

# INTRODUCTION TO UAV SYSTEMS 4TH EDITION

INTRODUCTION TO UAV SYSTEMS INTRODUCTION TO UAV SYSTEMS INTRODUCTION TO UNMANNED AERIAL VEHICLE SYSTEMS INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS UNMANNED AERIAL VEHICLES APPLICATIONS: CHALLENGES AND TRENDS UNMANNED AIRCRAFT SYSTEMS INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS UNMANNED AIRCRAFT SYSTEMS UNMANNED AERIAL REMOTE SENSING DRONE SYSTEMS AND OPERATIONS UNMANNED AERIAL VEHICLE DESIGN AND TECHNOLOGY OVER 40 PUBLICATIONS / STUDIES COMBINED: UAS / UAV / DRONE SWARM TECHNOLOGY RESEARCH MULTI-ROTOR PLATFORM BASED UAV SYSTEMS UNMANNED AERIAL SYSTEMS UNMANNED AIRCRAFT SYSTEMS UNMANNED AIRCRAFT SYSTEMS (DRONES) AND LAW SMALL FLYING DRONES ADVANCES IN UNMANNED AERIAL VEHICLES - TECHNOLOGY AND APPLICATIONS - BIG ISSUES SOLVED WITH DRONE TECHNOLOGY UNMANNED AERIAL VEHICLE CELLULAR COMMUNICATIONS UNMANNED AERIAL SYSTEMS PAUL G. FAHLSTROM PAUL G. FAHLSTROM PAUL GERIN FAHLSTROM R. KURT BARNHART MOHAMED ABDELKADER REG AUSTIN R. KURT BARNHART KIMON P. VALAVANIS DAVID R. GREEN RICHARD JOHNSON T. HIKMET KARAKOC FRANCK CAZAURANG JOHN DAVID BLOM ELLA ATKINS LYDIA DE BEER GIANLUCA CASAGRANDE ANTONI GRAU AGBOTINAME LUCKY IMOIZE ANIS KOUBAA

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UNMANNED AERIAL VEHICLES UAVS HAVE BEEN WIDELY ADOPTED IN THE MILITARY WORLD OVER THE LAST DECADE AND THE SUCCESS OF THESE MILITARY APPLICATIONS IS INCREASINGLY DRIVING EFFORTS TO ESTABLISH UNMANNED AIRCRAFT IN NON MILITARY ROLES INTRODUCTION TO UAV SYSTEMS 4TH EDITION PROVIDES A COMPREHENSIVE INTRODUCTION TO ALL OF THE ELEMENTS OF A COMPLETE UNMANNED AIRCRAFT SYSTEM UAS IT ADDRESSES THE AIR VEHICLE MISSION PLANNING AND CONTROL SEVERAL TYPES OF MISSION PAYLOADS DATA LINKS AND HOW THEY INTERACT WITH MISSION PERFORMANCE AND LAUNCH AND RECOVERY CONCEPTS THIS BOOK PROVIDES ENOUGH INFORMATION TO ENCOURAGE A STUDENT TO LEARN MORE TO PROVIDE A SPECIALIST WITH A BASIC APPRECIATION OF THE TECHNICAL ISSUES THAT DRIVE OTHER PARTS OF THE SYSTEM AND INTERACT WITH THEIR SPECIALTY OR TO HELP A PROGRAM MANAGER UNDERSTAND SYSTEM LEVEL TRADEOFFS AND KNOW WHAT QUESTIONS TO ASK KEY FEATURES COMPREHENSIVE OVERVIEW OF ALL ELEMENTS OF A UAS AND OF HOW THEY INTERACT INTRODUCES THE UNDERLYING CONCEPTS OF KEY SUBSYSTEMS EMPHASIZES SYSTEM INTEGRATION ISSUES AND HOW THEY RELATE TO SUBSYSTEM DESIGN CHOICES PRACTICAL DISCUSSION OF ISSUES INFORMED BY LESSONS LEARNED IN UAV PROGRAMS INTRODUCTION TO UAV SYSTEMS 4TH EDITION IS WRITTEN BOTH FOR NEWCOMERS TO THE SUBJECT AND FOR EXPERIENCED MEMBERS OF THE UAV COMMUNITY WHO DESIRE A COMPREHENSIVE OVERVIEW AT THE SYSTEM LEVEL AS WELL AS BEING A PRIMARY TEXT FOR AN INTRODUCTORY COURSE ON UAS OR A SUPPLEMENTARY TEXT IN A COURSE THAT GOES INTO MORE DEPTH IN ONE OF THE INDIVIDUAL TECHNOLOGIES INVOLVED IN A UAS THIS BOOK IS A USEFUL OVERVIEW FOR PRACTICING ENGINEERS RESEARCHERS MANAGERS AND CONSULTANTS INTERESTED IN UAV SYSTEMS

