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Review of ONR's Uninhabited Combat Air Vehicles Program *Unmanned Combat Air Systems in Future Warfare* *Drone Strike!* *Unmanned Combat Aerial Vehicles* *Uninhabited Combat Aerial Vehicles* X-45: Uninhabited Combat Air Vehicle *Unmanned Combat Air Systems* **Autonomous Vehicles in Support of Naval Operations** *Defense Science Board Study* The Last Manned Fighter - Replacing Manned Fighters with Unmanned Combat Air Vehicles **Review of ONR's Uninhabited Combat Air Vehicles Program** *Uninhabited Air Vehicles* **One Nation, Under Drones** *Unmanned Aerial Vehicles* **Unmanned Aviation Unmanned Aerial Vehicles** Unmanned Vehicle Systems & Operations on Air, Sea, Land Unmanned Technologies. The future of the concept of Air Power **Cooperative Engagement Unmanned Aerial Vehicles X-47 Unmanned Combat Air Vehicle (Ucav)** *Unmanned Combat Air Systems in Future Warfare* **Unmanned Airlift: a Viable Option for Meeting the Strategic Airlift Shortfall UAVs: Unmanned Aerial Vehicles Birds of Prey Three Horizons** Uncrewed Vehicle **An Examination of Latency and Degradation Issues in Unmanned Combat Aerial Vehicle Environments** *Drone Warfare* **Autonomy Research for Civil Aviation Theory, Design, and Applications of Unmanned Aerial Vehicles** *Unmanned Aircraft Systems* Advances in Unmanned Aerial Vehicles 2001 Assessment of the Office of Naval Research's Aircraft Technology Program **Legitimacy and Drones Uninhabited Air Vehicles Special Operations Forces and Unmanned Aerial Vehicles AI at War Rise of the Drones Unmanned Systems Integrated Roadmap FY2013-2038**

Essay from the year 2019 in the subject Engineering - Safety Engineering, , language: English, abstract: In this work, the author argues that unmanned technologies will be the future of military airpower around the globe in the year 2040. Militaries around the world are heavily investing in unmanned aerial vehicles (UAV) technologies and drone warfare. These technologies are leading the evolution in airpower. The United States, China and several other developed and developing countries are involved in the massive development of Unmanned Combat Aerial Vehicles (UCAVs). Given the complex nature of modern warfare and technological advancements of enemies, military experts predict that in the future UAVs will play a crucial role in battlefields around the globe. This is attributed to the fact that UAVs are capable of minimizing risks of human life, which are associated with operating in hostile territories and poor weather. This paper addresses the question, can and should the Air Force pursue an unmanned multirole fighter to replace manned systems? Unmanned aircraft systems have demonstrated enormous intelligence, surveillance, and reconnaissance (ISR) capabilities in both flexibility and persistence. Current and emerging technology may permit unmanned fighters to replace conventional multirole aircraft in the face of high endurance missions, evolving threat systems, and political pressure to preserve human life. This research is framed in the context of a specialized weapon in military aviation: an unmanned multirole fighter capable of replacing manned systems and their respective missions. This paper gives a brief history of unmanned aerial vehicles and their employment as weapons to demonstrate the evolution from ISR platform to unmanned combat air vehicle and then evolves into two main sections of “can we” and “should we” pursue this avenue of development. The primary means of answering the research question is both technical and philosophical. Before being able to answer if the Air Force should pursue an unmanned fighter, it is necessary to determine if it is technically feasible for such a system. A methodical analysis of mission subsets and common tasks that fighters currently perform and how those tasks might be performed in an unmanned vehicle are examined to substantiate technical capability. Inherent to this discussion are the obvious questions of remote piloting versus autonomous operations, command and control, and weaknesses that may be presented to an adversary. Modern media, political costs of human life, single points of failure, command and control, and monetary costs are then addressed to develop the subjective main point of pursuing acquisition. The range and endurance of unmanned combat air vehicle (UCAV) fighters offer persistence and attractive options in a world of growing antiaccess strategies. They offer advantages in performance, altitude, and employment without the limitations of human physiology. UCAV fighters vi deny the political use of prisoners of war by our adversaries and preserve the tactical knowledge of our pilots at home. The research finds there are no technological barriers that prohibit the design and use of UCAV fighters on a large scale. There are anticipated limitations in bandwidth and concern for performance during within-visual-range maneuvering if man-in-the-loop is the solution to command and control. Ultimately, UCAV fighters are not a panacea but offer the presence of force in a threat environment that 20 years from now will be extremely lethal. The costs and risks associated with UCAV fighters are significant but surmountable. The single point of failure may be in our command and control through the radio frequency spectrum. Autonomy provides a solution but is incompatible with US ascription to the law of armed conflict and its mandates. If sufficient bandwidth can be secured and the control of remote vehicles can be assured, there are immense dollar and political costs to be saved in their employment. In the context of future threat systems and antiaccess strategies, the Air Force would be foolish not to pursue UCAV fighter technology. Lessons from recent combat experiences in Kosovo, Afghanistan and Iraq have shown that UAVs can provide vastly improved acquisition and more rapid dissemination of Intelligence, Surveillance and Reconnaissance (ISR) data. They are one of the principal contributors to successful outcomes for the United States, in these campaigns. The benefits and promise offered by UAVs in surveillance, targeting and attack have captured the attention of senior military and civilian officials in the Defense Department (DoD), members of Congress, and the public alike. Indeed, these recent combat operations appear to indicate that unmanned air systems have at last come of age. There is no longer any question of the technical viability and operational utility of UAVs. The success of UAVs in recent conflicts represents a historic opportunity to exploit the transformational capabilities inherent in UAVs/Uninhabited Combat Aerial Vehicles (UCAVs).

