

Curriculum Vitae
ESA MARKUS RANTANEN

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AREAS OF INTEREST, SCHOLARSHIP, AND EXPERTISE

Human factors in complex systems, human performance measurement and modeling, mental workload, decision-making, and human error and reliability; in particular, human timing of actions, temporal decision-making, errors in timing, and the effects of time pressure and temporal uncertainty on workload and performance. Development of cognitive models of human operators' temporal awareness that will allow for prediction of their performance under various operational demands, and development of information displays and other augmented reality applications to support effective, error-free, and timely decision-making under conditions of uncertainty and time stress. Development of methods and standards for human-centered design of successful products and systems. Also, human factors education, curriculum development, and program evaluation and accreditation; I believe that bridging the schism between applied and theoretical human factors in education, research, and practice is critical to the discipline's impact and growth in the future.

CURRENT POSITION

ASSOCIATE PROFESSOR OF PSYCHOLOGY, *Rochester Institute of Technology* (Aug. 2007—present).

EDUCATION

Degrees:

DOCTOR OF PHILOSOPHY, ENGINEERING PSYCHOLOGY: 2000.
The Pennsylvania State University, University Park, Pennsylvania.

MASTER OF SCIENCE IN INDUSTRIAL ENGINEERING, option in Human Factors/Ergonomics Engineering: 1996.
The Pennsylvania State University, University Park, Pennsylvania.

MASTER OF AERONAUTICAL SCIENCE, specialization in Aviation/Aerospace Operations: 1993.
Embry-Riddle Aeronautical University, Daytona Beach, Florida.

BACHELOR OF SCIENCE IN PROFESSIONAL AERONAUTICS, minor in Aviation Business Administration: 1992.
Embry-Riddle Aeronautical University, Daytona Beach, Florida.

Other:

MATHEMATICAL MODELING, Institute of Mathematics and its Applications (IMA) Summer Program: 1996.
University of Minnesota, Minneapolis, Minnesota.

INDEPENDENT RESEARCH, Automation Applications in Air Traffic Control (ATC): 1988—1989.
Aero-Space Institute, Chicago, Illinois.

AIR TRAFFIC CONTROL, Procedural and Tower Course: 1983—1984; En route Surveillance Radar and Terminal Approach Radar Course: 1987.
Finnish Civil Aviation Administration, Vantaa, Finland.

FLIGHT TRAINING, Basic and Supplementary Training for Commercial Pilot's License: 1981—1982.
Finnair Training Center, Kuopio, Finland.

PROFESSIONAL CERTIFICATIONS

CERTIFIED PROFESSIONAL ERGONOMIST (CPE), by *Board of Certification for Professional Ergonomics (BCPE)*, No. 1286: September 19, 2004.

PROFESSIONAL EXPERIENCE

Primary Appointment:

ASSOCIATE PROFESSOR OF PSYCHOLOGY, *Rochester Institute of Technology* (Aug. 2007—present).

Previous Appointments:

RESEARCH SCIENTIST/USABILITY ENGINEER, *National Center for Supercomputing Applications (NCSA), University of Illinois at Urbana-Champaign* (May—Aug. 2007). Reviewed the user interface and human factors aspects of the software produced by the *Cyberenvironment and Technologies Directorate* at NCSA, primarily on the user interface for *Environmental Cyber Infrastructure Demonstration (ECID)*, focusing on the systems-level interaction between ECID's portal, content management, data provenance and workflow systems, and made design recommendations for their improvement. Worked with the development team to meet the evolving needs of the community, reviewed existing requirements, and interacted directly with the user community to gather user requirements, issues and interests and interpret their findings into a software design document.

ASSISTANT PROFESSOR, *Institute of Aviation Human Factors Division and Department of Psychology, University of Illinois at Urbana-Champaign* (Jan. 2000—May 2007).

BECKMAN INSTITUTE AFFILIATE, *Beckman Institute for Advanced Science and Technology*, Urbana, IL (Jan. 2001—May 2007).

TECHNICAL INFORMATION SPECIALIST/GRADUATE ASSISTANT, *Pennsylvania Technical Assistance Program (PennTAP), Pennsylvania State University*, University Park, Pennsylvania (May 1995—Aug. 1999). Answered questions and assisted in gathering information concerning high technology for small manufacturing businesses.

RESEARCH ASSISTANT, *Department of Industrial and Manufacturing Engineering, Pennsylvania State University*, University Park, Pennsylvania (Aug. 1994—Dec. 1995). Worked on modeling of industrial visual inspection for Corning Corp. and investigation of human attentional lapses through eye-movement data for NASA.

RESEARCH ASSOCIATE, *Aeronautical Science Department, Embry-Riddle Aeronautical University*, Daytona Beach, Florida (Dec. 1993—Aug. 1994). Developed research in performance measures and integrated ATC simulations, continual development of the University's ATC curriculum, course material, and instructional software.

AIR TRAFFIC CONTROLLER, *Helsinki Vantaa International Airport, Finnish Civil Aviation Administration*, Vantaa, Finland (Dec. 1984—Sep. 1991). Responsible for duties of an air traffic controller in accordance with International Civil Aviation Organization (ICAO) rules, validated for Helsinki tower and ground control, terminal approach radar, procedural approach; on-the-job instructor in the tower.

TEACHING EXPERIENCE:

Graduate Students Advised:

Ongoing:

Kathryn Coles, MS, Psychology, Rochester Institute of Technology. Thesis topic: *Emergency department crowding and physician workload*.