THE LATEST EDITION OF THE LEADING RESOURCE ON UNMANNED AERIAL VEHICLE SYSTEMS IN THE NEWLY REVISED FIFTH EDITION OF INTRODUCTION TO UAV SYSTEMS AN EXPERT TEAM OF AVIATORS ENGINEERS AND RESEARCHERS DELIVERS THE FUNDAMENTALS OF UAV SYSTEMS FOR BOTH PROFESSIONALS AND STUDENTS IN UAV COURSES SUITABLE FOR STUDENTS IN BOTH AEROSPACE ENGINEERING PROGRAMS AS WELL AS FLIGHT AND AERONAUTICS PROGRAMS THIS NEW EDITION NOW INCLUDES END OF CHAPTER QUESTIONS AND ONLINE INSTRUCTOR ANCILLARIES THAT MAKE IT AN IDEAL TEXTBOOK AS THE PERFECT COMPLEMENT TO THE AUTHOR S DESIGN OF UNMANNED AERIAL SYSTEMS THIS BOOK INCLUDES THE HISTORY CLASSES AND MISSIONS OF UAVS IT COVERS FUNDAMENTAL TOPICS LIKE AERODYNAMICS STABILITY AND CONTROL PROPULSION LOADS AND STRUCTURES MISSION PLANNING PAYLOADS AND COMMUNICATION SYSTEMS BRAND NEW MATERIALS IN AREAS INCLUDING AUTOPILOTS QUADCOPTERS PAYLOADS AND GROUND CONTROL STATIONS HIGHLIGHT THE LATEST INDUSTRY TECHNOLOGIES THE AUTHORS ALSO DISCUSS A THOROUGH INTRODUCTION TO THE HISTORY OF UNMANNED AERIAL VEHICLES INCLUDING THEIR USE IN VARIOUS CONFLICTS AN OVERVIEW OF CRITICAL UAV SYSTEMS AND THE PREDATOR REAPER A COMPREHENSIVE EXPLORATION OF THE CLASSES AND MISSIONS OF UAVS INCLUDING SEVERAL EXAMPLES OF UAV SYSTEMS LIKE MINI UAVS UCAVS AND QUADCOPTERS PRACTICAL DISCUSSIONS OF AIR VEHICLES INCLUDING COVERAGE OF TOPICS LIKE AERODYNAMICS FLIGHT PERFORMANCE STABILITY AND CONTROL IN DEPTH EXAMINATIONS OF PROPULSION LOADS STRUCTURES MISSION PLANNING CONTROL SYSTEMS AND AUTONOMY PERFECT FOR PROFESSIONAL AERONAUTICAL AND AEROSPACE ENGINEERS AS WELL AS STUDENTS AND INSTRUCTORS IN COURSES LIKE UNMANNED AIRCRAFT SYSTEMS DESIGN AND INTRODUCTION TO UNMANNED AERIAL SYSTEMS INTRODUCTION TO UAV SYSTEMS IS ALSO AN INDISPENSABLE RESOURCE FOR ANYONE SEEKING COVERAGE OF THE LATEST INDUSTRY ADVANCES AND TECHNOLOGIES IN UAV AND UAS TECHNOLOGY

INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS THIRD EDITION SURVEYS THE BASICS OF UNMANNED AIRCRAFT SYSTEMS UAS FROM SENSORS CONTROLS AND AUTOMATION TO REGULATIONS SAFETY PROCEDURES AND HUMAN FACTORS FEATURING CHAPTERS BY LEADING EXPERTS THIS FULLY UPDATED BESTSELLER FILLS THE NEED FOR AN ACCESSIBLE AND EFFECTIVE UNIVERSITY TEXTBOOK FOCUSING ON THE CIVILIAN APPLICATIONS OF UAS THE TEXT BEGINS WITH AN HISTORICAL OVERVIEW OF UNMANNED AERIAL VEHICLES AND PROCEEDS TO EXAMINE EACH MAJOR UAS SUBSYSTEM ITS COMBINATION OF UNDERSTANDABLE TECHNICAL COVERAGE AND UP TO DATE INFORMATION ON POLICY AND REGULATION MAKES THE TEXT APPROPRIATE FOR BOTH AEROSPACE ENGINEERING AND AVIATION PROGRAMS

