

THE FUTURE OF AIR TRAFFIC CONTROL

HUMAN OPERATORS AND AUTOMATION

Future Of Air Traffic Control Human Operators And Automation

C.-H. Chen,A.C. Trappey,M. Peruzzini



Future Of Air Traffic Control Human Operators And Automation:

The Future of Air Traffic Control Panel on Human Factors in Air Traffic Control Automation, Board on Human-Systems Integration, Division of Behavioral and Social Sciences and Education, National Research Council, 1998-02-09 Automation in air traffic control may increase efficiency but it also raises questions about adequate human control over automated systems Following on the panel's first volume on air traffic control automation *Flight to the Future* NRC 1997 this book focuses on the interaction of pilots and air traffic controllers with a growing network of automated functions in the airspace system The panel offers recommendations for development of human centered automation addressing key areas such as providing levels of automation that are appropriate to levels of risk examining procedures for recovery from emergencies free flight versus ground based authority and more The book explores ways in which technology can build on human strengths and compensate for human vulnerabilities minimizing both mistrust of automation and complacency about its abilities The panel presents an overview of emerging technologies and trends toward automation within the national airspace system in areas such as global positioning and other aspects of surveillance flight information provided to pilots and controllers collision avoidance strategic long term planning and systems for training and maintenance The book examines how to achieve better integration of research and development including the importance of user involvement in air traffic control It also discusses how to harmonize the wide range of functions in the national airspace system with a detailed review of the free flight initiative

The Future of Air Traffic Control, 1997 **Flight to the Future** National Research Council, Division of Behavioral and Social Sciences and Education, Board on Human-Systems Integration, Panel on Human Factors in Air Traffic Control Automation, 1997-02-28 Despite the strong safety record of the national airspace system serious disruptions occasionally occur often as a result of outdated or failed equipment Under these circumstances safety relies on the skills of the controllers and pilots and on reducing the number of aircraft in the air The current and growing pressures to increase the capacity to handle a greater number of flights has led to a call for faster and more powerful equipment and for equipment that can take over some of the tasks now being performed by humans Increasing the role of automation in air traffic control may provide a more efficient system but will human controllers be able to effectively take over when problems occur This comprehensive volume provides a baseline of knowledge about the capabilities and limitations of humans relative to the variety of functions performed in air traffic control It focuses on balancing safety with the expeditious flow of air traffic identifying lessons from past air accidents The book discusses The function of the national airspace system and the procedures for hiring training and evaluating controllers Decisionmaking memory alertness vigilance sleep patterns during shift work communication and other factors in controllers performance Research on automation and human factors in air traffic control and incorporation of findings into the system The Federal Aviation Administration's management of the air traffic control system and its dual mandate to promote safety and the development of air commerce This book also offers recommendations for evaluation the

human role in automated air traffic control systems and for managing the introduction of automation into current facilities and operations It will be of interest to anyone concerned about air safety policymakers regulators air traffic managers and controllers airline officials and passenger advocates **FAA's Modernization Programs** United States. Congress. House. Committee on Transportation and Infrastructure. Subcommittee on Aviation,1998 *Human-automation teamwork* Åsa Svensson,2020-04-07 This dissertation explores the topic of human automation teamwork in Air Traffic Control ATC ATC is a high stakes environment where complex automation is being introduced while the human operator has the legal responsibility With increasing demands on productivity in various industries as also in ATC automation is introduced for efficiency maintaining safety and to keep the workload of the human operator within acceptable limits However previous research has shown that automation may cause negative effects on the human operator and performance such as forcing the operator out of the control loop which might lead to problems or confusion Previous research suggests a need for strengthening human automation collaboration where automation is seen as a team member to keep the operator in the loop In order to achieve such teamwork the design of the automation needs to be human centred i e that the automation is designed for the underlying need of the operator The aim of this dissertation is to explore teamwork in ATC from several angles to understand how the air traffic controllers are working in current ATC environments and how automation could be designed to support human automation teamwork The included studies rely on interviews simulations and questionnaires all with operational air traffic controllers as participants The results indicate that for both human human teamwork and human automation teamwork teamwork factors such as adaptability and mutual performance monitoring knowing what the other team members are doing are important for the work performance in current ATC environments where mutual performance monitoring is especially important during stressful situations When designing automation lessons learned from human human teamwork should be considered The work within the scope of this dissertation identifies and concerns two human automation teamwork aspects boundary awareness and implicit communication These are proposed to support the operator s knowledge about the automation and the communication flow between the operator and the automation Boundary awareness is the operator s knowledge of the automation s abilities its boundaries what it can or cannot manage and about consequences if it would go outside of these boundaries Implicit communication is the unspoken or implied small cues that the operator and the automation can use to communicate with each other It is proposed that implicit communication can be based on the work patterns of the operator The knowledge gained through the work in this dissertation can be used as a foundation for further research and design of automation regarding operator knowledge about the automation boundaries and the communication within the team Denna avhandling utforskar teamwork mellan m nniska och automation inom flygtrafikledning Flygtrafikledning r en h griskmilj d r komplex automation introduceras samtidigt som den m nskliga operat ren har det juridiska ansvaret Med kade krav p produktivitet inom olika industrier och ven inom flygtrafikledning s introduceras

automation för effektiviteten för att bibehålla säkerheten och för att hålla arbetsbelastningen för den mänskliga operatören inom acceptabla gränser Tidigare forskning har dock visat att automationen kan orsaka negativa effekter på den mänskliga operatören och på prestationen som till exempel att tvinga ut operatören utanför kontrollloopen vilket leder till problem och förvirring Tidigare forskning föreslår ett starkare samarbete mellan människa och automation där automationen ses som en teammedlem för att bibehålla operatören i looperna För att uppnå ett sådant samarbete bör automation vara mänskligt centrerad att automation med andra ord är designad för operatörens underliggande behov Syftet med denna avhandling är att utforska teamwork från olika vinklar inom flygtrafikledning för att först hur flygledare jobbar i nuvarande flygtrafikledningsmiljöer och för att först hur automation skulle kunna designas för att stödja teamwork mellan människa och automation Studierna som denna avhandling bygger på har använt sig av intervjuer simuleringar och enkäter alla med operativa flygtrafikledare som deltagare Resultatet tyder på att för både människa-människa teamwork och människa-automations teamwork så är teamwork faktorer såsom flexibilitet och ömsesidig övervakning av teammedlemmarnas prestationer viktiga där övervakning av teammedlemmarnas prestationer är speciellt viktigt under stressiga situationer När man designar automation bör man ta hänsyn till teamwork mellan människor Vidare så identifierar och behandlar arbetet inom denna avhandling två aspekter gällande teamwork mellan människa och automation gränsmedvetenhet och implicit kommunikation Dessa aspekter föreslagna vi att stötta operatörens kunskap om automationen och kommunikationsflödet mellan operatören och automationen Gränsmedvetenhet är operatörens kunskap om automationens funktioner dess gränser och dess konsekvenser när automation går utanför dessa gränser Implicit kommunikation är de uttalade eller implicita ledtrådar som operatören och automationen kan använda för att kommunicera med varandra Det föreslås att implicit kommunikation kan baseras på arbetsmönster från operatören eller från prediktioner från automationen Kunskapen från denna avhandling kan användas som ett underlag för vidare forskning och design av automation gällande operatörens kunskap om automationens gränser och kommunikationen inom teamet

New Concepts and Methods in Air Traffic Management Lucio Bianco, Paolo Dell'Olmo, Amedeo R. Odoni, 2013-03-09 This volume is a compendium of papers presented during the International Workshop on Air Traffic Management which took place in Capri Italy on September 26-30 1999 The workshop was organized by Italian National Research Council in co-operation with the University of Rome Tor Vergata and the Massachusetts Institute of Technology MIT This was the fifth in a series of meetings held periodically over a ten year span for the purpose of encouraging an exchange of views and findings by scientists in the field of Air Traffic Management ATM The papers presented at the workshop dealt with a wide range of topics and covered different aspects that are currently important in Air Traffic Control and Air Traffic Management This volume contains only a subset of the papers presented namely the ones that addressed the main area emphasis in the workshop new concepts and methods The subject of the first two papers is Collaborative Decision Making CDM a concept which embodies to a large extent the new philosophy of partial decentralization and increased delegation of responsibilities to users in ATM operations

In the first of these papers Wambsganss describes the original CDM project and its initial implementation in the form of the Ground Delay Program Enhancements He also provides a brief description of some of the tools that have been developed as part of the CDM effort and identifies future research and development requirements

Transdisciplinary Engineering: A Paradigm Shift C.-H. Chen, A.C. Trappey, M. Peruzzini, 2017-07-20 Concurrent Engineering is based on the concept that different phases of a product life cycle should be conducted concurrently and initiated as early as possible within the Product Creation Process PCP Its main goal is to increase the efficiency and effectiveness of the PCP and reduce errors in the later stages and to incorporate considerations for the full lifecycle through life operations and environmental issues of the product It has become the substantive basic methodology in many industries and the initial basic concepts have matured and become the foundation of many new ideas methodologies initiatives approaches and tools This book presents the proceedings of the 24th ISPE Inc International Conference on Transdisciplinary formerly Concurrent Engineering TE 2017 held in Singapore in July 2017 The 120 peer reviewed papers in the book are divided into 16 sections air transport and traffic operations and management risk aware supply chain intelligence product innovation and marketing management human factors in design human engineering design methods and tools decision supporting tools and methods concurrent engineering knowledge based engineering collaborative engineering engineering for sustainability service design digital manufacturing design automation artificial intelligence and data analytics smart systems and the Internet of Things The book provides a comprehensive overview of recent advances in transdisciplinary concurrent engineering research and applications and will be of interest to researchers design practitioners and educators working in the field

Aviation Psychology: Practice and Research Klaus-Martin Goeters, 2017-03-02 In the well established aviation system the importance of sound human factors practice based on good aviation psychology research is obvious from those incidents and accidents resulting from its neglect This carefully structured book presents an up to date review of the main areas in the field of Aviation Psychology It contains current thinking mainly from Europe but with input from Australia and North America from specialists involved in research training and operational practice Spanning six parts the book covers Human Engineering Occupational Demands Selection of Aviation Personnel Human Factors Training Clinical Psychology Accident Investigation and Prevention Looking at the six parts in human engineering the reader learns about human centered automation as well as human factors issues in aircraft certification Results derived by job analysis methods are presented in the next part and serve as basic information in the design of selection and training programs In selection computerized testing or behaviour oriented assessments are challenging approaches for personnel recruitment Cost benefit analyses in selection reveal convincing results enabling organizations to save huge amounts of inappropriate training investment by the application of proper selection tests The NOTECHS method is described which helps to assess CRM capabilities in training and can also be used to measure training effects in systematic validation studies Although operational personnel in aviation are usually able to cope with stress more

efficiently than other occupational groups individual problems might develop as reactions to traumatic influences Either a psychological evaluation or a proper treatment or both is then required as described in the Clinical Psychology part of the book The readership includes aviation psychologists and flight surgeons training selection and recruitment specialists instructor pilots CRM facilitators personnel managers accident investigators safety pilots air traffic controllers aircraft engineers and those dealing with human machine interfaces

Situational Awareness Eduardo Salas,2017-07-05

Situational awareness has become an increasingly salient factor contributing to flight safety and operational performance and the research has burgeoned to cope with the human performance challenges associated with the installation of advanced avionics systems in modern aircraft The systematic study and application of situational awareness has also extended beyond the cockpit to include air traffic controllers and personnel operating within other complex high consequence work domains This volume offers a collection of essays that have made important contributions to situational awareness research and practice To this end it provides unique access to key readings that address the conceptual development of situational awareness methods for its assessment and applications to enhance situational awareness through training and design

Aviation Automation Charles E. Billings,2018-01-29 The advent of very compact very powerful digital computers has made it possible to automate a great many processes that formerly required large complex machinery Digital computers have made possible revolutionary changes in industry commerce and transportation This book an expansion and revision of the author's earlier technical papers on this subject describes the development of automation in aircraft and in the aviation system its likely evolution in the future and the effects that these technologies have had and will have on the human operators and managers of the system It suggests concepts that may be able to enhance human machine relationships in future systems The author focuses on the ability of human operators to work cooperatively with the constellation of machines they command and control because it is the interactions among these system elements that result in the system's success or failure whether in aviation or elsewhere Aviation automation has provided great social and technological benefits but these benefits have not come without cost In recent years new problems in aircraft have emerged due to failures in the human machine relationship These incidents and accidents have motivated this inquiry into aviation automation Similar problems in the air traffic management system are predicted as it becomes more fully automated In particular incidents and accidents have occurred which suggest that the principle problems with today's aviation automation are associated with its complexity coupling autonomy and opacity These problems are not unique to aviation they exist in other highly dynamic domains as well The author suggests that a different approach to automation called human centered automation offers potential benefits for system performance by enabling a more cooperative human machine relationship in the control and management of aircraft and air traffic

International Encyclopedia of Ergonomics and Human Factors, Second Edition - 3 Volume Set

Waldemar Karwowski,2006-03-15 The previous edition of the International Encyclopedia of Ergonomics and Human Factors

made history as the first unified source of reliable information drawn from many realms of science and technology and created specifically with ergonomics professionals in mind It was also a winner of the Best Reference Award 2002 from the Engineering Libraries Division American Society of Engineering Education USA and the Outstanding Academic Title 2002 from Choice Magazine Not content to rest on his laurels human factors and ergonomics expert Professor Waldemar Karwowski has overhauled his standard setting resource incorporating coverage of tried and true methods fundamental principles and major paradigm shifts in philosophy thought and design Demonstrating the truly interdisciplinary nature of this field these changes make the second edition even more comprehensive more informative more in a word encyclopedic Keeping the format popularized by the first edition the new edition has been completely revised and updated Divided into 13 sections and organized alphabetically within each section the entries provide a clear and simple outline of the topics as well as precise and practical information The book reviews applications tools and innovative concepts related to ergonomic research Technical terms are defined where possible within entries as well as in a glossary Students and professionals will find this format invaluable whether they have ergonomics engineering computing or psychology backgrounds Experts and researchers will also find it an excellent source of information on areas beyond the range of their direct interests

Handbook of Transportation Policy and Administration Jeremy Plant, 2007-02-22 In the past few decades the field of transportation has changed dramatically Deregulation and greater reliance on markets and the private sector has helped to reconfigure the transport industries while the rise of intermodal goods and global commerce has produced efficiencies of operation and a greater interdependence among transport modes In a

Engineering Psychology and Human Performance Christopher D. Wickens, William S. Helton, Justin G. Hollands, Simon Banbury, 2021-09-27 Forming connections between human performance and design this new edition of Engineering Psychology and Human Performance examines human machine interaction The book is organized directly from a psychological perspective of human information processing and chapters correspond to the flow of information as it is processed by a human being from the senses through the brain to action rather than from the perspective of system components or engineering design concepts Upon completing this book readers will be able to identify how human ability contributes to the design of technology understand the connections within human information processing and human performance challenge the way they think about technology's influence on human performance and show how theoretical advances have been or might be applied to improving human machine interactions This new edition includes the following key features A new chapter on research methods Sections on interruption management and distracted driving as cogent examples of applications of engineering psychology theory to societal problems A greatly increased number of references to pandemics technostress and misinformation New applications Amplified emphasis on readability and commonsense examples Updated and new references throughout the text This book is ideal for psychology and engineering students as well as practitioners in engineering psychology human performance and human

factors The text is also supplemented by online resources for students and instructors *Air Traffic Management and Systems* Electronic Navigation Research Inst,2014-03-12 The Electronic Navigation Research Institute ENRI held its third International Workshop on ATM CNS in 2013 with the theme of Drafting the future sky There is worldwide activity taking place in the research and development of modern air traffic management ATM and its enabling technologies in Communication Navigation and Surveillance CNS Pioneering work is necessary to contribute to the global harmonization of air traffic management and control At this workshop leading experts in research industry and academia from around the world met to share their ideas and approaches on ATM CNS related topics The Journal of Air Traffic Control ,1998

Transdisciplinary Engineering: Crossing Boundaries M. Borsato,N. Wognum,M. Peruzzini,2016-10-13 The Concurrent Engineering CE approach was developed in the 1980s based on the concept that different phases of a product life cycle should be conducted concurrently and initiated as early as possible within the Product Creation Process PCP CE concepts have matured and become the foundation of many new ideas methodologies initiatives approaches and tools This book contains the proceedings from the 23rd ISPE Inc International Conference on Transdisciplinary formerly Concurrent Engineering held in Curitiba Parana Brazil in October 2016 The conference entitled Transdisciplinary Engineering Crossing Boundaries provides an important forum for international scientific exchange on Concurrent Engineering and collaborative enterprises and attracts the participation of researchers industry experts and students as well as government representatives The 108 peer reviewed papers and keynote speech included here range from theoretical and conceptual to strongly pragmatic works which are organized into 17 sections including Concurrent Engineering and knowledge exchange engineering for sustainability multidisciplinary project management collaborative design and engineering optimization of engineering operations and data analytics and multidisciplinary design optimization among others The book gives an overview of the latest research advancements and applications in the field and will be of interest to researchers design practitioners and educators International Encyclopedia of Ergonomics and Human Factors - 3 Volume Set Informa Healthcare,2000-12-14 The first encyclopedia in the field the International Encyclopedia of Ergonomics and Human Factors provides a comprehensive and authoritative compendium of current knowledge on ergonomics and human factors It gives specific information on concepts and tools unique to ergonomics About 500 entries published in three volumes and on CD ROM are pre **Advances in Human Aspects of Aviation** Steven J. Landry,2012-07-11 Since the very earliest years of aviation it was clear that human factors were critical to the success and safety of the system As aviation has matured the system has become extremely complex Bringing together the most recent human factors work in the aviation domain *Advances in Human Aspects of Aviation* covers the design of aircrafts for the *Air Transportation Systems Engineering* George L. Donohue,2001 **National Airspace System : FAA has implemented some free flight initiatives, but challenges remain : report to Congressional requesters** United States. General Accounting Office,1998

Unveiling the Energy of Verbal Artistry: An Emotional Sojourn through **Future Of Air Traffic Control Human Operators And Automation**

In a world inundated with displays and the cacophony of instantaneous connection, the profound energy and mental resonance of verbal artistry usually diminish in to obscurity, eclipsed by the continuous assault of noise and distractions. Yet, located within the lyrical pages of **Future Of Air Traffic Control Human Operators And Automation**, a captivating work of fictional elegance that impulses with organic feelings, lies an unique journey waiting to be embarked upon. Written with a virtuoso wordsmith, that mesmerizing opus guides visitors on a mental odyssey, lightly revealing the latent potential and profound affect embedded within the delicate web of language. Within the heart-wrenching expanse with this evocative evaluation, we shall embark upon an introspective exploration of the book is main themes, dissect their charming writing design, and immerse ourselves in the indelible impression it leaves upon the depths of readers souls.