Transformation is not a term, it is a philosophy. Transformation is a predisposition to exploring adaptations of existing and new systems, doctrine and organizations. True transformation is not the result of a one-time improvement, but of sustained and determined effort. For example, the American forces used multiple Predator UAVs during Operation Iraqi Freedom (OIF) to provide a far more comprehensive operational perspective across the theater to the Combined Air Operations Center by integrating the Predator common operating picture with the Falcon View mission planning system. There is now another mission imperative and that is distance. During this review the new concept of Global Persistence Surveillance has specifically focused on the contributions of UAVs and UCAVs. During OIF Predator UAVs also enabled time-critical targeting via streaming video to strike platforms. Likewise one Global Hawk in the Iraqi theater from 8 March 03 to 23 April 03 accounted for 55% of the Time Sensitive Targets generated to kill air defense equipment. In 16 missions, Global Hawk located 13 Surface-to-Air Missile (SAM) batteries, 50 SAM launchers, over 70 SAM transport vehicles and over 300 tanks. Notwithstanding the success of UAVs in OIF, UAVs have not been fully "embedded" in current Concepts of Operations (CONOPS) or valued with effects driven methodology. Future UAV programs must be conceived with this mix in mind, i.e. predefined operational concepts and effects driven methodology. UAVs are ideal systems to support the emerging joint character and the asymmetric nature of warfare. The Task Force feels it is time for DoD and the Services to move forward and make UAVs and UCAVs an integral part of the force structure, not an "additional asset." To do so requires appropriate planning, appropriate budgeting, and continued management attention of DoD and Service leadership. The DoD and the Services have already started to integrate UAVs into their force structure plans. Currently there are UAV plans and roadmaps within the DoD and Services and the FY 04 budget also shows substantial increases in funding of UAV programs. While progress has been made in planning and funding for UAVs, the Services need to move from deconfliction to integration to interdependence. UAV capabilities should be assessed in the larger context of the Global Persistent Surveillance. UAVs can ideally complement current architectures for Future Imagery Architecture, New Imagery System, and Space Based Radar. This study identifies steps the Department of Defense and Armed Services can take to field a robust UAV and UCAV capability. The recommendations in his executive summary indicate the Task Force's top level recommendations. Additional recommendations can be found in the body of the report. The Task Force's findings and recommendations fall into eight subject areas and are described in this executive summary in order of importance. Joint Vision 20101 addresses the need for achieving military dominance through the application of new operational concepts. For the Department of the Navy, future operational concepts will hinge on a continuance of forward yet unobtrusive presence and the capability to influence events ashore as required. This capability will be enabled by the development and insertion into the forces of new technologies for providing command, control, and surveillance; battlespace dominance; power projection; and force sustainment. For example, unmanned aerial vehicles (UAVs) have recently proven to be valuable operational platforms for providing tactical intelligence by surveillance of the battlefield. To support naval force objectives, the Office of Naval Research (ONR) has established a research program within the Strike Technology Division (Code 351) of the Naval Expeditionary Warfare Science and Technology Department aimed at expanding the operational capabilities of UAVs to include not only surveillance and reconnaissance, but strike and logistics missions as well. This new class of autonomous vehicles, known as uninhabited combat air vehicles (UCAVs), is foreseen as being intelligent, recoverable, and highly maneuverable in support of future naval operations. Review of ONR'S Uninhabited Combat Air Vehicles Program evaluates ONR's UCAV technology activities, including its vision documents and its science and technology roadmap (in areas of vehicle dynamics, communications, sensors, and autonomous agents) against criteria that would be selected by the committee, such as the relevance for meeting future naval priorities, the cost and time scale for its utilization, duplication of effort, and scientific and technical quality. The field of unmanned combat aerial vehicles (UCAVs) is rapidly diversifying as an array of light, midsized, and heavy UCAVs and munitions enter the global marketplace. This has the potential to dramatically expand access to armed unmanned platforms and change the way unmanned aerial vehicles are used in combat.The influence of UCAVs on the conduct of war has already been felt in conflicts in the Caucasus, the Middle East and North Africa, where state and non-state actors have fielded a dizzying number of UCAVs from around the world. At the same time, advanced militaries are beginning to equip UCAVs with increasingly sophisticated munitions, some of which are heavier and can fly farther than the types of weapons used by UCAVs in the past.The first in a new series of Strategic Handbooks from Harpia Publishing presents an essential guide to the world of armed unmanned aircraft. It features profiles of every unmanned combat aerial vehicles (UCAVs) currently in active military service or under development, as well as other unmanned aerial vehicles that could potentially be armed in the future. Unmanned Aerial Vehicles (UAVs) have been referred to in many ways: RPV (remotely piloted vehicle), drone, robot plane, and pilotless aircraft are a few such names. Most often called UAVs, they are defined by the Department of Defense (DOD) as powered, aerial vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or non-lethal payload. The war an terrorism has put a high premium on the primary mission of UAVs, intelligence gathering. Furthermore, the military effectiveness of UAVs in recent conflicts such as Iraq (2003), Afghanistan (2001), and Kosovo (1999) has opened the eyes of many to both the advantages and disadvantages provided by unmanned aircraft. Long relegated to the sidelines in military operations, UAVs