THIS IS A BOOK THAT COVERS DIFFERENT ASPECTS OF UAV TECHNOLOGY INCLUDING DESIGN AND DEVELOPMENT APPLICATIONS SECURITY AND COMMUNICATION AND LEGAL AND REGULATORY CHALLENGES THE BOOK IS DIVIDED INTO 13 CHAPTERS GROUPED INTO FOUR PARTS THE FIRST PART DISCUSSES THE DESIGN AND DEVELOPMENT OF UAVS INCLUDING ROS CUSTOMIZATION STRUCTURED DESIGNS AND INTELLIGENT TRAJECTORY TRACKING THE SECOND PART EXPLORES DIVERSE APPLICATIONS SUCH AS SEARCH AND RESCUE MONITORING DISTRIBUTED PARAMETER SYSTEMS AND LEVERAGING DRONE TECHNOLOGY IN ACCOUNTING THE THIRD PART FOCUSES ON SECURITY AND COMMUNICATION CHALLENGES INCLUDING SECURITY CONCERNS MULTI UAV SYSTEMS AND COMMUNICATIONS SECURITY THE FINAL PART DELVES INTO THE LEGAL AND REGULATORY CHALLENGES OF INTEGRATING UAVS INTO NON SEGREGATED AIRSPACE THE BOOK SERVES AS A VALUABLE RESOURCE FOR RESEARCHERS PRACTITIONERS AND STUDENTS IN THE FIELD OF UNMANNED AERIAL VEHICLES PROVIDING A COMPREHENSIVE UNDERSTANDING OF UAV TECHNOLOGY AND ITS APPLICATIONS

UNMANNED AIRCRAFT SYSTEMS DELIVERS A MUCH NEEDED INTRODUCTION TO UAV SYSTEM TECHNOLOGY TAKING AN INTEGRATED APPROACH THAT AVOIDS COMPARTMENTALISING THE SUBJECT ARRANGED IN FOUR SECTIONS PARTS 1 3 EXAMINE THE WAY IN WHICH VARIOUS ENGINEERING DISCIPLINES AFFECT THE DESIGN DEVELOPMENT AND DEPLOYMENT OF UAS THE FOURTH SECTION ASSESSES THE FUTURE CHALLENGES AND OPPORTUNITIES OF UAS TECHNOLOGICAL INNOVATION AND INCREASINGLY DIVERSE APPLICATIONS ARE TWO KEY DRIVERS OF THE RAPID EXPANSION OF UAS TECHNOLOGY THE GLOBAL DEFENCE BUDGET FOR UAS PROCUREMENT IS EXPANDING AND IN THE FUTURE THE MARKET FOR CIVILIAN UAVS IS EXPECTED TO OUTMATCH THAT OF THE MILITARY AGRICULTURE METEOROLOGY CONSERVATION AND BORDER CONTROL ARE JUST A FEW OF THE DIVERSE AREAS IN WHICH UAVS ARE MAKING A SIGNIFICANT IMPACT THE AUTHOR ADDRESSES ALL OF THESE APPLICATIONS LOOKING AT THE ROLES AND TECHNOLOGY BEHIND BOTH FIXED WING AND ROTORCRAFT UAVS LEADING AERONAUTICAL CONSULTANT REG AUSTIN CO FOUNDED THE BRISTOL INTERNATIONAL REMOTELY PILOTED VEHICLE RPV CONFERENCES IN 1979 WHICH ARE NOW THE LONGEST ESTABLISHED UAS CONFERENCES WORLDWIDE IN ADDITION AUSTIN HAS OVER 40 YEARS EXPERIENCE IN THE DESIGN AND DEVELOPMENT OF UAS ONE OF AUSTIN S PROGRAMMES THE SPRITE UAV SYSTEM HAS BEEN DEPLOYED AROUND THE WORLD AND OPERATED BY DAY AND NIGHT IN ALL WEATHERS

INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS SURVEYS THE FUNDAMENTALS OF UNMANNED AIRCRAFT SYSTEM UAS OPERATIONS FROM SENSORS CONTROLS AND AUTOMATION TO REGULATIONS SAFETY PROCEDURES AND HUMAN FACTORS IT IS DESIGNED FOR THE STUDENT OR LAYPERSON AND THUS ASSUMES NO PRIOR KNOWLEDGE OF UASS ENGINEERING OR AERONAUTICS DYNAMIC AND WELL ILLUSTRATED THE FIRST EDITION OF THIS POPULAR PRIMER WAS CREATED IN RESPONSE TO A NEED FOR A SUITABLE UNIVERSITY LEVEL TEXTBOOK ON THE SUBJECT FULLY UPDATED AND SIGNIFICANTLY EXPANDED THIS NEW SECOND EDITION REFLECTS THE PROLIFERATION OF TECHNOLOGICAL CAPABILITY MINIATURIZATION AND DEMAND FOR AERIAL INTELLIGENCE IN A POST 9 11 WORLD PRESENTS THE LATEST MAJOR COMMERCIAL USES OF UASS AND UNMANNED AERIAL VEHICLES UAVS ENHANCES ITS COVERAGE WITH GREATER DEPTH AND SUPPORT FOR MORE ADVANCED COURSEWORK PROVIDES MATERIAL APPROPRIATE FOR INTRODUCTORY UAS COURSEWORK IN BOTH AVIATION AND AEROSPACE ENGINEERING PROGRAMS INTRODUCTION TO UNMANNED AIRCRAFT SYSTEMS SECOND EDITION CAPITALIZES ON THE EXPERTISE OF CONTRIBUTING AUTHORS TO INSTILL A PRACTICAL UP TO DATE UNDERSTANDING OF WHAT IT TAKES TO SAFELY OPERATE UASS IN THE NATIONAL AIRSPACE SYSTEM NAS COMPLETE WITH END OF CHAPTER DISCUSSION QUESTIONS THIS BOOK MAKES AN IDEAL TEXTBOOK FOR A FIRST COURSE IN UAS OPERATIONS

