

## AUTONOMOUS WEAPON SYSTEMS AND THE LAW OF ARMED CONFLICT

For policymakers, this book explains the ramifications under international humanitarian law of a major new field of weapon development with a focus on questions currently being debated by governments, the United Nations and other bodies. Based on a clear explanation of the principles of autonomous systems and a survey of technologies under active development as well as some that are in use today, it provides a thorough legal analysis grounded on a clear understanding of the technological realities of autonomous weapon systems.

For legal practitioners and scholars, it describes the legal constraints that will apply to use of autonomous systems in armed conflict and the measures that will be needed to ensure that the efficacy of the law is maintained. More generally, it serves as a case study in identifying the legal consequences of use of autonomous systems in partnership with, or in place of, human beings.

TIM MCFARLAND is a Research Fellow at the University of New South Wales, Canberra, Australia. He has a mixed technical and legal background, earning a degree in mechanical engineering and embarking on a varied information technology career before completing a JD and then a PhD researching autonomous weapon systems and international humanitarian law.

Cambridge University Press

978-1-108-49974-3 — Autonomous Weapon Systems and the Law of Armed Conflict

Tim McFarland

Frontmatter

[More Information](#)

---

# AUTONOMOUS WEAPON SYSTEMS AND THE LAW OF ARMED CONFLICT

Compatibility with International Humanitarian Law

TIM MCFARLAND

*University of New South Wales, Canberra*



CAMBRIDGE  
UNIVERSITY PRESS

Cambridge University Press  
 978-1-108-49974-3 — Autonomous Weapon Systems and the Law of Armed Conflict  
 Tim McFarland  
 Frontmatter  
[More Information](#)

## CAMBRIDGE UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom  
 One Liberty Plaza, 20th Floor, New York, NY 10006, USA  
 477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
 314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India  
 79 Anson Road, #06–04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)  
 Information on this title: [www.cambridge.org/9781108499743](http://www.cambridge.org/9781108499743)  
 DOI: 10.1017/9781108584654

© Tim McFarland 2020

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2020

*A catalogue record for this publication is available from the British Library.*

### *Library of Congress Cataloging-in-Publication Data*

Names: McFarland, Tim, 1971– author.

Title: Autonomous weapon systems and the law of armed conflict : compatibility with international humanitarian law / Tim McFarland, University of New South Wales, Canberra.

Description: Cambridge, United Kingdom ; New York, NY, USA : Cambridge University Press, 2020. | Based on author's thesis (doctoral - University of Melbourne Law School, 2017) issued under title: The status of autonomous weapon systems under international humanitarian law. | Includes bibliographical references and index.

Identifiers: LCCN 2019060040 (print) | LCCN 2019060041 (ebook) | ISBN 9781108499743 (hardback) | ISBN 9781108731225 (paperback) | ISBN 9781108584654 (epub)

Subjects: LCSH: Autonomous weapons systems (International law)

Classification: LCC KZ5645.5.A98 M34 2020 (print) | LCC KZ5645.5.A98 (ebook) | DDC 341.6/3–dc23

LC record available at <https://lcn.loc.gov/2019060040>

LC ebook record available at <https://lcn.loc.gov/2019060041>

ISBN 978-1-108-49974-3 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

CONTENTS

<i>List of Figures and Tables</i>	vii
<i>Acknowledgements</i>	viii
<b>1 Introduction</b>	<b>1</b>
<b>2 Legal Background</b>	<b>8</b>
Development of Legal Principles and Rules	8
Regulatory Debate	21
<b>3 Understanding Weapon Autonomy</b>	<b>28</b>
The Technology of Autonomous Machines	29
Autonomous Control of Weapon Platforms	51
<b>4 Identifying Legal Issues</b>	<b>57</b>
Effects on Decision-Making Processes	57
Predictability and Failure	59
Legal Categorisation of AWS	66
Identifying Legal Concerns	79
Law Relating Specifically to AWS	84
Weapons Law versus Targeting Law	85
<b>5 Weapons Law</b>	<b>88</b>
Weapon-Specific Restrictions	89
Distinction	90
Superfluous Injury and Unnecessary Suffering	100
Martens Clause	101
<b>6 Targeting Law</b>	<b>113</b>
Human Involvement	114
Targeting Processes	119

vi CONTENTS

7	<b>Accountability</b>	127
	General Statement on Accountability for AWS Behaviour	128
	State Responsibility	130
	Individual Criminal Responsibility	137
	Other Forms of Accountability	164
8	<b>Recommendations</b>	175
	Defining AWS	176
	Regulating AWS	177
	<i>Index</i>	181

FIGURES AND TABLES

**Figures**

- 3.1 Manual weapon system 32
- 3.2 Autonomous weapon system 33

**Tables**

- 3.1 Sheridan and Verplank’s ten levels of automation 44

## ACKNOWLEDGEMENTS

This material is based upon work supported by the Australian Research Council's Discovery Projects funding scheme (project DP130100432) and the Air Force Office of Scientific Research (award number FA9550-18-1-0181). Any opinion, finding and conclusion or recommendation expressed in this material are those of the author and do not necessarily reflect the views of the United States Air Force.

Much of the content of Chapter 3 is taken from: McFarland, T, 'Factors Shaping the Legal Implications of Increasingly Autonomous Military Systems' (2015) 97(900) *International Review of the Red Cross* 97 1313–39 © ICRC 2016, published by Cambridge University Press. Reprinted with permission.

Portions of Chapter 7 on 'Developer Responsibility' are taken from: McFarland, T., and McCormack, T, 'Mind the Gap: Can Developers of Autonomous Weapons Systems Be Liable for War Crimes?' (2014) 90 *International Law Studies* 361–85. I would like to acknowledge Professor McCormack's assistance in identifying and refining the discussion of the issues covered in that section.

Finally, to Professor Tim McCormack, Associate Professor Rain Liivoja and Associate Professor Robert Mathews, many thanks for your constant support and encouragement in the production of this book and the thesis on which it is based.