

# Drones and the Creative Industry

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Editors

# Drones and the Creative Industry

Innovative Strategies for European SMEs

 Springer Open

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ISBN 978-3-319-95260-4      ISBN 978-3-319-95261-1 (eBook)  
<https://doi.org/10.1007/978-3-319-95261-1>

Library of Congress Control Number: 2018947740

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Printed on acid-free paper

This Springer imprint is published by the registered company Springer International Publishing AG part of Springer Nature.

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Foreword

Drones, also called unmanned aerial systems (UAS) or remotely piloted aircraft systems (RPAS)—there are slight differences between them—have traditionally been used for military applications. Over the last decade, improvements in electronics miniaturization, control and perception systems and battery technologies have accelerated the growth of civil drone technologies and applications.

Civil drones are here to stay. They provide unprecedented advantages in certain fields such as aerial photography and filming and aerial inspections, where they have become almost irreplaceable, partly because they involve dramatic cost reductions when compared to traditional solutions. Drones are currently employed in hundreds of applications in different domains. And this is only the tip of the iceberg. All the technology roadmaps agree that drones will have a deep impact on society and that this trend will continue over the next few decades. According to Goldman Sachs, the drone market will reach a total market size of \$100 billion before 2020. A large percentage of these sales will come from the military sector, yet the sharpest increases will come from the business and civil sectors, which are forecast to grow at yearly rates of over 15%.

Drones equipped with cameras and other sensors are ideal platforms to gather images and other information from inaccessible locations. In fact, most civil drone applications currently centre on aerial photography and filming. Recently, other drone uses, including transporting objects, logistics and precision agriculture, have begun to attract significant attention and are starting to be exploited. Drones are now starting to interact physically with the environment and perform aerial manipulation while flying, thanks to recent research and development work, particularly in European Framework Programme projects, such as FP7 ARCAS and the ongoing H2020 AEROARMS. This is highly relevant when performing tasks such as repairing, installing and replacing items or performing contact inspection tasks with contact sensors, which is of major importance when maintaining infrastructures (i.e. bridges) and industrial plants (i.e. elevated pipes and tanks in oil and gas industries), as it saves on costs and helps to decrease the number of accidents suffered by humans working at a height. In addition, the improvements made in

safety and in the autonomy of drones, thanks to advances in perception and control systems among others, will enable drones to become co-workers that can take an active role in productive processes in close conjunction with human workers, though this would require the addition of “soft” materials. These two last applications are very challenging and are still at a low TRL status, yet the results obtained are promising and will almost certainly become a reality in a few years’ time.

There is still much to be done in the drone world. Battery lifetimes still critically constrain their applicability. Improvements in safety, security and data privacy are also essential. New advances in sensors, control, navigation, mapping and indoor localization, communications, obstacle detection and avoidance and artificial intelligence, among others, are required to provide drone autonomy.

Drones are very powerful tools. An international regulatory framework, or at least globally homogeneous national regulatory frameworks, will be necessary to facilitate the suitable development of the sector and future applications, whilst also ensuring safety and security as well as the right to privacy and data protection. This framework should also include unmanned traffic management (UTM) and the integration of drones in air traffic management (ATM). The new European Regulation that is soon to be published will represent a significant step in this direction.

The drone sector also needs to consolidate platforms, electronics and software in easy-to-use, off-the-shelf solutions that can be straightforwardly used by non-experts who are interested in taking advantage of drones as “working tools”. Aerial photography and filming represent a very large percentage of the current civil drone market and have become essential in cinematography and creative industries. The book you have in your hands and the AiRT H2020 project have contributed to making drone-based solutions an innovative, daily tool at the service of the highly demanding creative industry.

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**Correction to: Introduction to Drones and Technology Applied to the Creative Industry. AiRT Project: An Overview of the Main Results and Actions . . . . . E1**

# List of Abbreviations

3D	Three Dimensions
ADVMA	Advanced Materials
AiRT	Arts indoor RPAS Technology Transfer
AR	Augmented Reality
B2B	Business to Business
CAE	Culture Action Europe
CCIs	Creative and Cultural Industries
CIP	Competitiveness and Innovation Programme
CI	Creative Industries
CISCAC	International Confederation of Societies of Authors and Composers
CORDIS	Community Research and Development Information Service
CSA	Coordination and Support Action
DCA	Department of Culture and the Arts (Western Australia)
DCMS	British Department of Culture Media and Sports
DG	Directorate-General
DoA	Description of the Action
EASA	European Agency of Safety Aviation
ECO	European Cluster Observatory
EEA	European Economic Area
EGNOS	European Geostationary Navigation Overlay System
EU	European Union
EUIPO	European Union Intellectual Property Organization
FCS	Framework for Culture Statistics
FP	Framework Programmes
FRIFF	Flying Robot International Festival
GCS	Ground Control System
GDP	Gross Domestic Product
GNSS	Global Navigation Satellite System
GPS	Geographical Positioning System
GUI	Graphical User Interface
H2020	Horizon 2020



I2C	Central microcontroller to slave microcontrollers
ICT	Information and Communication Technologies
IFCS	Intelligent Flight Control System
IIPA	International Intellectual Property Alliance
IMU	Inertial Measurement Unit
IPR	Intellectual Property Rights
IPS	Intelligent Positioning System
ITN	International Training Network
LEG	European Leadership Group
LEIT	Industrial Leadership
MEMS	Microelectromechanical systems
MSCA	Marie Skłodowska Curie Actions
NEM	New European Media Initiative platform
NLOS	Non-line-of-sight
OCS	On-board Control System
PAR	Participatory Action Research
R&D	Research and Development
RIA	Research and Innovation Action
RIS3	Research and Innovation Strategies
RPAS	Remotely Piloted Aircraft System
RTK	Real-Time Kinematic
SBAS	Satellite-Based Augmentation System
SLAM	Simultaneous Localization and Mapping
SMEs	Small and Medium Enterprises
SNA	Social Network Analysis
SPI	Serial Peripheral Interface
SWAFS	Science with and for Society
ToCM	Toolkit of Creative Med
TFP	Total Factor Productivity
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicles
UCD	User-Centered Design
UI	User Interface
UNCTAD	United Nations Conference of Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPV	Universitat Politècnica de València
UWB	Ultra-Wideband
VEM	Virtual Environment Mapping
VPS	Vision Positioning System
VR	Virtual Reality
WAAS	Wide Area Augmentation System
WIPO	World Intellectual Property Organization
XR	Extended Reality