are now making national headlines as they are used in ways normally reserved for manned aircraft. Conventional wisdom states that UAVs offer two main advantages over manned aircraft: they are considered most cost-effective, and they minimise the risk to a pilot's life. However, the current UAV accident rate (the rate at which the aircraft are lost or damaged) is 100 times that of manned aircraft. A unique keepsake with beautiful color pictures of the X-47 unmanned combat aircraft vehicle (UCAV), the Navy version of the Joint Unmanned Combat System (J-UCAS). Enjoy this look at the future of naval aviation! Although primitive unmanned TV-guided airplanes were used in combat during World War II, it is only recently that these machines have matured into the most significant new method of aerial combat since the beginning of contemporary warfare. The fact that onboard human pilots are no longer needed for these aircraft to carry out their deadly missions is fascinating for military enthusiasts and aviation historians alike. These remotely piloted vehicles are now re-writing the book on modern aerial surveillance and close air support. Delivering their lethal payloads with surgical precision, propeller-driven and jet-powered remotely piloted aircraft are guided by satellite, and flown by human operators located halfway around the world in air-conditioned trailers, isolated from the hostile combat environment of the aircraft themselves. While this book also covers the history and development of early-unmanned aerial vehicles, the focus is on all the latest impressive technology used in today's most modern remotely piloted combat aircraft. Control of the air is the foundation for all conventional military operations against an adversary with an air defence capability. In future warfare, will it be possible for

Unmanned Combat Air Systems, the next stage in Unmanned Aircraft System and drone evolution, to undertake the tasks and accept most of the risks that, until now, have been the lot of military aviators? Against potential adversaries with an Anti-Access/Area Denial doctrine, current and planned weapon systems will be tested by the necessity to operate at extended ranges and with adequate persistence. This book examines the requirements and advantages of extended range and endurance, and the potential for swifter and more efficient actions that counter-air Unmanned Combat Air Systems could bring to warfare. The idea of the armed, combat-configured unmanned aerial vehicle entered the 21st Century in the same manner as the idea of military airplanes had entered the 20th Century. It was an untried and untested concept suddenly thrust into the spotlight in an unexpected global war. By 1999, few people outside the military recognized the potential of armed, unmanned flying vehicles, or Unmanned Combat Air Vehicles (UCAVs), as they were called. Today, UCAVs form a vital arm of U.S. strike forces and are controlled from halfway around the world. In this book, the author picks up the UCAV story where he left off in his 2010 Specialty Press book Birds of Prey: Predators, Reapers and America’s Newest UAVs in Combat. Since that time, both technology and battlefield doctrine have evolved considerably and this book is a new window into that world. It provides a detailed look inside the present and future of robotic aerial warfare systems and technologies. Yenne's first book on UCAVs covered the period of early development through the end of the 20th Century. Drone Strike! takes you from that time through today's latest technical wonders, covering such amazing unmanned aircraft capabilities as aerial refueling and landing aboard aircraft carriers even more accurately than manned aircraft. This book also contains recently declassified photographs of the latest U.S. Unmanned Combat Aerial Vehicles. Air superiority has been a near given for the US in every conflict since the Korean War. We are, however, at the cusp of time in history where this could be challenged. An explosion in unmanned aerial vehicle technology and proliferation combine with an unpredictable asymmetric threat at the same time that the USAF inventory of air superiority fighter aircraft is decreasing rapidly. It is very plausible that we could enter a period where the air superiority requirements outstrip our capabilities. In this paper, the author presents a possible solution for this dilemma by combining manned fighter aircraft with unmanned launch platforms in a concept called cooperative engagement. The paper examines the argument for development of an unmanned airborne air-to-air capability in the USAF by exploring the mission of air superiority, followed by a presentation of potential threats to US air superiority. A gap analysis of USAF capability in this arena is examined, and arguments are made for making any added air-to-air capability unmanned through exploration of the concept of "cooperative engagement" between manned fighter aircraft and unmanned launch platforms. The paper concludes with recommendations for the implementation of this capability and presents thoughts for exploration of additional applications of this concept as it evolves. An unmanned aerial vehicle, commonly known as a drone, is an aircraft without a human pilot on board. Its flight is either controlled autonomously by computers in the vehicle, or under the remote control of a navigator or pilot on the ground or in another vehicle. Drone Warfare is one of the first books to examine the development and use of such aerial drones. Drones have been much maligned in the media and popular culture and there has been much controversy over their deployment. This book reveals the history of unmanned aircraft, their recent development, and why they have emerged onto the scene, setting the record straight about drones and their use. Drone Warfare answers questions such as: Why did the United States invest so highly drone technology? When did all that start? What barriers had to be overcome? What was there before drones arrived? What roles did drones play in Iraq and Afghanistan? Were they successful? What new developments emerged during operations? Did they save lives? How many have been shot down and where? Will all air forces be drone based in the future? What other applications may arise in the civilian market? In a timely publication, Drone Warfare sets the record straight on unmanned aerial vehicles and explores technology and usage around the globe. Skyhorse