Ryan Hope, MS, Psychology, Rochester Institute of Technology. Thesis topic: *Predictive utility of the model of multiple identity tracking (MOMIT) in air traffic control performance*.

Noah Stupak, MS, Psychology, Rochester Institute of Technology. Thesis topic: *The effect of displays of system response time on user performance in human-computer interaction*.

Daniel Colombo, MS, Psychology, Rochester Institute of Technology. Thesis topic: *Temporal awareness and rhythmic performance*.

Jessica Smagner, MS, Psychology, Rochester Institute of Technology. Thesis topic: *Cyberenvironments and technologies usability*.

Stéphanie Stankovic, Ph.D., Cognitive Psychology, Université de Toulouse, France. Dissertation topic: *Cognitive processes involved in risk management for risky situations in air traffic control* (Co-Adviser with Dr. Etienne Mullet, Ethics and Work Laboratory, Institute of Advanced Studies [EPHE], University of Toulouse, France).

Krista Oinonen, Ph.D., Psychology, University of Turku, Finland. Dissertation topic: *Effect of task interruptions on multiple object tracking* (Co-Adviser with Dr. Lauri Oksama and Prof. Jukka Hyönä, University of Turku).

Asal Naseri, Ph.D., Aerospace Engineering, University of Illinois at Urbana-Champaign. Dissertation topic: *Conflict Detection in Air Traffic Management* (Co-Adviser with Prof. Natasha Neogi, Dept. of Aerospace Engineering, University of Illinois at Urbana-Champaign).

Completed:

Ramona (Su) Thompson, M.S., Human Factors, University of Illinois at Urbana-Champaign (2006). Thesis title: *Usability Study of Network Security Analyst Visualization Tool*. Winner of the 2006 RALPH FLEXMAN AWARD for best human factors thesis.

Jiazhong Yang, Ph.D., Psychology, Chinese Academy of Sciences (2006). Dissertation title: *Impact of Individual Differences, ATC Complexity, and Number of Aircraft on Controller Situation Awareness and Mental Workload*. (Co-Adviser with Prof. Kan Zhang, Institute of Psychology, Chinese Academy of Sciences).

Lisa Thomas, Ph.D., Psychology, University of Illinois at Urbana-Champaign (2005). Dissertation title: *Effects of Display Dimensionality, Conflict Geometry, and Time Pressure on Conflict Detection and Resolution Performance Using a Cockpit Display of Traffic Information*. (Co-Adviser with Prof. Christopher D. Wickens, Dept. of Psychology, University of Illinois at Urbana-Champaign)

Xidong Xu, Ph.D., Psychology, University of Illinois at Urbana-Champaign (2004). Dissertation title: *Effects of air traffic geometry and conflict alerting system reliability on pilots' conflict detection with cockpit display of traffic information*. (Co-Adviser with Prof. Christopher D. Wickens, Dept. of Psychology, University of Illinois at Urbana-Champaign).

Other Teaching Experience:

ROCHESTER INSTITUTE OF TECHNOLOGY, Rochester, NY: *Associate Professor*, Department of Psychology (Sep. 2007—present). *Courses Developed and Taught*: Topics in Engineering Psychology (0514.788; topics included Temporal Awareness and Human Performance, Fall 2007, Advanced Ergonomics/Human Factors—Human Performance Models, Spring 2008, and Human Error and Reliability, Fall 2008), Thesis (0514.890), Research Methodology (0514.786), Judgment and Decision-Making (0514.532), Research Methods (0514.402).

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, Champaign, IL: *Assistant Professor*, Institute of Aviation (Jan. 2000—Aug. 2007). *Courses Taught*: Aviation Psychology (PSYC 497/AVI 497), Human Error (AVI/PSYC 347, PSYC 457/AVI 447), Human Factors (PSYC/AVI 258/358/IE 240/340), Human Factors in Air Traffic Control (AVI 397ER/PSYCH 396EMR), Analysis, Modeling and Design of Human-Machine Systems (IE 440). *Courses Developed*: Human Error (AVI/PSYCH 347, PSYC 457/AVI 447), Human Factors in Air Traffic Control (AVI 349/397ER).

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, Champaign, IL: *Instructor*, Institute of Aviation (Aug.—Dec. 1999). Taught PSYCH/AVI 258/IE 240 course 'Human Factors in Human-Machine Systems.'

PENNSYLVANIA STATE UNIVERSITY, University Park, PA: *Instructor*, Department of Psychology (August-December 1998). Participated in development and co-taught the PSY 432 Engineering Psychology course.

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY, Daytona Beach, FL: *Instructor*, Aeronautical Science Department (Dec. 1993 - Aug. 1994). Continued development of the University's ATC curriculum, course material, and instructional software; instructor for AT365, AT462 and AT464 ATC courses.

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY, Daytona Beach, FL: *Teaching Assistant*, Airway Science Simulation Laboratory (Sep. 1991 - Dec. 1993). Designed curriculum for the University's ATC program, wrote specifications for the laboratory's ATC radar simulator, installed and programmed the simulator, developed course material and instructional software for the ATC courses; instructor for AT364, AT462 and AT464 undergraduate ATC courses.

GRANTS AND CONTRACTS

Principal Investigator:

FEDERAL AVIATION ADMINISTRATION, \$10,000 (Jun. 8—Oct. 6, 2006): *Development of an Air Traffic Control Measures Database* (Purchase Order # DTFAAC-06-P-08010).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, \$76,525 (Mar. 1, 2004—Aug. 31, 2006); *En Route Controller Task Prioritization Research To Support CE-6 Human Performance Modeling*. Via MICRO ANALYSIS & DESIGN, Boulder, CO (DAG CE-6 Golden Nuggets Modeling & Simulation Studies).