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I have a 2001 Daewoo Lanos. The engine revs is too fast. It Feb 22, 2008 — The first thing to do is to disconnect the idle air control valve. This is located on the side of the throttle body (where the throttle cable ... Daewoo Lanos Idle Rev issue Apr 1, 2010 — The car is a W reg. The problem is that the revs idle at around 1k, she says that when she is driving she can hear the revs going high even ... Daewoo Lanos high Idle speed Hi,. My Daewoo Lanos is having a problem with its idle speed being

too high. At a standstill it idles at about 1600rpm, and can be a bit embarrassing SOLVED: My daewoo lanos 1999 wont idle at the lights it Feb 23, 2011 — Remove the idle air control motor (IAC) and clean it well and the hole it comes out of with throttle body spray cleaner, or carburetor cleaner ... Daewoo Lanos Stalls: causes and solutions Hello, I have a Lanos and its problem is that it is always powerless and tends to stall. When turning the air conditioning on, this failure is even more ... Rough Idle: Hi Again Everyone, My Lanos ... May 21, 2009 — Hi Again everyone, my lanos idles very rough, doesn't stall, seems to lack power when driving, recently replaced plugs, leads, air filter ... My 2001 Daewoo has a rough idle after. Dec 30, 2012 — It shakes and studders a lot. Sometimes the car stalls and I have to press the gas pedal in order for the car to keep running. After it warms up ... my 2001 daewoo lanos keeps dying when i come to a stop Jun 2, 2014 — I have Daewoo lanos 16v it can't start plugs firering timing is good i spre y qikstart meas start fluid nothing happen it doesn't have camshaft ... Daewoo Matiz Idle Woes - YouTube Daewoo Lanos Idle Air Control Valve Order Daewoo Lanos Idle Air Control Valve online today. Free Same Day Store Pickup. Check out free battery charging and engine diagnostic testing while you ... Bikini Body Guide: Exercise & Training Plan Kayla Itsines Healthy Bikini Body Guide are for general health improvement recommendations only and are not intended to be a substitute for professional medical. Kayla Itsines' Bikini Body Guide Review Oct 11, 2018 — These circuit-style workouts promise to get you in shape in just 28 minutes a day. The guides themselves include the workouts for a 10-week ... Kayla Itsines Has Officially Renamed Her Infamous "Bikini ... May 6, 2021 — Australian trainer Kayla Itsines has renamed the Bikini Body Guides that made her so successful. Here's why she made the change, ... Kayla Itsines - Sweat Co-Founder I'm Kayla Itsines, co-founder of Sweat and co-creator of the High Impact with Kayla (formerly BBG) programs. Train with me in the Sweat app. FREE 8 week bikini body guide by Kayla Itsines Dec 24, 2017 — BBG is a 12-week workout program designed by Kayla Itnes. Each week there circuit training workouts and LISS (Low Intensity Steady State Cardio) ... I Tried Kayla Itsines's Bikini Body Guide Workout Aug 29, 2018 — Kayla Itsines's Bikini Body Guide 12 week program includes three 28-minute HIIT workouts, three cardio sessions, and two recovery days each week ... The Bikini Body Motivation & Habits Guide by Itsines, Kayla Bikini Body Guides (BBG) co-creator Kayla Itsines, named the world's number one fitness influencer by Forbes, shows you how to harness the power of motivation ... Bikini Body Guide Review Weeks 1-4 - A Cup of Kellen Jan 31, 2015 — One of my 2015 goals is to complete the Kayla Itsines 12 week Bikini Body Guide (also known as BBG). Let's be honest, it's hard to commit to ... 2007 Volkswagen Touareg Owners Manual in PDF The complete 10 booklet user manual for the 2007 Volkswagen Touareg in a downloadable PDF format. Includes maintenance schedule, warranty info, ... Volkswagen Touareg Manuals & Literature for sale 2014 Volkswagen Touareg Owners Manual Book Guide HHNRE. Pre-Owned: Volkswagen ... 2007 Volkswagen VW Touareg Owner's Manual Book With Case OEM. Pre-Owned ... pdf owners manual Jan 26, 2008 — Owners Manual (section 3.1) 2007 V8. General Maintenance & Repair. 2 ... Club Touareg Forum is a forum community dedicated to Volkswagen Touareg ... The Volkswagen Online Owner's

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