Publishing, as well as our Arcade imprint, are proud to publish a broad range of books for readers interested in history--books about World War II, the Third Reich, Hitler and his henchmen, the JFK assassination, conspiracies, the American Civil War, the American Revolution, gladiators, Vikings, ancient Rome, medieval times, the old West, and much more. While not every title we publish becomes a New York Times bestseller or a national bestseller, we are committed to books on subjects that are sometimes overlooked and to authors whose work might not otherwise find a home. "The purpose of this Roadmap is to articulate a vision and strategy for the continued development, production, test, training, operation , and sustainment of unmanned systems technology across DoD. This "Unmanned Systems Integrated Roadmap" establishes a technological vision for the next 25 years and outlines actions and technologies for DoD and industry to pursue to intelligently and affordably align with this vision."--Page v. This book provides a complete overview of the theory, design, and applications of unmanned aerial vehicles. It covers the basics, including definitions, attributes, manned vs. unmanned, design considerations, life cycle costs, architecture, components, air vehicle, payload, communications, data link, and ground control stations. Chapters cover types and civilian roles, sensors and characteristics, alternative power, communications and data links, conceptual design, human machine interface, sense and avoid systems, civil airspace issues and integration efforts, navigation, autonomous control, swarming, and future capabilities. This title explores the development and use of unmanned aerial vehicles, or remotely piloted aircraft, more commonly known as drones. Readers will follow the history of the origins and development of the incredible military technology behind UAVs such as the Predator Drone, the Wasp Micro-Air Vehicle, the Global Hawk unmanned aerial vehicle, the hand-launched remote control RQ-11 Raven for field troops, and the long-endurance hunter-killer MQ-9 Reaper. Chapters detail their military and performance specifications as well as their features and advantages in the field (including their cameras, sensors, control systems, and weapons) and their pilots (often sitting on the other side of the world). Readers will also learn about their use in significant combat and surveillance missions throughout the Middle East and in other countries. Includes spec boxes and other text features. Aligned to Common Core Standards and correlated to state standards. A&D Xtreme is an imprint of Abdo Publishing, a division of ABDO. The development and application of increasingly autonomous (IA) systems for civil aviation is proceeding at an accelerating pace, driven by the expectation that such systems will return significant benefits in terms of safety, reliability, efficiency, affordability, and/or previously unattainable mission capabilities. IA systems range from current automatic systems such as autopilots and remotely piloted unmanned aircraft to more highly sophisticated systems that are needed to enable a fully autonomous aircraft that does not require a pilot or human air traffic controllers. These systems, characterized by their ability to perform more complex mission-related tasks with substantially less human intervention for more extended periods of time, sometimes at remote distances, are being envisioned for aircraft and for air traffic management and other ground-based elements of the national airspace system. Civil aviation is on the threshold of potentially revolutionary improvements in aviation capabilities and operations associated with IA systems. These systems, however, face substantial barriers to integration into

the national airspace system without degrading its safety or efficiency. Autonomy Research for Civil Aviation identifies key barriers and suggests major elements of a national research agenda to address those barriers and help realize the benefits that IA systems can make to crewed aircraft, unmanned aircraft systems, and ground-based elements of the national airspace system. This report develops a set of integrated and comprehensive technical goals and objectives of importance to the civil aeronautics community and the nation. Autonomy Research for Civil Aviation will be of interest to U.S. research organizations, industry, and academia who have a role in meeting these goals. There are two basic ways to control an Unmanned Combat Aerial Vehicle (UCAV) as it searches for targets: allow the UCAV to act autonomously or employ man-in-the-loop control. There are also two target sets of interest: fixed or mobile targets. This research focuses on UCAV-based targeting of mobile targets using man-in-the-loop control. In particular, the interest is in how levels of satellite signal latency or signal degradation affect the ability to accurately track, target, and attack mobile targets. This research establishes a weapon effectiveness model assessing targeting inaccuracies as a function of signal latency and/or signal degradation. The research involved three phases. The first phase in the research was to identify the levels of signal latency associated with satellite communications. A literature review, supplemented by interviews with UAV operators, provided insight into the expected range latency values. The second phase of the research identified those factors whose value, in the presence of satellite signal latency, could influence targeting errors during UCAV employment. The final phase involved developing and testing a weapon effectiveness model explicitly modeling satellite signal latency in UCAV targeting against mobile targets. This phase included an effectiveness analysis study. The X-45 was born from the studies of a number of programs in the 1990's aimed at producing technology that could be incorporated into a viable uninhabited air vehicle designed to autonomously conduct a range of operational missions including strike and suppression of enemy air defences. The successful conduct of the X-45 program paved the way for the new generation of Uninhabited Combat Air Vehicles being flight tested in the early part of this second decade of the 21st Century including the Boeing Phantom Ray, which is a direct descendant of the X-45 Advanced Technology Demonstrators of the previous decade. Artificial intelligence (AI) may be the most beneficial technological development of the twenty-first