FEDERAL AVIATION ADMINISTRATION, \$130,800 (May 6, 2002—Sep. 31, 2004): *Development and Validation of Objective Performance and Workload Measures in Air Traffic Control* (Cooperative Agreement No. 02-G-019).

FEDERAL AVIATION ADMINISTRATION, \$78,850 (Aug. 23, 2002—Dec. 31, 2003): *Developing and Validating Human Factors Certification Criteria for Cockpit Displays of Traffic Information Avionics* (Research Grant No. 02-G-032).

FEDERAL AVIATION ADMINISTRATION, \$67,289 (May. 2—Dec. 31, 2001): *The Effect of Audio Throughput Delay of the NEXCOM System on Air Traffic Controller Performance and Workload* (Purchase Order No. DTFA0101P1029)

UNIVERSITY OF ILLINOIS RESEARCH BOARD, \$22,000 (Jan. 1, 2001—Dec. 31, 2002): *Timing of Discrete Actions*.

TOTAL (2001-2007): **\$383,466**

Co-Principal Investigator:

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN CRITICAL RESEARCH INITIATIVE GRANT, \$192,000 (Jul. 1, 2006—Jun. 30, 2008): *Center for Air Transportation Research* (with Mike Bragg and Natasha Neogi, UIUC-AE, P. R. Kumar, UIUC-ECE, and Kieran Donaghy, UIUC-URP).

DEPARTMENT OF ENERGY (DOE) through CONCURRENT TECHNOLOGIES CORPORATION (CTC), \$230,000 (Jan. 1, 2006—Mar. 30, 2007): *Integration of PSERC Control Center Visualization Techniques into the TVA-Hosted Southeast Wide Area Display Environment* (with Tom Overbye, UIUC-ECE).

POWER SYSTEMS ENGINEERING RESEARCH CENTER (PSERC), \$190,000 (Jun. 1, 2005—Jun. 31, 2007): *Effective Power System Control Center Visualization* (with Tom Overbye, UIUC-ECE, Sakis Meliopoulos, Georgia Tech).

EMERSON PROCESS MANAGEMENT, INC., MYNAH TECHNOLOGIES, AND OSISOFT, INC., \$144,000 valued power plant digital control automation and simulation software provision for research (2003–2004): *Human performance in semi-automated process control* (with Alex Kirlik, UIUC-HFD)

FEDERAL AVIATION ADMINISTRATION, \$350,012 (Aug. 28, 2002—Apr. 23, 2005): *Effectiveness of Flight Training Devices Used for Instrument Training* (Cooperative Agreement DOT 2002-G-033-1-5-21755-497606).

FEDERAL AVIATION ADMINISTRATION, \$467,765 (Sep. 20, 2001—Nov. 21, 2004): *The Effectiveness of a Personal Computer Aviation Training Device, a Flight Training Device, and an Airplane in Conducting Instrument Proficiency Checks* (Cooperative Agreement DTFA 2001-G-037-1-5-21606-497738).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, \$182,575 (Jan. 1, 2001—Dec 31, 2002): *Defining the Relationship Between Human Error Classes and Technological Interventions* (Grant/Agreement No. NAG-1-02032).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, \$299,087 (Jan 15, 1999—Jan. 31, 2002): *Incremental Training Effectiveness of Personal Computer Aviation Training Devices (PCATD) Used for Instrument Training* (Contract NASA NAG 2-1282-1-5-21208).

FEDERAL AVIATION ADMINISTRATION, \$558,062 (Jan. 7, 1998—Apr. 30, 2001). *Evaluation of a Personal Computer Aviation Training Device to Meet Recency of Experience Requirements* (Contract DTFA 98-G-003-1-5-21040).

TOTAL (2001-2007): **\$2,613,501**

Other Grants:

ROCHESTER INSTITUTE OF TECHNOLOGY STUDENT AFFAIRS DIVISION, (Sep. 2008). *Interactive Learning Support* for student participation in the 52nd Annual Meeting of the Human Factors and Ergonomics Society in New York, NY, September 22–26, 2008.

ROCHESTER INSTITUTE OF TECHNOLOGY STUDENT AFFAIRS DIVISION, \$780 (Oct. 2007). *Interactive Learning Support* for student participation in the 51st Annual Meeting of the Human Factors and Ergonomics Society in Baltimore, MD, October 1–5, 2007.

GRAND TOTAL (1999-2007): **\$2,997,747**

AWARDS AND RECOGNITION

Nominated for the *Hohenboken Award for Excellence in Teaching* (April, 2004). The award is funded by an endowment from Mabel Kirkpatrick Hohenboken to the Department of Psychology at the University of Illinois at Urbana-Champaign.

UNIVERSITY SERVICE

ROCHESTER INSTITUTE OF TECHNOLOGY, Rochester, NY: *BS/MS Program Committee*, member, September 2007–present; *BS/MS Curriculum Committee*, member, September 2007–present; *MS Admissions Committee*, member, September 2007–present; *MS Recruitment Committee*, chair, September 2007–present; *Library Committee*, member, September 2007–present; *MS Student Career Workshop*, chair, September 2007–present; *MS Student Handbook Committee*, chair, September 2007–present; *MS Program Accreditation Committee*, chair, September 2007–present.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, Champaign, IL: *Academic Advisor Search Committee*, April–July, 2006; *Human Factors Curriculum Review Committee*, chair, 2005–2006; *Executive Committee*, member 2001–2003.

PROFESSIONAL ACTIVITIES

Editorial Board Member:

HUMAN FACTORS, published by the Human Factors and Ergonomics Society, Santa Monica, CA; 2006–present.

INTERNATIONAL JOURNAL OF AVIATION PSYCHOLOGY, published by Lawrence Erlbaum Associates, Mahwah, NJ; 2001–present.

INTERNATIONAL JOURNAL OF APPLIED AVIATION STUDIES–IJAAS (formerly *International Journal of Aviation Research and Development*), published by the FAA Academy, Oklahoma City, OK; 2001–present.

THE INDIAN JOURNAL OF AEROSPACE MEDICINE–IJASM, published by the Indian Society of Aerospace Medicine, Bangalore, India; 2005–present.

Reviewer:

AIR TRAFFIC CONTROL QUARTERLY, published by the Air Traffic Control Association, Inc., Arlington, VA

COLLEGIATE AVIATION REVIEW, published by the University Aviation Association, Auburn, AL.

ERGONOMICS, published by Taylor and Francis Ltd., Oxfordshire, UK.

INTERNATIONAL JOURNAL OF HUMAN-COMPUTER STUDIES, published by Elsevier Science, B. V.

INTERNATIONAL JOURNAL OF INDUSTRIAL ERGONOMICS, published by Elsevier Science, B. V.

JOURNAL OF COGNITIVE ENGINEERING AND DECISION MAKING, published by Human Factors and Ergonomics Society, Santa Monica, CA.

JOURNAL OF EXPERIMENTAL PSYCHOLOGY: APPLIED, published by the American Psychological Association, Washington, DC

JOURNAL OF EXPERIMENTAL PSYCHOLOGY: HUMAN PERCEPTION AND PERFORMANCE, published by the American Psychological Association, Washington, DC

PSYCHOLOGICAL REPORTS: PERCEPTUAL AND MOTOR SKILLS, published by Psychological Reports, Missoula, MO.

THEORETICAL ISSUES IN ERGONOMICS SCIENCE, published by Taylor and Francis Ltd., Oxfordshire, UK.

Human Factors Consultant:

U.S. ATTORNEY'S OFFICE, WESTERN DISTRICT OF NEW YORK (May 2, 2008). Provided ergonomics training to office employees.

USERWORKS, INC., Silver Spring, MD (January–August 2006). Provided advice and guidance in literature review and analysis of staffing requirements, standards, and models, and on human factors in the staffing of air traffic control facilities.

COMED/EXELON CORP., *Bulk Power Office*, Lombard, IL (June 2005–June 2007). Conducted task- and function analyses of transmission dispatchers' tasks and developed effective visualization tools for power system control centers' use.

EXELON NUCLEAR, *LaSalle County Generating Station*, LaSalle Co., IL (June, 2005). Observed and evaluated nuclear power plant control room panel monitoring practices and procedures.

PRO/CONSUL, INC., *Technical & Medical Experts*, Long Beach, CA (June–July, 2004). Provided an analysis of air traffic controller workload in a case of a midair collision of two general aviation aircraft.

MUNIZ ENGINEERING, *NASA Johnson Space Center*, Houston, TX (January–August 2004). Reviewed and critiqued a final report on root cause software analysis and comparison project, made recommendations for the methodologies, additional information, and evaluation parameters, and provided an expert opinion on the validity of the conclusions.

ABBOTT POWER PLANT, *University of Illinois at Urbana-Champaign*, Champaign, IL (June–July, 2004). Human factors expert; conducted task analyses, evaluated a new digital boiler control interface, and developed an electronic boiler start-up manual and checklist for the plant.

SENSIS CORPORATION, 5793 Widewaters Parkway, DeWitt, NY 13214 (July–August, 2003). Evaluated the Aerobahn Advanced Surface Movement Guidance and Control System (ASMGCS) in terms of human factors requirements for its interface and operation.

HELSINKI AIRPORT, *Finnish Civil Aviation Administration*, Vantaa, Finland (1990–1991). Member and subject matter expert in surface movement radar and apron management task forces.

PROFESSIONAL ASSOCIATIONS

HUMAN FACTORS AND ERGONOMICS SOCIETY (HFES), *USA*, student member 1993–2000, member 2000–present, *HFES Pennsylvania State University Student Chapter*, member 1995–1999.

- *Member*, Aerospace Systems (AS), Cognitive Engineering and Decision Making (CE), Education (E), Human Performance Modeling (HP), System Development (SD) and Standards (S-PEN) technical groups.
- *Member*, HFES committee for review of HFES accreditation process and standards for graduate programs, 2006.
- *Member*, HFES subcommittee formulating criteria for recognition of outstanding undergraduate human factors programs, 2005–2006.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE), SYSTEMS, MAN, AND CYBERNETICS SOCIETY (SMC), *USA*, student member 1997–2000, associate member 2000–2003, member 2004–present.

ASSOCIATION FOR AVIATION PSYCHOLOGY, *USA*, member 1999–present.

AIR TRAFFIC CONTROL ASSOCIATION, INC. (ATCA), *USA*, member 2001–present

AMERICAN PSYCHOLOGICAL ASSOCIATION (APA), DIVISION 21: APPLIED EXPERIMENTAL AND ENGINEERING PSYCHOLOGY, member 2008–present.

UNIVERSITY AVIATION ASSOCIATION, *USA*, affiliate member 1998–present.

INTERNATIONAL FEDERATION OF AIR TRAFFIC CONTROLLERS' ASSOCIATIONS (IFATCA), *International*, member 1985–1991, member of the Finnish delegation for collaboration with IFATCA and a special delegate to the Technical Committee of IFATCA 1990–1991.

ASSOCIATION OF AIR TRAFFIC CONTROLLERS OF HELSINKI, *Finland*, member 1985–1991, President 1990–1991.

SKILLS

LANGUAGES: Fully fluent in English, Finnish, and Swedish, reads and writes German.

FLIGHT EXPERIENCE: Private Pilot's License (FAA). Total flight experience 200 hrs. in single-engine, land, aircraft.

PUBLICATIONS (Student contributions are denoted by a superscript^s)

Peer-Reviewed Publications in Journals, in Print or Accepted:

16. Yang, J.^s, Rantanen, E. M., & Zhang, K. (In press). The Impact of time efficacy on air traffic controller situation awareness and mental workload. *International Journal of Aviation Psychology*.
15. Morrow, D., Wickens, C., Rantanen, E., Chang, D.^s, & Marcus, J.^s (2008). Designing external aids that support older pilots' communication. *International Journal of Aviation Psychology*, 18(2), 167–182.
14. Rantanen, E. M., Naseri, A.^s, & Neogi, N. (2007). Evaluation of airspace complexity and dynamic density metrics derived from operational data. *Air Traffic Control Quarterly*, 15(1), 65-88.

13. Xu, X.^s, & Rantanen, E. M. (2007). Effects of air traffic geometry on pilots' conflict detection with cockpit display of traffic information. *Human Factors*, 49(3), 358-375.
12. Xu, X.^s, Wickens, C. D., & Rantanen, E. M. (2007). Effects of conflict alerting system reliability and task difficulty on pilots' conflict detection with Cockpit Display of Traffic Information. *Ergonomics*, 50(1), 112-130.
11. Rantanen, E. M., Palmer, B. O.^s, Wiegmann, D. A., & Musiorski, K. M.^s (2006). Five-dimensional taxonomy to relate human errors and technological interventions in a human factors literature database. *Journal of the American Society for Information Science and Technology (JASIST)*, 57(9), 1221-1232.
10. Thomas, L. C.^s, & Rantanen, E. M. (2006). Human factors issues in implementation of advanced aviation technologies: A case of false alerts and cockpit displays of traffic information. *Theoretical Issues of Ergonomics Science*, 7(5), 501-523.
9. Rantanen, E. M., & Nunes, A.^s (2005). Hierarchical conflict detection in air traffic control. *International Journal of Aviation Psychology*, 15(4), 339-362.
8. Rantanen, E. M., McCarley, J. S., & Xu, X.^s (2004). Time delays in air traffic control communication loop: Effect on controller performance and workload. *International Journal of Aviation Psychology*, 14(4), 369-394.
7. Johnson, N. R.^s, Rantanen, E. M., & Talleur, D. A. (2004). Time series based objective pilot performance measures. *International Journal of Applied Aviation Studies (IJAAS)*, 4(1), 13-29.
6. Wickens, C. D., Rantanen, E. M., Thomas, L. C.^s, & Xu, X.^s (2004). Imperfect automation and CDTI alerting: Implications from literature and systems analysis for display design. *Aviation, Space, and Environmental Medicine*, 75(4, section II), B138.
5. Talleur, D. A., Taylor, H. L., Bradshaw, G. L., Emanuel, T. W., & Rantanen, E. M. (2003). Personal computer aviation training devices: Their effectiveness for maintaining instrument currency. *International Journal of Aviation Psychology*, 13(4), 387-399.
4. Rantanen, E. M. & Rosenbaum, D. A. (2003). Drift in blind reciprocal aiming movements. *Motor Control*, 7(2), 199-228.
3. Rantanen, E. M. (2003). Measurement of visual fields. *Perceptual and Motor Skills*, 96, 92-94.
2. Rantanen, E. M., & Talleur, D. A. (2001). Measurement of pilot performance during instrument flight using flight data recorders. *International Journal of Aviation Research and Development*, 1(2), 89-102.
1. Rantanen, E. M., & Goldberg, J. H. (1999). The effect of mental workload on visual field size and shape. *Ergonomics*, 42(6), 816-834.

Articles in Review or in Preparation:

9. Xu, X.^s, Rantanen, E. M. & Huo, Y.^s (In preparation). Relative importance of conflict geometry variables in influencing pilots' conflict detection using a cockpit display of traffic information. *International Journal of Aviation Psychology*.
8. Naseri, A.^s, Neogi, N. A., & Rantanen, E. M. (Under revision). Aircraft mode detection by using stochastic hybrid models. *AIAA Journal of Guidance, Control, and Dynamics*.
7. Rantanen, E. M. & Morris, J.^s (Under revision). The measurement of the air traffic controller: Twenty-five years later. *Human Factors*.
6. Rantanen, E. M. (Under revision). Air traffic controllers exhibit temporal awareness in prioritizing tasks under different levels of workload. *Human Factors*.
5. Rantanen, E. M., & Yang, J.^s (In preparation). Air traffic controllers' taskload, workload, and situation awareness: Theoretical underpinnings and performance implications. *Human Factors*.
4. Rantanen, E. M., & Yang, J.^s (In preparation). Subjective and objective measures of workload and situation awareness in air traffic control: Comparison and validation of methods. *International Journal of Aviation Psychology*.
3. Rantanen, E. M., & Yeakel, S. B. (In preparation). Part-task simulation in ATC research: The University of Illinois experiments. *Behavior Research Methods*.
2. Rantanen, E. M., Talleur, D. A., & Johnson, N. R.^s (In preparation). Evaluation of objective pilot performance metrics from instrument proficiency check flights. *Aviation, Space, and Environmental Medicine*.

1. Rantanen, E. M. (In preparation). Measurement of temporal awareness and its effects on human performance in dynamic tasks. *Human Factors*.

Peer-Reviewed Publications in Conference Proceedings:

26. Rantanen, E. M., Winkle, J.^s, & Overbye, T. J. (In press). Cognitive task analysis of electric power system control center operations. *Proceedings of the 52nd Annual Meeting of the Human Factors and Ergonomics Society*. Santa Monica, CA: HFES.
25. Naseri, A.^s, Neogi, N., & Rantanen, E. (2007). Stochastic hybrid models with applications to air traffic management. *AIAA Guidance, Navigation and Control Conference and Exhibit*, Hilton Head, South Carolina, Aug. 20-23, 2007, AIAA-2007-6696.
24. Overbye, T. J., Rantanen, E. M., & Judd, S. L.^s (2007). Electric power control center visualization using geographic data views. *Proceedings of the International Symposium of Bulk Power System Dynamics and Control-VII*, August 19-24, 2007, Charleston, SC.
23. Rantanen, E. M. & Vlach, P. M. (2007). Development of air traffic control measures database. *Proceedings of the 51st Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1124–1128). Santa Monica, CA: HFES.
22. Serwy, R. D.^s, & Rantanen, E. M. (2007). Evaluation of a software implementation of the Cognitive Reliability and Error Analysis Method (CREAM). *Proceedings of the 51st Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1249–1253). Santa Monica, CA: HFES.
21. Thompson, R.^s, Rantanen, E. M., Yurcik, W., & Bailey, B. (2007). Command Line or Pretty Lines? Comparing Textual and Visual Interfaces for Intrusion Detection. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems 2007*, April 28-May 3, San Jose, CA. (Acceptance rate 24%, 144 accepted out of about 600 submissions).
20. Rantanen, E. M., Yang, J.^s, & Yin, S.^s (2006): Comparison of pilots' and controllers' conflict resolution maneuver preferences. *Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 16–19). Santa Monica, CA: HFES.
19. Thompson, R.^s, Rantanen, E. M., & Yurcik, W. (2006). Network intrusion detection cognitive task analysis: textual and visual tool usage and recommendations. *Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 669–673). Santa Monica, CA: HFES.
18. Rantanen, E. M., & Vlach, P. M. (2006). A framework for evaluation of university human factors curricula. *Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1954–1957). Santa Monica, CA: HFES.
17. Shattuck, L. G., Bisantz, A. M., Gilson, R. D., Moroney, W. F., & Rantanen, E. M. (2006): Recognizing excellence in undergraduate human factors education. *Proceedings of the 50th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 794–798). Santa Monica, CA: HFES.
16. Rantanen, E. M., & Levinthal, B. R.^s (2005). Time-based modeling of human performance. *Proceedings of the 49th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1200–1204). Santa Monica, CA: HFES.
15. Rantanen, E. M., & Talleur, D. A., (2005). Incremental transfer and cost effectiveness of ground-based flight trainers in a university aviation program. *Proceedings of the 49th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 764–768). Santa Monica, CA: HFES.
14. Morrow, D. G., Chang, D.^s, Wickens, C. D., Rantanen, E. M., & Raquel, L.^s (2005). Designing external aids that support older pilot performance. *Proceedings of the 49th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 186–189). Santa Monica, CA: HFES.
13. Hildebrandt, M., & Rantanen, E. M. (2004). Time Design. *Proceedings of the 48th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 703-707). Santa Monica, CA: HFES.
12. Levinthal, B. R.^s, & Rantanen, E. M. (2004). Measurement of taskload and performance in a dynamic multi-task experiment. *Proceedings of the 48th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 567-570). Santa Monica, CA: HFES.
12. Johnson, N. R.^s, Rantanen, E. M., & Talleur, D. A. (2004). Criterion setting for objective, fourier analysis based pilot performance metrics. *Proceedings of the 48th Annual Meeting of the Human Factors and Ergonomics Society* (157-160). Santa Monica, CA: HFES.

11. Tokuda, S.^s, Rantanen, E. M., & Gonzalez de Sather, J. C. M.^s (2004) An electronic instruction manual and checklist for steam boiler start-up. *Proceedings of the 48th Annual Meeting of the Human Factors and Ergonomics Society* (2197-2201). Santa Monica, CA: HFES.
10. Xu, X.^s, Wickens, C. D., & Rantanen, E. M. (2004) Effects of air traffic geometry on pilots' conflict detection with cockpit display of traffic information. *Proceedings of the 48th Annual Meeting of the Human Factors and Ergonomics Society* (26-30). Santa Monica, CA: HFES.
9. Rantanen, E. M., & Gonzalez de Sather, J. C. M.^s (2003). Special projects in undergraduate human factors courses: Evaluation of power plant boiler control interface. *Proceedings of the 47th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 899-902). Santa Monica, CA: HFES.
8. Rantanen, E. M., Butts T. A.^s, Wojtowicz D. S.^s, Webb M. L.^s, & Marin, A. K. (2003). Human factors considerations in the design of an aircraft maintenance hangar. *Proceedings of the 47th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 927-931). Santa Monica, CA: HFES.
8. Rantanen, E. M., Wiegmann, D. A., Palmer B. O.^s, & Musiorski K. M.^s (2003). A human factors database for matching human errors and technological interventions. *Proceedings of the 47th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 782-786). Santa Monica, CA: HFES.
7. Xu, X.^s, & Rantanen, E. M. (2003). Timing of discrete actions: Evidence for perceptual dominance in human performance. *Proceedings of the 47th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 581-585). Santa Monica, CA: HFES.
6. Thomas, L. C.^s, Wickens, C. D., & Rantanen, E. M. (2003). Imperfect automation in aviation traffic alerts: a review of conflict detection algorithms and their implications for human factors research. *Proceedings of the 47th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 344-348). Santa Monica, CA: HFES.
5. Rantanen, E. M., McCarley, J. S., & Xu, X.^s (2002). The impact of communication delays on air traffic controllers' vectoring performance. *Proceedings of the 46th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 56—60). Santa Monica, CA: HFES.
4. Rantanen, E. M., & Kokayeff, N. K.^s (2002). Pilot error in copying ATC clearances. *Proceedings of the 46th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 145—149). Santa Monica, CA: HFES.
3. Rantanen, E. M., & Xu, X.^s (2001). Human performance in timing of discrete actions. *Proceedings of the 45th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 527—531). Santa Monica, CA: HFES.
2. Wroblewski, L.^s & Rantanen, E. M. (2001). Design guidelines for web-based applications. *Proceedings of the 45th Annual Meeting of the Human Factors and Ergonomics Society* (pp. 1191—1195). Santa Monica, CA: HFES.
1. Ebbing, A. A.^s, & Rantanen, E. M. (2001). Computerized electoral ballot design using a touch screen. *Proceedings of the Human Factors and Ergonomics Society 45th Annual Meeting* (p. 746). Santa Monica, California: The Human Factors and Ergonomics Society.

Other Publications in Conference Proceedings:

30. Rantanen, E. M. (2008). Objective, time-based measures of human and system performance to support the NextGen development. *Human Factors and NextGen: The Future of Aviation*, University of Texas at Arlington, Texas, May 28–29, 2008.
29. Rantanen, E. M. (2008). Derivation of objective measures of temporal awareness from high-fidelity simulations. *Human Factors and NextGen: The Future of Aviation*, University of Texas at Arlington, Texas, May 28–29, 2008.
28. Rantanen, E. M. (2008). Temporal awareness and human performance in engineering psychology. *Proceedings of the 2008 College of Liberal Arts Forum on Student-Faculty Research* (pp. 205–213). Rochester, NY: Rochester Institute of Technology.
27. Rantanen, E. M. (2007). Temporal awareness in ATC: Literature review and a proposed model. *Proceedings of the 14th International Symposium on Aviation Psychology* (pp. 570-576). Dayton, OH, April 23-26, 2007.
26. Schriver, A. T.^s, & Rantanen, E. M. (2007). Evaluation of the SEEV model of visual attention allocation in ATC applications. *Proceedings of the 14th International Symposium on Aviation Psychology* (pp. 625-631). Dayton, OH, April 23-26, 2007.

25. Johnson, C. M.^s, Rantanen, E. M., & Moment, S. L. (2007). Aviation technologies and human error: A research literature database and analysis. *Proceedings of the 14th International Symposium on Aviation Psychology* (pp. 294-299). Dayton, OH, April 23-26, 2007.
24. Xu, X.^s, Rantanen, E. M., & Huo, Y.^s (2007). Relative importance of conflict geometry variables in influencing pilots' conflict detection using a cockpit display of traffic information. *Proceedings of the 14th International Symposium on Aviation Psychology* (pp. 769-775). Dayton, OH, April 23-26, 2007.
23. Morrow, D M., Chang, D.^s, Wickens, C. D., Rantanen, E. M., & Carbonari, R. (2007). External aids for general aviation pilot communication. *Proceedings of the 14th International Symposium on Aviation Psychology* (pp. 458-461). Dayton, OH, April 23-26, 2007.
22. Rantanen, E. M., & Levinthal, B. R.^s (2005). Effect of air traffic controller taskload and workload on task prioritization. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 485-490). Dayton, OH: Wright State University.
21. Maynard, P.^s, & Rantanen, E. M. (2005). Team aspects of air traffic control and their implications on automation. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 389-394). Dayton, OH: Wright State University.
20. Rantanen, E. M., Maynard, P.^s, & Özhan, D.^s (2005). The impact of sector characteristics and aircraft count on air traffic control communications. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 491-496). Dayton, OH: Wright State University.
19. Johnson, N. R.^s, & Rantanen, E. M. (2005). Objective pilot performance measurement: A literature review and taxonomy of metrics. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 283-288). Dayton, OH: Wright State University.
18. Morrow, D., Chang, D.^s, Wickens, C., Rantanen, E., & Raquel, L.^s (2005). The influence of external aids on age differences in pilot communication. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 411-415). Dayton, OH: Wright State University.
17. Xu, X.^s, Wickens, C. D., & Rantanen, E. M. (2005). Imperfect conflict alerting systems for the cockpit display of traffic information. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp.657-662). Dayton, OH: Wright State University.
16. Taylor, H. L., Talleur, D. A., Rantanen, E. M., & Emanuel, T. W., Jr. (2005). The effectiveness of a personal computer aviation training device, a flight training device, and an airplane in conducting instrument proficiency checks. *Proceedings of the 13th International Symposium on Aviation Psychology* (pp. 568-572). Dayton, OH: Wright State University.
15. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Jr., & Rantanen, E. M. (2005). Incremental transfer of training effectiveness of a personal computer aviation training device (PCATD) and flight training device (FTD). *Proceedings of the 13th International Symposium on Aviation Psychology*. Dayton, OH: Wright State University.
14. Rantanen, E. M., Wickens, C. D., Xu, X.^s, & Thomas, L. C.^s (2003). Developing and validating human factors certification criteria for cockpit displays of traffic information avionics. *Paper presented at the FAA General Aviation, Aviation Maintenance, and Vertical Flight Human Factors Research Program Review Conference*, University of Nevada Reno, September 10-11, 2003.
13. Rantanen, E. M., & Nunes, A.^s (2003). Taxonomies of measures in air traffic control research. *Proceedings of the 12th International Symposium on Aviation Psychology* (pp. 977-980). April 14-17, 2003, Dayton, OH.
12. Rantanen, E. M., & Davis, W. J. (2003). Human factor implications of air traffic management procedures and algorithms. *Proceedings of the 12th International Symposium on Aviation Psychology* (pp. 971-976). April 14-17, 2003, Dayton, OH.
11. Xu, X.^s, & Rantanen, E. M. (2003). Conflict detection and resolution in air traffic control: A task analysis, literature review, and need for further research. *Proceedings of the 12th International Symposium on Aviation Psychology* (pp. 1289-1295). April 14-17, 2003, Dayton, OH.
10. Emanuel, T. W., Jr., Taylor, H. L., Talleur, D. A., & Rantanen, E. M. (2003). Comparison of the effectiveness of a personal computer aviation training device, a flight training device, and an airplane in conducting instrument proficiency checks. *Proceedings of the 12th International Symposium on Aviation Psychology* (pp. 356-360). April 14-17, 2003, Dayton, OH.

9. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Jr., Rantanen, E. M., Bradshaw, G. L., & Phillips, S. I. (2003). Incremental training effectiveness of personal computers used for instrument training. *Proceedings of the 12th International Symposium on Aviation Psychology* (pp. 1149-1154). April 14-17, 2003, Dayton, OH.
8. Rantanen, E. M., & Talleur, D. A. (2001). Use of flight recorders for pilot performance measurement and training. *Proceedings of the 2001 International Aviation Training Symposium*. Oklahoma City, OK: FAA Academy
7. Rantanen, E. M., Talleur, D. A., Taylor, H. L., Bradshaw, G. L., Emanuel, T. W., Jr., Lendrum, L., & Hulin, C. L. (2001). Derivation of pilot performance measures from flight data recorder information. *Proceedings of the 11th International Symposium on Aviation Psychology*, March 5-8, 2001, Columbus, OH: The Ohio State University.
6. Talleur, D. A., Taylor, H. L., Bradshaw, G. L., Emanuel, T. W., Rantanen, E. M., Lendrum, L., & Hulin, C. L. (2001). Effectiveness of personal computer aviation training device (PCATD) for maintaining instrument currency. *Proceedings of the 11th International Symposium on Aviation Psychology*, March 5-8, 2001, Columbus, OH: The Ohio State University.
5. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Rantanen, E. M., Bradshaw, G. L., Phillips, S. I. (2001). Incremental Training Effectiveness of Personal Computers Used for Instrument Training. *Proceedings of the 11th International Symposium on Aviation Psychology*, March 5-8, 2001, Columbus, OH: The Ohio State University.
4. Rantanen, E. M., & Thomas, H. (1999). Modeling air traffic controller selection test battery tasks. *Proceedings of the Tenth International Symposium on Aviation Psychology* (pp. 587-591). Columbus, OH: The Ohio State University.
3. Rantanen, E. M., & Zak, R. E. (1997). Modeling driver reliability in vehicle-following. *Proceedings of the International Ergonomics Association 13th Triennial Congress* (pp. 412-414). Helsinki, Finland: Finnish Institute of Occupational Health.
2. Rantanen, E. M., & Goldberg, J. H. (1996). Perception of symmetry in polygon displays. *Proceedings of the 1996 American Nuclear Society International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies [NPIC&HMIT'96]* (pp. 459-466). La Grange Park, Illinois: American Nuclear Society.
1. Rantanen, E. M., & Spach, G. L. (1995). Applying quality function deployment to air traffic control curriculum at Embry-Riddle Aeronautical University. *Proceedings of the 40th Annual Air Traffic Control Association Conference* (pp. 105-109). Arlington: Air Traffic Control Association

Chapters in Books:

4. Rantanen, E. M. (Publication scheduled on Sep. 30, 2010). Temporal Awareness and Human Performance. In D. Harris (Ed.), *Reviews of Human Factors and Ergonomics, Volume 6*. Santa Monica, CA: Human Factors and Ergonomics Society.
3. Rantanen, E. M., & Butler, J. S. (1995). Evaluation of air traffic controller performance and situation awareness during simulator training. In D. J. Garland and M. R. Endsley (Eds.), *Experimental Analysis and Measurement of Situation Awareness* (pp. 203-209). Daytona Beach, Florida: Embry-Riddle Aeronautical University Press.
2. Rantanen, E. M. (1994). The role of dynamic memory in air traffic controllers' situation awareness. In R. D. Gilson, D. J. Garland, & J. M. Koonce (Eds.), *Situational Awareness in Complex Systems* (pp. 209-215). Orlando, