

Security Analysis of DJI Phantom 3 Standard

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Abstract

This paper comprises a security analysis of the DJI Phantom 3 Standard [1], a popular consumer drone with an onboard camera and standard set of features. Drones present a novel airborne platform for new commercial and consumer work, and this, in addition to their increasing ubiquity, makes a security analysis especially worthwhile. We present a collection of fatal attacks, minor observations, and associated security vulnerabilities, discovered over the course of a month of research. These vulnerabilities affect both the physical integrity of the drone and the security of user data. Finally, we make a set of recommendations that, if implemented, will dramatically bolster the security of the drone.

1 Introduction

In recent years, commercial drones have become increasingly popular among the public, as models such as the DJI Phantom series make the industry more accessible for consumers. These drones are cheaper and easier to fly than ever before. In addition, increased media attention and advances in aerial, battery, and camera technology have made drones especially attractive for endeavors ranging from aerial film projects to research. The growing prevalence of drones in society, however, poses an immediate security concern. When used properly, drones are harmless and are incredibly useful, providing, for instance, beautiful aerial shots and cinematography. However, when misappropriated, drones can directly lead to invasions of privacy, concerns with aircraft safety, and even result in personal injury. It is essential for the owner of the drone to be able to secure it from attack and misuse. Since regulations now require owner registration, and hold owners accountable for illegal misuse, this becomes an immediate consequence for DJI customers, in addition to concerns for public safety. Therefore, the security of commercial drones should be a chief concern for security researchers, the legislative branch, and drone companies.

The following research was performed with permission from DJI through a responsible disclosure process. Please do not publish or discuss findings in this paper until further notice, after DJI has a chance to review and fix any vulnerabilities.

2 System Overview

First, we introduce the Phantom 3 Standard system, and its various components.

Security Analysis Of Dji Phantom 3 Standard

Timothy Russell Miller



Security Analysis Of Dji Phantom 3 Standard:

Trust, Privacy and Security in Digital Business Steven Furnell, Haralambos Mouratidis, Günther Pernul, 2018-08-20 This book constitutes the refereed proceedings of the 15th International Conference on Trust Privacy and Security in Digital Business TrustBus 2018 held in Regensburg Germany in September 2018 in conjunction with DEXA 2018 The 15 revised full papers presented were carefully reviewed and selected from 29 submissions The papers are organized in the following topical sections Permission models and cloud privacy proactive security measures and cyber physical systems Digital Forensics and Cyber Crime Petr Matoušek, Martin Schmiedecker, 2018-01-04 This book constitutes the refereed proceedings of the 9th International Conference on Digital Forensics and Cyber Crime ICDF2C 2017 held in Prague Czech Republic in October 2017 The 18 full papers were selected from 50 submissions and are grouped in topical sections on malware and botnet deanonymization digital forensics tools cybercrime investigation and digital forensics triage digital forensics tools testing and validation hacking **Future Network Systems and Security** Robin Doss, Selwyn Piramuthu, Wei Zhou, 2019-10-28 This book constitutes the refereed proceedings of the 5th International Conference on Future Network Systems and Security FNSS 2019 held in Melbourne Australia in November 2019 The 16 full papers and two short papers presented were carefully reviewed and selected from 38 submissions The papers are organized in topical sections on emerging networks and applications security privacy and trust and security analytics and forensics **Telematics and Computing** Miguel Félix Mata-Rivera, Roberto Zagal-Flores, Cristian Barria-Huidobro, 2022-10-30 This book constitutes the proceedings of the 11th International Congress on Telematics and Computing WITCOM 2022 held in Canc n M xico in November 2022 The 30 full papers presented in this volume were carefully reviewed and selected from 73 submissions The papers are focused on the topics of artificial intelligence techniques Data Science Blockchain environment Monitoring Cybersecurity Education and software for communications protocols **Artificial Intelligence and Security** Xingming Sun, Jinwei Wang, Elisa Bertino, 2020-09-12 The 3 volume set CCIS 1252 until CCIS 1254 constitutes the refereed proceedings of the 6th International Conference on Artificial Intelligence and Security ICAIS 2020 which was held in Hohhot China in July 2020 The conference was formerly called International Conference on Cloud Computing and Security with the acronym ICCCS The total of 178 full papers and 8 short papers presented in this 3 volume proceedings was carefully reviewed and selected from 1064 submissions The papers were organized in topical sections as follows Part I artificial intelligence Part II artificial intelligence Internet of things information security Part III information security big data and cloud computing information processing Augmented Reality, Virtual Reality, and Computer Graphics Lucio Tommaso De Paolis, Patrick Bourdot, 2018-07-13 The 2 volume set LNCS 10850 and 10851 constitutes the refereed proceedings of the 5th International Conference on Augmented Reality Virtual Reality and Computer Graphics AVR 2018 held in Otranto Italy in June 2018 The 67 full papers and 26 short papers presented were carefully reviewed and selected from numerous submissions The papers are

organized in the following topical sections virtual reality augmented and mixed reality computer graphics human computer interaction applications of VR AR in medicine and applications of VR AR in cultural heritage and applications of VR AR in industry

Security Technologies and Social Implications Garik Markarian,Ruza Karlovic,Holger Nitsch,Krishna Chandramouli,2022-10-04 SECURITY TECHNOLOGIES AND SOCIAL IMPLICATIONS Explains how the latest technologies can advance policing and security identify threats and defend citizens from crime and terrorism Security Technologies and Social Implications focuses on the development and application of new technologies that police and homeland security officers can leverage as a tool for both predictive and intelligence led investigations The book recommends the best practices for incorporation of these technologies into day to day activities by law enforcement agencies and counter terrorism units Practically it addresses legal technological and organizational challenges e g resource limitation and privacy concerns combined with challenges related to the adoption of innovative technologies In contrast to classic tools modern policing and security requires the development and implementation of new technologies using AI machine learning social media tracking drones robots GIS computer vision and more As crime and cybercrime in particular becomes more and more sophisticated security requires a complex mix of social measures including prevention detection investigation and prosecution Key topics related to these developments and their implementations covered in Security Technologies and Social Implications include New security technologies and how these technologies can be implemented in practice plus associated social ethical or policy issues Expertise and commentary from individuals developing and testing new technologies and individuals using the technologies within their everyday roles The latest advancements in commercial and professional law enforcement technologies and platforms Commentary on how technologies can advance humanity by making policing and security more efficient and keeping citizens safe Security Technologies and Social Implications serves as a comprehensive resource for defense personnel and law enforcement staff practical security engineers and trainee staff in security and police colleges to understand the latest security technologies with a critical look at their uses and limitations regarding potential ethical regulatory or legal issues

Intelligent Computing Kohei Arai,2024-06-20 Explore the forefront of computing with the proceedings of the Computing Conference 2024 Featuring 165 carefully selected papers from a pool of 457 submissions this collection encapsulates the cutting edge research and innovation presented during the conference Delve into a diverse range of topics insights and methodologies that shape the future of computing Whether you re an academic researcher or enthusiast this concise volume offers a snapshot of the dynamic and collaborative spirit defining the Computing Conference 2024

Cyber Forensics Albert J. Marcella,2021-09-13 Threat actors be they cyber criminals terrorists hacktivists or disgruntled employees are employing sophisticated attack techniques and anti forensics tools to cover their attacks and breach attempts As emerging and hybrid technologies continue to influence daily business decisions the proactive use of cyber forensics to better assess the risks that the exploitation of these technologies pose to enterprise wide operations is

rapidly becoming a strategic business objective This book moves beyond the typical technical approach to discussing cyber forensics processes and procedures Instead the authors examine how cyber forensics can be applied to identifying collecting and examining evidential data from emerging and hybrid technologies while taking steps to proactively manage the influence and impact as well as the policy and governance aspects of these technologies and their effect on business operations A world class team of cyber forensics researchers investigators practitioners and law enforcement professionals have come together to provide the reader with insights and recommendations into the proactive application of cyber forensic methodologies and procedures to both protect data and to identify digital evidence related to the misuse of these data This book is an essential guide for both the technical and non technical executive manager attorney auditor and general practitioner who is seeking an authoritative source on how cyber forensics may be applied to both evidential data collection and to proactively managing today s and tomorrow s emerging and hybrid technologies The book will also serve as a primary or supplemental text in both under and post graduate academic programs addressing information operational and emerging technologies cyber forensics networks cloud computing and cybersecurity

UAV Communications for 5G and Beyond
Yong Zeng,Ismail Guvenc,Rui Zhang,Giovanni Geraci,David W. Matolak,2020-12-08 Explore foundational and advanced issues in UAV cellular communications with this cutting edge and timely new resource UAV Communications for 5G and Beyond delivers a comprehensive overview of the potential applications networking architectures research findings enabling technologies experimental measurement results and industry standardizations for UAV communications in cellular systems The book covers both existing LTE infrastructure as well as future 5G and beyond systems UAV Communications covers a range of topics that will be of interest to students and professionals alike Issues of UAV detection and identification are discussed as is the positioning of autonomous aerial vehicles More fundamental subjects like the necessary tradeoffs involved in UAV communication are examined in detail The distinguished editors offer readers an opportunity to improve their ability to plan and design for the near future explosive growth in the number of UAVs as well as the correspondingly demanding systems that come with them Readers will learn about a wide variety of timely and practical UAV topics like Performance measurement for aerial vehicles over cellular networks particularly with respect to existing LTE performance Inter cell interference coordination with drones Massive multiple input and multiple output MIMO for Cellular UAV communications including beamforming null steering and the performance of forward link C C channels 3GPP standardization for cellular supported UAVs including UAV traffic requirements channel modeling and interference challenges Trajectory optimization for UAV communications Perfect for professional engineers and researchers working in the field of unmanned aerial vehicles UAV Communications for 5G and Beyond also belongs on the bookshelves of students in masters and PhD programs studying the integration of UAVs into cellular communication systems