century.Media hype and raised expectations for results, however, have clouded understanding of the true nature of AI—including its limitations and potential. AI at War provides a balanced and practical understanding of applying AI to national security and warfighting professionals as well as a wide array of other readers. Although the themes and findings of the chapters are relevant across the U.S. Department of Defense, to include all Services, the Joint Staff and defense agencies as well as allied and partner ministries of defense, this book is a case study of warfighting functions in the Naval Services—the U.S. Navy and U.S. Marine Corps. Sam J. Tangredi and George Galdorisi bring together over thirty experts, ranging from former DOD officials and retired flag officers to scientists and active duty junior officers. These contributors present views on a vast spectrum of subjects pertaining to the implementation of AI in modern warfare, including strategy, policy, doctrine, weapons, and ethical concerns. Control of the air is the foundation for all conventional military operations against an adversary with an air defence capability. In future warfare, will it be possible for Unmanned Combat Air Systems to undertake the tasks and accept most of the risks that, until now, have been the lot of military aviators? The Office of Naval Research (ONR) contracted with the Naval Studies Board (NSB) of the National Research Council (NRC) to establish a committee to review ONR's Aircraft Technology Program (ATP). The committee convened on May 15 and 16, 2001, and reviewed some 28 science and technology (S&T) efforts that were presented as constituting the ATP. The committee met separately on May 17, 2001, to formulate its findings and recommendations. This report represents the consensus opinion of the committee and is based on the information presented at the review. The ONR ATP resides within the Strike Technology Division (Code 351) of the Naval Expeditionary Warfare Science and Technology Department (Code 35). In 2001 the ATP is funded at $55.0 million, which is approximately 60 percent of the Strike Technology Division budget. The ATP S&T 2001 budget is further divided into the following categories: (1) 6.1 basic research at $4.3 million, (2) 6.2 exploratory development at $18.1 million, and (3) 6.3 advanced development, including technology demonstrations, at $32.5 million. However, the ATP will be in major transition beginning in FY02. Starting in FY02, all of the 6.3 funding and one-half of the 6.2 funding at the ONR will be dedicated to 12 major program areas referred to as Future Naval Capabilities (FNCs). The purpose of the FNCs is to focus advanced technology development at ONR on naval force capabilities that have been identified as high priority for the future by a cross-functional group of naval operators, naval development and support organizations, and ONR program managers. Plans have been made to integrate several of the Code 351 programs reviewed into FNCs. The ATP was presented to the committee in six thrust areas: integrated avionics, propulsion and power, air vehicle technology, unmanned aerial vehicles/unmanned combat air vehicles (UAVs/UCAVs), survivability, and special aviation projects. Several projects were presented within each thrust area. The committee organized this report in response to these thrust areas, and in several of these areas it also suggests new S&T topics for consideration for the future ATP. The findings and recommendations of the committee are summarized in this report. What Is Uncrewed Vehicle A vehicle that does not have any people on board is referred to as an uncrewed vehicle or an unmanned vehicle. Unmanned vehicles may be remote-controlled or remote-guided vehicles, or they can be autonomous vehicles that have the ability to sense their surroundings and navigate independently. How You Will Benefit (I) Insights, and validations about the following topics: Chapter 1: Uncrewed vehicle Chapter 2: Autonomous robot Chapter 3: Unmanned aerial vehicle Chapter 4: Unmanned combat aerial vehicle Chapter 5: Micro air vehicle Chapter 6: Remote-control vehicle Chapter 7: Autonomous underwater vehicle Chapter 8: Unmanned ground vehicle Chapter 9: History of unmanned aerial vehicles Chapter 10: History of unmanned combat aerial vehicles Chapter 11: Unmanned underwater vehicle Chapter 12: List of unmanned aerial vehicles Chapter 13: Autonomous logistics Chapter 14: Association for Unmanned Vehicle Systems International Chapter 15: Guidance, navigation, and control Chapter 16: Autonomous aircraft Chapter 17: Loitering munition Chapter 18: List of unmanned aerial vehicle applications Chapter 19: USV Maxlimer Chapter 20: CSSC unmanned vehicles Chapter 21: XTDT unmanned vehicles (II) Answering the public top questions about uncrewed vehicle. (III) Real world examples for the usage of uncrewed vehicle in many fields. (IV) 17 appendices to explain, briefly, 266 emerging technologies in each industry to have 360-degree full understanding of uncrewed vehicle' technologies. Who This Book Is For Professionals, undergraduate and graduate students, enthusiasts, hobbyists, and those who want to go beyond basic knowledge or information for any kind of uncrewed vehicle. Unmanned Vehicle Systems & Operations On Air, Sea, Land is our fourth textbook in a series covering the world of Unmanned Aircraft Systems (UAS) and Counter Unmanned Aircraft Systems (CUAS). (Nichols R. K., 2018) (Nichols R. K., et al., 2019) (Nichols R. , et al., 2020)The authors have expanded their purview beyond UAS / CUAS systems. Our title shows our concern for growth and unique cyber security unmanned vehicle

technology and operations for unmanned vehicles in all theaters: Air, Sea and Land - especially maritime cybersecurity and China proliferation issues. Topics include: Information Advances, Remote ID, and Extreme Persistence ISR; Unmanned Aerial Vehicles & How They Can Augment Mesonet Weather Tower Data Collection; Tour de Drones for the Discerning Palate; Underwater Autonomous Navigation & other UUV Advances; Autonomous Maritime Asymmetric Systems; UUV Integrated Autonomous Missions & Drone Management; Principles of Naval Architecture Applied to UUV's; Unmanned Logistics Operating Safely and Efficiently Across Multiple Domains; Chinese Advances in Stealth UAV Penetration Path Planning in Combat Environment; UAS, the Fourth Amendment and Privacy; UV & Disinformation / Misinformation Channels; Chinese UAS Proliferation along New Silk Road Sea / Land Routes; Automaton, AI, Law, Ethics, Crossing the Machine - Human Barrier and Maritime Cybersecurity.Unmanned Vehicle Systems are an integral part of the US national critical infrastructure The authors have endeavored to bring a breadth and quality of information to the reader that is unparalleled in the unclassified sphere. Unmanned Vehicle (UV) Systems & Operations On Air, Sea, Land discusses state-of-the-art technology issues facing U.S. UV system researchers / designers / manufacturers / testers. We trust our newest look at Unmanned Vehicles in Air, Sea, and Land will enrich our students and readers understanding of the purview of this wonderful technology we call UV. Unmanned combat air vehicles, or in common parlance 'drones', have become a prominent instrument in US efforts to counter an objective (and subjective) cross-border terrorist threat with lethal force. As a result, critical questions abound on the legitimacy of their use. In a series of multidisciplinary essays by scholars with an extensive knowledge of international norms, this book explores the question of legitimacy through the conceptual lenses of legality, morality and efficacy, it then closes with the consideration of a policy proposal aimed at incorporating all three indispensable elements. The importance of this inquiry cannot be overstated. Non-state actors fully understand that attacking the much more powerful state requires moving the conflict away from the traditional battlefield where they are at an enormous disadvantage. Those engaging in terrorism seek to goad the ruling government into an overreaction, or abuse of power, to trigger a destabilization via an erosion of its legitimacy. Thus defending the target of legitimacy”in this case, insuring the use of deadly force is constrained by valid limiting principles”represents an essential strategic interest. This book seeks to come to grips with the new reality of drone warfare by exploring if it can be used to preserve, rather than eat away at, legitimacy. After an extensive analysis of the three key parameters in twelve chapters, the practical proposition of establishing a 'Drone Court' is put forward and examined as a way of pursuing the goal of integrating these essential components to defend the citizenry and the legitimacy of the government at the same time. This study on airlift, written before Operation Iraqi Freedom began, has greater relevance now that we have some clear lessons about the vital importance of airlift for operations in Iraq and Afghanistan. In Unmanned Airlift: A Viable Option for Meeting the Strategic Airlift Shortfall, Lt Col Chad T. Manske points to the growing dependency on strategic airlift as well as the abiding corollary that there will continue to be a shortfall in strategic airlift. Quite naturally, he asked whether there might be a suitable role for unmanned airlift in the Air Force. To get to the analysis, Colonel Manske raised three crucial questions: (1) are operational requirements able to justify unmanned airlifters, (2) are current and emerging technologies likely to meet these potential operational requirements, and (3) are the operational concepts cost-effective? Unsurprisingly, the author found a paucity of operational requirements. The first step in applying new technology is to convince unified combatant commanders and defense planners of a viable potential. Generally, operational and combat planners think primarily about capabilities available in the present. In addition, a long history of unproven aircraft concepts translates to high reluctance by the DOD and senior military leaders to commit funds to programs that show little near-term prospects of success. Clear assurances are needed to invest in procurement and acquisition of these new systems and attendant capabilities. The author suggests that the current shortfall of aircrew, the evident progress in emerging unmanned aircraft technology, and the currently increasing funding of unmanned aerial vehicle (UAV) research and development are all providing impetus to investigate the unmanned airlift concept. Colonel Manske thoughtfully provides an interesting scheme for employing these large vehicles using a monitoring mother ship to mitigate the very real problem of globally navigating in controlled airspace occupied by manned aircraft. He is also hopeful that air traffic management procedures will be upgraded to support autonomous UAV operations. Finally, the author has three suggestions for a DOD investigation: 1) Agents must perform a detailed cost-benefit analysis, learning best practices from Joint Unmanned Combat Air Systems and UAV programs; 2) Charge Defense Advanced Research Projects Agency with the responsibility of determining the feasibility of concepts for unmanned airlift; and 3) Use war games to determine and establish a feasible concept of operations and employment. UNMANNED AIRCRAF T SYSTEMS UNMANNED AIRCRAF T SYSTEMS An unmanned aircraft system (UAS), sometimes called a drone, is an aircraft without a human pilot on board ??? instead, the UAS can be controlled by an operator station on the ground or may be autonomous in operation. UAS are capable of addressing a broad range of applications in diverse, complex environments. Traditionally employed in mainly military applications, recent regulatory changes around the world are leading to an explosion of interest and wide-ranging new applications for UAS in civil airspace. Covering the design, development, operation, and mission profiles of unmanned aircraft systems, this single, comprehensive volume forms a complete, stand-alone reference on the topic. The volume integrates with the online Wiley Encyclopedia of Aerospace Engineering, providing many new and updated articles for existing subscribers to that work. The chapters cover the following items: Airframe configurations and design (launch systems, power generation, propulsion) Operations (missions, integration issues, and airspace access) Coordination (multivehicle cooperation and human oversight) With contributions from leading experts, this volume is intended to be a valuable addition, and a useful resource, for aerospace manufacturers and suppliers, governmental and industrial aerospace research establishments, airline and aviation industries, university engineering and science departments, and industry analysts, consultants, and researchers. U.S. Air Force (USAF) planners have envisioned that uninhabited