lethal autonomous weapon Discusses the dangers and ethics of autonomous weapons 12 The Machine Question Poses ethical questions about AI s moral and legal status 13 Positive computing Focuses on enhancing wellbeing through ethically driven robotics 14 Robotic governance Outlines regulatory frameworks shaping ethical robotics 15 Joanna Bryson Highlights Bryson s ethical perspectives on AI development 16 Algorithmic entities Examines ethical issues with autonomous algorithmic agents 17 Regulation of algorithms Discusses governance for algorithms with societal impact 18 Mariarosaria Taddeo Spotlights Taddeo s influence on cybersecurity ethics 19 Ajung Moon Profiles Moon s work in ethical AI policy development 20 Kay FirthButterfield Discusses FirthButterfield s impact on AI ethics standards 21 Alan Winfield Reflects on Winfield s ethical insights into AI and robotics This compelling book is more than a guide it s a blueprint for responsible technological innovation in the digital age      Ethics and Autonomous Weapons Alex Leveringhaus, 2016-05-18 This book is amongst the first academic treatments of the emerging debate on autonomous weapons Autonomous weapons are capable once programmed of searching for and engaging a target without direct intervention by a human operator Critics of these weapons claim that taking the human out of the loop represents a further step towards the de humanisation of warfare while advocates of this type of technology contend that the power of machine autonomy can potentially be harnessed in order to prevent war crimes This book provides a thorough and critical assessment of these two positions Written by a political philosopher at the forefront of the autonomous weapons debate the book clearly



assesses the ethical and legal ramifications of autonomous weapons and presents a novel ethical argument against fully autonomous weapons

**Rights for Robots** Joshua C. Gellers, 2020-10-26 Bringing a unique perspective to the burgeoning ethical and legal issues surrounding the presence of artificial intelligence in our daily lives the book uses theory and practice on animal rights and the rights of nature to assess the status of robots Through extensive philosophical and legal analyses the book explores how rights can be applied to nonhuman entities This task is completed by developing a framework useful for determining the kinds of personhood for which a nonhuman entity might be eligible and a critical environmental ethic that extends moral and legal consideration to nonhumans The framework and ethic are then applied to two hypothetical situations involving real world technology animal like robot companions and humanoid sex robots Additionally the book approaches the subject from multiple perspectives providing a comparative study of legal cases on animal rights and the rights of nature from around the world and insights from structured interviews with leading experts in the field of robotics Ending with a call to rethink the concept of rights in the Anthropocene suggestions for further research are made An essential read for scholars and students interested in robot animal and environmental law as well as those interested in technology more generally the book is a ground breaking study of an increasingly relevant topic as robots become ubiquitous in modern society The Open Access version of this book available at <http://www.taylorfrancis.com/books/9780429288159> has been made available under a Creative Commons Attribution Non Commercial No Derivatives 4.0 license

**Inhuman Power** Nick Dyer-Witheford, Atle Mikkola, KjØsen, James Steinhoff, 2019-06-20 Artificial Intelligence AI has seen major advances in recent years While machines were always central to the Marxist analysis of capitalism AI is a new kind of machine that Marx could not have anticipated Contemporary machine learning AI allows machines to increasingly approach human capacities for perception and reasoning in narrow domains This book explores the relationship between Marxist theory and AI through the lenses of different theoretical concepts including surplus value labour the general conditions of production class composition and surplus population It argues against left accelerationism and post Operaismo thinkers asserting that a deeper analysis of AI produces a more complex and disturbing picture of capitalism's future than has previously been identified Inhuman Power argues that on its current trajectory AI represents an ultimate weapon for capital It will render humanity obsolete or turn it into a species of transhumans working for a wage until the heat death of the universe a fate that is only avoidable by communist revolution

**Toy Theory** Seth Giddings, 2024-11-05 A novel interpretation of the history and theory of technology from the perspective of toys play and play objects Toy Theory addresses the relationships between toys and technology in two distinct but overlapping ways first as underexamined cultural artifacts and behaviors with significant technical attributes and second as playful and toylike dimensions of technology at large Seth Giddings sets out a toy theory of technology that emphasizes the speculative experimental and noninstrumental in technological paradigms and argues that children's playthings rather than being the most ephemeral and inconsequential of

technical devices instead offer analytical and anthropological resources for understanding the materiality and imaginaries of technology over time After defining toy theory in general and conceptual terms Giddings examines different types of toys to explore shifting relationships between the microcosmic symbolic or mimetic content material and technical constitution and modes of play of toys and toy related artifacts on the one hand and prevailing macrocosmic technological paradigms and imaginaries on the other Taking a broad historical and genealogical view Giddings traces contemporary postdigital toy and play culture to precedents from the neolithic through to the Enlightenment to consumer culture from the early nineteenth century to the present day

*Robots that Talk and Listen* Judith Markowitz, 2014-12-12 *Robots That Talk and Listen* provides a forward looking examination of speech and language in robots from technical functional and social perspectives Contributors address cultural foundations as well as the linguistic skills and technologies that robots need to function effectively in real world settings Among the most difficult and complex is the ability to understand and use language Speech enabled automata are already serving as interactive toys teacher s aides and research assistants These robots will soon be joined by personal companions industrial co workers and military support automata The social impact of these and other robots extends well beyond the specific tasks they perform Contributors tackle the most knotty of those issues notably acceptance of advanced speech enabled robots and developing ethical and moral controls for robots Topics in this book include Language and Beyond The True Meaning of Speech Enabled Robots in Myth and Media Enabling Robots to Converse Language Learning by Automata Handling Noisy Settings Empirical Studies of Robots in Real World Environments Acceptance of Intelligent Robots Managing Robots that Can Lie and Deceive Envisioning a World Shared with Intelligent Robots

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