IOT with Smart Systems Tomonobu Senjyu,Parakshit Mahalle,Thinagaran Perumal,Amit Joshi,2022-01-05 This book gathers papers addressing state of the art research in all areas

of information and communication technologies and their applications in intelligent computing cloud storage data mining and software analysis It presents the outcomes of the Fifth International Conference on Information and Communication Technology for Intelligent Systems ICTIS 2021 held in Ahmedabad India The book is divided into two volumes It discusses the fundamentals of various data analysis techniques and algorithms making it a valuable resource for researchers and practitioners alike

Drone and UAV Forensics Hudan Studiawan, Kim-Kwang Raymond Choo, 2025-11-01 This textbook is designed to introduce and deepen the understanding of drone technology in the field of forensic science It is tailored for university level courses blending theoretical knowledge with practical application This makes it an ideal resource for advanced level students in digital forensics computer science criminal justice and related fields Real world case studies are designed throughout the text providing practical insights and demonstrating how the principles and techniques discussed can be applied in actual forensic investigations This hands on approach not only aids in understanding theoretical concepts but also provides valuable practical experience This textbook not only focuses on current practices in drone forensics but also discusses the future challenges and advancements expected in the field This forward thinking approach ensures that readers are not only well versed in current methodologies but are also prepared for emerging technologies and evolving legal landscapes This aspect makes the textbook a long term resource for students and researchers interested in or working in drone forensics

Nuclear Power Plants: Innovative Technologies for Instrumentation and Control Systems Yang Xu, Yongbin Sun, Yanyang Liu, Yanjun Wang, Pengfei Gu, Zheming Liu, 2020-01-07 This book presents a compilation of selected papers from the Fourth International Symposium on Software Reliability Industrial Safety Cyber Security and Physical Protection of Nuclear Power Plant held in August 2019 in Guiyang China The purpose of the symposium was to discuss inspection testing certification and research concerning the software and hardware of instrument and control I C systems used at nuclear power plants NPP such as sensors actuators and control systems The event provides a venue for exchange among experts scholars and nuclear power practitioners as well as a platform for the combination of teaching and research at universities and enterprises to promote the safe development of nuclear power plants Readers will find a wealth of valuable insights into achieving safer and more efficient instrumentation and control systems

Secure IT Systems Hans P. Reiser, Marcel Kyas, 2023-01-01 This book constitutes the refereed proceedings of the 27th Nordic Conference on Secure IT Systems NordSec 2022 held in Reykjavic Iceland during November 30 December 2 2022 The 20 full papers presented in this volume were carefully reviewed and selected from 89 submissions The NordSec conference series addresses a broad range of topics within IT security and privacy

Dji Phantom 3 Standard Greg Keast, 2016-06-13 This booklet is written for beginning pilots who are interested in flying the DJI Phantom 3 Standard Model and serves to supplement the DJI manual not replace it It takes an in depth look at the DJI GO app offers many useful tips and can save you time money and headaches The information in the booklet is current as of June 2016 and is based on the DJI Manual V1 4 and the DJI GO app Android

Version 2.8.1 However it can also be used for the iOS version of the GO app v2.8.3 and notes the differences If you are looking for a handy field reference or just want a quick study guide this is a good resource to have Please note The DJI manual and this booklet share much of the same information but there are significant differences between them not only in terms of content but in how that content is organized and presented

Foundations of Security Analysis and Design VIII Alessandro Aldini, Javier Lopez, Fabio Martinelli, 2016-08-15 FOSAD has been one of the foremost educational events established with the goal of disseminating knowledge in the critical area of security in computer systems and networks Over the years both the summer school and the book series have represented a reference point for graduate students and young researchers from academia and industry interested to approach the field investigate open problems and follow priority lines of research This book presents thoroughly revised versions of four tutorial lectures given by leading researchers during three International Schools on Foundations of Security Analysis and Design FOSAD held in Bertinoro Italy in September 2014 2015 and 2016 The topics covered in this book include zero knowledge proof systems JavaScript sandboxing assessment of privacy and distributed authorization

Quantifying Minimum-time-to-intrusion Based on Dynamic Software Safety Assessment Jeffrey M. Voss, Reliable Software Technologies, Rome Air Development Center, United States. Defense Advanced Research Projects Agency, 2000

Formal Security Analysis of Access Control Models and Their Spatiotemporal Extensions Emre Uzun, 2015

~A Security Analysis of Firmware Over-the-air Update Mechanisms for Smartphones Andreas Wolf, 2013

Foundations of Security Analysis and Design III, 2005

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