air vehicles (UAVs), working in concert with inhabited vehicles, will become an integral part of the future force structure. Current plans are based on the premise that UAVs have the potential to augment, or even replace, inhabited aircraft in a variety of missions. However, UAV technologies must be better understood before they will be accepted as an alternative to inhabited aircraft on the battlefield. The U.S. Air Force Office of Scientific Research (AFOSR) requested that the National Research Council, through the National Materials Advisory Board and the Aeronautics and Space Engineering Board, identify long-term research opportunities for supporting the development of technologies for UAVs. The objectives of the study were to identify technological developments that would improve the performance and reliability of "generation-after-next" UAVs at lower cost and to recommend areas of fundamental research in materials, structures, and aeronautical technologies. The study focused on innovations in technology that would "leapfrog" current technology development and would be

ready for scaling-up in the post-2010 time frame (i.e., ready for use on aircraft by 2025). The U.S. Navy's Unmanned Combat Air System aircraft currently in development will transform naval aviation, extending its reach while dramatically reducing its cost, according to naval weapons expert Norman Friedman. In this his latest weapons book, he describes the new X-47B and shows how these new aircraft offer tactics that manned aircraft cannot duplicate. He calls the X-47B a natural extension of the evolving networked form of drone warfare that can be used for a variety of missions, including intelligence, surveillance and reconnaissance, and time sensitive targeting. Friedman makes the important point that an unmanned attack aircraft can also be seen as an extension of some current missiles that interact with remote human controllers. The book includes an extensive appendix describing the world's military unmanned aircraft. This study analyzes whether special operations forces (SOF) should use unmanned aerial vehicles (UAV) to support intelligence, surveillance, reconnaissance, communications, and resupply capability deficiencies. The author's objective is to review the missions and requirements of the United States Special Operations Command, examine current and future unmanned aerial vehicle technologies, and analyze whether unmanned aircraft technologies are mature enough to meet the demanding special operations mission. The result of the analysis is that unmanned aerial vehicles have tremendous potential. But, due to the technological limitations and a lack of systems maturity, unmanned aerial vehicles lack the range, reliability, datalink capability, and size to meet SOF needs at this time. However, in the future, UAVs should be able to fulfill several SOF capability deficiencies. One Nation, Under Drones is an interesting and informative review of how robotic and unmanned systems are impacting every aspect of American life, from how we fight our wars to how we play to how we grow our food. Edited by John Jackson, this highly readable book features chapters from a dozen experts, researchers, and operators of the sophisticated systems that have become ubiquitous across the nation and around the world. Press reports have focused primarily on unmanned aerial vehicles, officially designated as UAVs, but more often referred to as “drones.” This work takes you behind the scenes and describes how Predators, Reapers, Scan Eagles, and dozens of other pilotless aircraft have been used to fight the Global War on Terrorism. Although these systems seemed to emerge fully-developed into the skies above America’s distant battlefields following the attacks of September 11, 2001, readers will discover that they actually trace their lineage to World War I, when the “automatic airplane/aerial torpedo,” designed and built by the Sperry Gyroscope Company, made its first flight just over a century ago. Unmanned aircraft were used by various combatants in World War II and took many forms: from converted manned bombers to intercontinental attacks on the American homeland by rice-paper balloons. Technology developed in the latter decades of the twentieth century enabled crews stationed thousands of miles away to attack targets on remote battlefields. Such long-range and remote-controlled weapons have been extensively used but are controversial from both legal and ethical standpoints. Chapters written by international law specialists and drone pilots with advanced education in ethics address these issues from both sides of the argument. The book also details how robotic systems are being used on land, in and below the seas, and in civilian applications such as driverless cars. Three dozen photographs display drones as small as an insect up to those as large as a 737 airliner. One Nation, Under Drones covers such a wide array of topics that it will be of interest to everyone from the casual reader seeking to know more about these systems to national security professionals, both in and out of uniform, who will be making decisions about their procurement and use in decades to come. Unmanned aerial vehicles (UAVs) are the most dynamic field of aerospace technology, and have only emerged from the shadows recently, despite having been in use for decades. After some limited use in World War II, UAVs emerged as substitutes for manned reconnaissance aircraft in missions deemed too dangerous to risk an aircrew. This book examines the development of UAV technology and speculates on its future potential. Packed with rare, recently declassified photographs and detailed full-colour cutaways, this title goes on to investigate the deployment of UAVs, from early Israeli airforce use to their current role over Iraq and Afghanistan today. Over the last decade, the number of unmanned systems and their applications has grown rapidly. So too has the number of operational, political, and legal questions associated with this technology. The growing demand for and reliance on unmanned systems has serious implications, both on and off the battlefield. As the United States is engaged in two wars abroad, unmanned systems, particularly unmanned aerial vehicles, have become a centerpiece of that war effort. In recent years, the Department of Defense's UAV inventory has rapidly grown in size, from 167 in 2002 to over seven thousand today. Last year, for the first time, the U.S. Air Force trained more unmanned pilots than traditional fighter pilots. Some express no doubt that unmanned systems have been a boost to U.S. war efforts in the Middle East and South Asia. CIA Director Leon Panetta said last May that "drone strikes are the only game in town in terms of confronting or trying to disrupt the al Qaeda leadership." Media reports over the last year that the top two leaders of the Pakistani Taliban were killed by drone strikes also support this argument. But some critics argue that drone strikes are unethical at best and counterproductive at worst. They point to the reportedly high rate of civilian casualties, which has been calculated by the New American Foundation to be around 32 percent, and argue that the strikes do more to stoke anti-Americanism than they do to weaken our enemies. A quick skim of any Pakistani newspaper provides some evidence to support this theory. This is particularly relevant in the era of counter-insurgency doctrine, a central tenet of which is, 'first, do no harm.' It also may be the case that we are fighting wars with modern technology under an antiquated set of laws. For example, if the United States uses unmanned weapons systems, does that require an official declaration of war or an authorization for the use of force? Newcome traces the family tree of unmanned aircraft all the way back to their roots as aerial torpedoes, which were the equivalent of todays cruise missiles. He discusses the work of leading aerospace pioneers whose efforts in the area of unmanned aviation have largely been ignored by history. U.S. Air Force (USAF) planners have envisioned that uninhabited air vehicles (UAVs), working in concert with inhabited vehicles, will become an integral part of the future force structure. Current plans are based on the premise that UAVs have the potential to augment, or even replace, inhabited aircraft in a variety of missions. However, UAV technologies must be better understood before they will be accepted as an alternative to inhabited aircraft on the battlefield. The U.S. Air Force Office of Scientific Research (AFOSR) requested that the National Research Council, through the National Materials Advisory Board and the Aeronautics and Space Engineering Board, identify long-term research opportunities for supporting the development of technologies for UAVs. The objectives of the study were to identify technological developments that would improve the performance and reliability of â€œgeneration-after-nextâ€ UAVs at lower cost and to recommend areas of fundamental research in materials, structures, and aeronautical technologies. The study focused on innovations in technology that would â€œleapfrogâ€ current technology development and would be ready for scaling-up in the post-2010 time frame (i.e., ready for use on aircraft by 2025). A practical framework for thinking about the future... and an exploration of 'future consciousness' and how to develop it Joint Vision 20101 addresses the need for achieving military dominance through the application of new operational

concepts. For the Department of the Navy, future operational concepts will hinge on a continuance of forward yet unobtrusive presence and the capability to influence events ashore as required. This capability will be enabled by the development and insertion into the forces of new technologies for providing command, control, and surveillance; battlespace dominance; power projection; and force sustainment. For example, unmanned aerial vehicles (UAVs) have recently proven to be valuable operational platforms for providing tactical intelligence by surveillance of the battlefield. To support naval force objectives, the Office of Naval Research (ONR) has established a research program within the Strike Technology Division (Code 351) of the Naval Expeditionary Warfare Science and Technology Department aimed at expanding the operational capabilities of UAVs to include not only surveillance and reconnaissance, but strike and logistics missions as well. This new class of autonomous vehicles, known as uninhabited combat air vehicles (UCAVs), is foreseen as being intelligent, recoverable, and highly maneuverable in support of future naval operations. Review of ONR'S Uninhabited Combat Air Vehicles Program evaluates ONR's UCAV technology activities, including its vision documents and its science and technology roadmap (in areas of vehicle dynamics, communications, sensors, and autonomous agents) against criteria that would be selected by the committee, such as the relevance for meeting future naval priorities, the cost and time scale for its utilization, duplication of effort, and scientific and technical quality. The past decade has seen tremendous interest in the production and refinement of unmanned aerial vehicles, both fixed-wing, such as airplanes and rotary-wing, such as helicopters and vertical takeoff and landing vehicles. This book provides a diversified survey of research and development on small and miniature unmanned aerial vehicles of both fixed and rotary wing designs. From historical background to proposed new applications, this is the most comprehensive reference yet. Autonomous vehicles (AVs) have been used in military operations for more than 60 years, with torpedoes, cruise missiles, satellites, and target drones being early examples.1 They have also been widely used in the civilian sector--for example, in the disposal of explosives, for work and measurement in radioactive environments, by various offshore industries for both creating and maintaining undersea facilities, for atmospheric and undersea research, and by industry in automated and robotic manufacturing. Recent military experiences with AVs have consistently demonstrated their value in a wide range of missions, and anticipated developments of AVs hold promise for increasingly significant roles in future naval operations. Advances in AV capabilities are enabled (and limited) by progress in the technologies of computing and robotics, navigation, communications and networking, power sources and propulsion, and materials. Autonomous Vehicles in Support of Naval Operations is a forward-looking discussion of the naval operational environment and vision for the Navy and Marine Corps and of naval mission needs and potential applications and limitations of AVs. This report considers the potential of AVs for naval operations, operational needs and technology issues, and opportunities for improved operations.