THIS SPIN OFF HARDBACK VOLUME IS DEVOTED TO THE CURRENT STATE OF THE ART AND RECENT ADVANCES IN UNMANNED AIRCRAFT SYSTEMS UAS THE AREA OF UAS HAS SEEN UNPRECEDENTED LEVELS OF GROWTH OVER THE LAST DECADE AND IT IS ALSO EXPECTED TO BE ONE OF THE MOST DOMINANT AREAS OF RESEARCH AND DEVELOPMENT IN THE FUTURE ALTHOUGH THE MAIN FOCUS OF UAS APPLICATIONS WAS IN MILITARY DOMAINS WE NOW SEE A SHIFT OF UAS USE IN CIVILIAN PUBLIC DOMAINS HOWEVER IT WILL BE LONG BEFORE UAS ARE EXTENSIVELY UTILIZED IN CIVILIAN DOMAINS BUT THEIR IMPORTANCE IN APPLICATIONS RELATED TO EARTH SCIENCE ENVIRONMENT POLLUTION MONITORING LAND MANAGEMENT CIVIL INFRASTRUCTURE HEALTH MANAGEMENT PUBLIC SECURITY FIRE DETECTION EMERGENCY RESPONSE SEARCH AND RESCUE ETC IS OBVIOUS DESPITE THE TREMENDOUS PROGRESS IN UAS THERE ARE STILL MAJOR CHALLENGES AND OBSTACLES TO BE OVERCOME WHICH RELATE AMONG OTHER THINGS TO NAVIGATION CONTROL AND COMMUNICATION ISSUES LEVELS OF AUTONOMY FAULT TOLERANCE SENSORS PAYLOADS RANGE AND ENDURANCE AND INTEGRATION OF UAS INTO THE NATIONAL AIRSPACE THIS VOLUME AIMS AT DISCUSSING SOME OF THE CURRENT CHALLENGES IN UAS BY PUBLISHING PEER REVIEWED ARCHIVE AND ORIGINAL PAPERS FROM RESEARCH GROUPS ALL OVER THE WORLD THE PAPERS HAVE BEEN DIVIDED IN THE FOLLOWING AREAS UAS OPERATIONS REGULATIONS AND AIRWORTHINESS ENERGY EFFICIENT UAV SYSTEMS AND UAS MANAGEMENT UAV DESIGN MODELING AND VALIDATION UAV CONTROL UAV MISSION AND PATH PLANNING UAV TRACKING UAV VISION SYSTEMS AND VISION BASED NAVIGATION QUADROTOR UAVS MICRO AIR VEHICLES MAVS UAV FORMATIONS AND SWARMS COOPERATIVE UAVS UAS TESTBEDS AND APPLICATIONS THE LIST OF TOPICS IS BY NO MEANS EXCLUSIVE AND COMPLETE BUT IT DOES PROVIDE AN INDICATION OF THE WIDE SPECTRUM OF PROBLEMS SCIENTISTS RESEARCHERS AND ENGINEERS WORK ON AN IMPORTANT PART OF THIS VOLUME IS CONDUCTED RESEARCH IN COOPERATIVE UAVS AND UAV FORMATIONS WHICH HINTS A MOVE FROM A SINGLE UAV TO MULTIPLE UAVS REGARDLESS THE LIST OF TOPICS IS VERY WIDE AND DIVERSE AND THE APPLICATIONS SECTION PAPERS GIVE THE READER NOTHING BUT AN IDEA OF WHERE UAVS MAY BE USED REPRINTED FROM THE JOURNAL OF INTELLIGENT ROBOTIC SYSTEMS VOLUMES 69 AND 70 2013

UNMANNED AIRCRAFT SYSTEMS UAS ARE A RAPIDLY EVOLVING TECHNOLOGY WITH AN EXPANDING ARRAY OF DIVERSE APPLICATIONS IN RESPONSE TO THE CONTINUING EVOLUTION OF THIS TECHNOLOGY THIS BOOK DISCUSSES UNMANNED AERIAL VEHICLES UAVS AND SIMILAR SYSTEMS PLATFORMS AND SENSORS AS WELL AS EXPLORING SOME OF THEIR ENVIRONMENTAL APPLICATIONS IT EXPLAINS HOW THEY CAN BE USED FOR MAPPING MONITORING AND MODELING A WIDE VARIETY OF DIFFERENT ENVIRONMENTAL ASPECTS AND AT THE SAME TIME ADDRESSES SOME OF THE CURRENT CONSTRAINTS PLACED ON REALIZING THE POTENTIAL USE OF THE TECHNOLOGY SUCH AS S FLIGHT DURATION AND DISTANCE SAFETY AND THE INVASION OF PRIVACY ETC FEATURES OF THE BOOK PROVIDES NECESSARY THEORETICAL FOUNDATIONS FOR PERTINENT SUBJECT MATTER AREAS INTRODUCES THE ROLE AND VALUE OF UAVS FOR GEOGRAPHICAL DATA ACQUISITION AND THE WAYS TO ACQUIRE AND PROCESS THE DATA PROVIDES A SYNTHESIS OF ONGOING RESEARCH AND A FOCUS ON THE USE OF TECHNOLOGY FOR SMALL SCALE IMAGE AND SPATIAL DATA ACQUISITION IN AN ENVIRONMENTAL CONTEXT WRITTEN BY EXPERTS OF THE TECHNOLOGY WHO BRING TOGETHER UAS TOOLS AND RESOURCES FOR THE ENVIRONMENTAL SPECIALIST UNMANNED AERIAL REMOTE SENSING UAS FOR ENVIRONMENTAL APPLICATIONS IS AN EXCELLENT RESOURCE FOR ANY PRACTITIONER UTILIZING REMOTE SENSING AND OTHER GEOSPATIAL TECHNOLOGIES FOR ENVIRONMENTAL APPLICATIONS SUCH AS CONSERVATION RESEARCH AND PLANNING STUDENTS AND ACADEMICS IN INFORMATION SCIENCE ENVIRONMENT AND NATURAL RESOURCES GEOSCIENCES AND GEOGRAPHY WILL LIKEWISE FIND THIS COMPREHENSIVE BOOK A USEFUL AND INFORMATIVE RESOURCE

DRONE SYSTEMS AND OPERATIONS PROVIDES A COMPREHENSIVE AND FORWARD THINKING EXPLORATION OF UNMANNED AERIAL VEHICLES UAVS LAYING OUT THE FOUNDATIONAL ARCHITECTURES AND DESIGN PRINCIPLES THAT POWER TODAY'S ADVANCED DRONE FLEETS TARGETED AT ENGINEERS RESEARCHERS AND INDUSTRY PROFESSIONALS THE BOOK SYSTEMATICALLY COVERS THE CLASSIFICATION OF UAV PLATFORMS INTRICATE AVIONICS AND PROPULSION SUBSYSTEM DESIGN RELIABILITY ENGINEERING AND THE INTRICATE ENVIRONMENTAL AND REGULATORY CHALLENGES SHAPING THE FIELD THROUGH DETAILED TECHNICAL DISCOURSE SPANNING EMBEDDED SYSTEMS REAL TIME OPERATIONS AND PIONEERING MATERIALS SCIENCE IT EQUIPS READERS WITH THE CRITICAL KNOWLEDGE TO DESIGN BUILD AND DEPLOY ROBUST HIGH ASSURANCE DRONE SYSTEMS PROGRESSING FROM HARDWARE TO SOFTWARE THE VOLUME SHOWCASES CUTTING EDGE ADVANCES IN FLIGHT CONTROL ALGORITHMS SENSOR FUSION AND AUTONOMOUS NAVIGATION INTEGRATING THE LATEST AI TECHNIQUES FOR GUIDANCE AND STATE ESTIMATION READERS ARE GUIDED THROUGH SECURE LOW LATENCY COMMUNICATION NETWORKS POWERTRAIN INNOVATIONS AND REAL TIME PERCEPTION SYSTEMS INCLUDING COMPUTER VISION LIDAR AND EDGE COMPUTATION SPECIAL EMPHASIS IS PLACED ON THE CHALLENGES OF COLLABORATIVE OPERATIONS SWARM ROBOTICS AND THE ETHICS AND GOVERNANCE ISSUES THAT ARISE AS AUTONOMY DEEPENS ALL SUPPORTED BY RIGOROUS BEST PRACTICES IN SOFTWARE ENGINEERING SIMULATION AND DEVOPS WORKFLOWS THE LATTER CHAPTERS EXTEND THE DISCUSSION INTO THE OPERATIONAL REALITIES OF UAV DEPLOYMENT AT SCALE MISSION PLANNING PREDICTIVE MAINTENANCE LOGISTICS AND SECURITY ARE ALL DISSECTED ALONGSIDE THE LATEST COUNTERMEASURES AGAINST EMERGENT CYBER AND PHYSICAL THREATS FINALLY THE BOOK PEERS INTO THE FUTURE WITH IN DEPTH REVIEWS OF NOVEL COMMERCIAL INDUSTRIAL AND DEFENSE APPLICATIONS INTEGRATION WITH IOT URBAN AIR MOBILITY OPEN STANDARDS AND THE SOCIETAL AND LEGAL DYNAMICS SHAPING UAV ADOPTION DRONE SYSTEMS AND OPERATIONS STANDS AS AN ESSENTIAL TECHNICAL GUIDE AND A FORWARD LOOKING ROADMAP FOR ANYONE ENGAGED IN THE RAPIDLY EVOLVING WORLD OF AUTONOMOUS AERIAL SYSTEMS

UNMANNED AERIAL VEHICLE DESIGN AND TECHNOLOGY PROVIDES READERS WITH A COMPREHENSIVE INTRODUCTION TO UNMANNED AERIAL SYSTEMS UAS TECHNOLOGY BASICS THE BOOK PRESENTS CLEAR CONCISE GUIDANCE ON UAS SYSTEM DESIGN COMPONENTS CONTROL AND OPERATIONS FUNDAMENTALS ADDITIONAL CHAPTERS LOOK AT UNMANNED AERIAL REGULATIONS AND ETHICS AND THE HISTORICAL BACKGROUND OF UAS TECHNOLOGY THIS TEXTBOOK OFFERS A WELL ROUNDED LOOK AT UNMANNED FLIGHT TECHNOLOGY MAKING IT AN IDEAL PRIMER FOR AVIATION AND AEROSPACE STUDENTS AND ANYONE INTERESTED IN LEARNING MORE ABOUT UNMANNED AERIAL SYSTEMS INCLUDING ENGINEERS TECHNICIANS DRONE AND FLIGHT HOBBYISTS AND CIVIL AVIATION ORGANIZATION OFFICIALS

MULTI ROTOR PLATFORM BASED UAV SYSTEMS PROVIDES AN EXCELLENT OPPORTUNITY FOR EXPERIENTIAL LEARNING CAPABILITY AUGMENTATION AND CONFIDENCE BUILDING FOR SENIOR LEVEL UNDERGRADUATES ENTRY LEVEL GRADUATES ENGINEERS WORKING IN GOVERNMENT AGENCIES AND INDUSTRY INVOLVED IN UAV R D TOPICS IN THIS BOOK INCLUDE AN INTRODUCTION TO VTOL MULTI COPTER UAV PLATFORMS UAV SYSTEM ARCHITECTURE INTEGRATION IN THE NATIONAL AIRSPACE INCLUDING UAV CLASSIFICATION AND ASSOCIATED MISSIONS REGULATION AND SAFETY CERTIFICATION AND AIR TRAFFIC MANAGEMENT INTEGRATED MISSION PLANNING INCLUDING AUTONOMOUS FAULT TOLERANT PATH PLANNING AND VISION BASED AUTO LANDING SYSTEMS FLIGHT MECHANICS AND STABILITY DYNAMIC MODELING AND FLIGHT CONTROLLER DEVELOPMENT OTHER TOPICS COVERED INCLUDE SENSE DETECT AND AVOID SYSTEMS FLIGHT TESTING INCLUDING SAFETY ASSESSMENT INSTRUMENTATION AND DATA ACQUISITION TELEMETRY SYNCHRONIZATION DATA FUSION THE GEO LOCATION OF IDENTIFIED TARGETS AND MUCH MORE PROVIDES AN EXCELLENT OPPORTUNITY FOR EXPERIENTIAL LEARNING CAPABILITY AUGMENTATION AND CONFIDENCE BUILDING FOR SENIOR LEVEL UNDERGRADUATES ENTRY LEVEL GRADUATES AND ENGINEERS WORKING IN GOVERNMENT AND INDUSTRY INVOLVED IN UAV R D INCLUDES MATLAB SIMULINK COMPUTATIONAL TOOLS AND OFF THE SHELF HARDWARE IMPLEMENTATION TUTORIALS OFFERS A STUDENT CENTERED APPROACH PROVIDES A QUICK AND EFFICIENT MEANS TO CONCEPTUALIZE DESIGN SYNTHESIZE AND ANALYZE USING MODELING AND SIMULATIONS OFFERS INTERNATIONAL PERSPECTIVE AND APPEAL FOR ENGINEERING STUDENTS AND PROFESSIONALS

MANNED AERIAL RECONNAISSANCE FROM THE BALLOONS OF WWI TO THE HELICOPTERS OF VIETNAM SOLIDIFIED THE TACTICAL NEED FOR ARMY AVIATION WHICH REMAINED RELATIVELY UNCHANGED UNTIL 1990 SIGNIFICANT CHANGES HAVE SINCE OCCURED ON THE BATTLEFIELD WITH THE ADVENT OF THE MODERN DAY UNMANNED FLIGHT AND ITS TECHNOLOGICAL ABILITIES FROM ITS HUMBLE BEGINNINGS OF THE SUGGESTED USE OF A TOY AIRCRAFT KIT TO THE DEVELOPMENT AND USE IN TODAY'S WARFARE IN IRAQ AND AFGHANISTAN THE UNMANNED AERIAL VEHICLE UAV POSSESSES A DEEP HISTORY UNDERSTANDING THIS PAST MAY PROVIDE CLUES INTO WHERE THIS TECHNOLOGY MAY BE GOING AND WHAT PROBLEMS COULD LIE AHEAD

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 CHARACTER OF WARFARE HAS CHANGED OVER TIME INDEED DEVELOPMENTS MAY BE SO DRAMATICAL THAT THEY CAN BE CHARACTERIZED AS REVOLUTIONARY TECHNOLOGY DEVELOPED NEW VEHICLES TO ATTACK ENEMIES IN THIS BOOK WE WILL ELABORATE ON UNMANNED AIRCRAFT SYSTEM UAS THESE SYSTEMS ARE ALSO KNOWN AS DRONES AND UAV S UNMANNED AERIAL VEHICLE IN THIS BOOK WILL BE DISCUSSED WHAT UAS ARE AND WHAT THE LEGAL LIMITS ARE OF THE USE OF THOSE UNMANNED SYSTEMS THIS BOOK WILL FIRST ZOOM IN ON LAWFUL CONFLICTS BETWEEN NATIONS BASED ON THE UNITED NATIONS CHARTER SECOND ON INTERNATIONAL HUMANITARIAN LAW OF WAR BASED ON THE FIRST GENEVA PROTOCOL MOREOVER THE LEGALITY OF TARGETED KILLING WITH THE USE OF UNMANNED SYSTEMS WILL BE DISCUSSED PROVIDED BY PUBLISHER

THIS BOOK FOCUSES ON SMALL FLYING DRONES AND THEIR APPLICATIONS IN CONDUCTING GEOGRAPHIC SURVEYS SCHOLARS AND PROFESSIONALS WILL DISCOVER THE POTENTIAL OF THIS TOOL AND HOPEFULLY DEVELOP A CONCEPTUAL AND METHODOLOGICAL FRAMEWORK FOR DOING THE FOLLOWING THINGS A TRANSLATE THEIR DATA ACQUISITION NEEDS INTO SPECIFICATIONS B USE THE DEVELOPED SPECIFICATIONS TO CHOOSE THE BEST ACCESSIBLE CONFIGURATION FOR THEIR DRONES AND C DESIGN AND ORGANIZE EFFECTIVE AND LOW COST FIELD DEPLOYMENT AND FLIGHT OPERATIONS BY INTEGRATING TECHNICAL ASPECTS WITH REGULATORY AND RESEARCH REQUIREMENTS READERS CAN APPLY THIS KNOWLEDGE TO WORK IN CARTOGRAPHY ENVIRONMENTAL MONITORING AND ANALYSIS LAND USE STUDIES AND LANDSCAPE ARCHAEOLOGY PARTICULAR ATTENTION IS ALSO GIVEN TO THE REASONS WHY A DRONE CAN DRAMATICALLY BOOST A GEOGRAPHER S CAPABILITY TO UNDERSTAND GEOGRAPHIC PHENOMENA BOTH FROM HARD SCIENCE AND HUMANITIES ORIENTED APPROACH

IN YOUR HANDS YOU HOLD A BOOK THAT WILL BE OF GREAT HELP IN UNDERSTANDING AND DEMYSTIFYING UNMANNED AERIAL VEHICLES UAVS THOSE ROBOTS THAT FOR MANY ARE NOTHING MORE THAN FLYING MACHINES HERE YOU WILL DISCOVER THAT BEHIND THESE MYSTERIOUS DEVICES LIES HIGHLY ADVANCED TECHNOLOGY BACKED BY YEARS OF EXPERIENCE WHICH ENABLES UAVS TO FLY INTELLIGENTLY AND AUTONOMOUSLY THERE ARE NO SECRETS JUST YEARS OF DEVELOPMENT AND THE EXPERTISE OF TECHNOLOGISTS WHO HAVE JOINED FORCES TO CREATE THESE MACHINES THAT CONTINUE TO AMAZE US ALL UAVS HAVE A WIDE RANGE OF APPLICATIONS AND THIS BOOK PRESENTS EXEMPLARY CASES OF THEIR RESPONSIBLE USE IN ENVIRONMENTAL PROTECTION AND CONSERVATION ACROSS VARIOUS ECOSYSTEMS FLYING ROBOTS OFFER A UNIQUE PERSPECTIVE ONE THAT DIFFERS FROM THE HUMAN VIEWPOINT GIVING THEM A SPECIAL ROLE IN THE BENEFICIAL USE OF TECHNOLOGY ADDITIONALLY GENERAL PURPOSE APPLICATIONS ARE PRESENTED TO HELP THE READER UNDERSTAND HOW FLYING ROBOTS ARE UTILIZED AND HOW THEY CAN SUPPORT HUMANITY IN NOBLE AND MEANINGFUL WAYS

THE BOOK DISCUSSES HOW UNMANNED AERIAL VEHICLES UAVS CAN LEVERAGE THE SUB 6 GHZ MASSIVE MIMO TO ADDRESS CELL SELECTION AND INTERFERENCE ISSUES IN FUTURE WIRELESS NETWORKS THE BOOK TAKES A CLOSE LOOK AT UTILIZING UAVS TO ACHIEVING DIRECT AND EFFICIENT DEVICE TO DEVICE D2D COMMUNICATIONS IN THE SKY ALSO THE KEY 6G ENABLERS CELL FREE ARCHITECTURES ARTIFICIAL INTELLIGENCE RECONFIGURABLE INTELLIGENT SURFACES THZ COMMUNICATIONS AND NON TERRESTRIAL NETWORKS FOR UAV COMMUNICATION ARE BROACHED AND THE PRIMARY TECHNOLOGICAL CHALLENGES OF EACH ENABLER ARE DISCUSSED EXTENSIVELY FURTHERMORE THE BOOK COVERS THE DESIGN OF ADAPTABLE UAVS TO OPERATE IN DIVERSE AND HARSH ENVIRONMENTAL CONDITIONS ADDITIONALLY THE EXISTING UAVS NETWORKING PROTOCOLS AND HOW THESE CAN BE GREATLY ENHANCED TO ADDRESS THE ISSUE OF INTERMITTENT NETWORK CHANGES AND CHANNEL IMPAIRMENTS ARE DISCUSSED THE PROSPECTS AND SOCIETAL BENEFITS ENVISIONED IN FUTURE UAVS ARE ALSO PRESENTED

UNMANNED AERIAL SYSTEMS THEORETICAL FOUNDATION AND APPLICATIONS PRESENTS SOME OF THE LATEST INNOVATIVE APPROACHES TO DRONES FROM THE POINT OF VIEW OF DYNAMIC MODELING SYSTEM ANALYSIS OPTIMIZATION CONTROL COMMUNICATIONS 3D MAPPING SEARCH AND RESCUE SURVEILLANCE FARMLAND AND CONSTRUCTION MONITORING AND MORE WITH THE EMERGENCE OF LOW COST UAS A VAST

ARRAY OF RESEARCH WORKS IN ACADEMIA AND PRODUCTS IN THE INDUSTRIAL SECTORS HAVE EVOLVED THE BOOK COVERS THE SAFE OPERATION OF UAS INCLUDING BUT NOT LIMITED TO FUNDAMENTAL DESIGN MISSION AND PATH PLANNING CONTROL THEORY COMPUTER VISION ARTIFICIAL INTELLIGENCE APPLICATIONS REQUIREMENTS AND MORE THIS BOOK PROVIDES A UNIQUE REFERENCE OF THE STATE OF THE ART RESEARCH AND DEVELOPMENT OF UNMANNED AERIAL SYSTEMS MAKING IT AN ESSENTIAL RESOURCE FOR RESEARCHERS INSTRUCTORS AND PRACTITIONERS COVERS SOME OF THE MOST INNOVATIVE APPROACHES TO DRONES PROVIDES THE LATEST STATE OF THE ART RESEARCH AND DEVELOPMENT SURROUNDING UNMANNED AERIAL SYSTEMS PRESENTS A COMPREHENSIVE REFERENCE ON UNMANNED AERIAL SYSTEMS WITH A FOCUS ON CUTTING EDGE TECHNOLOGIES AND RECENT RESEARCH TRENDS IN THE AREA

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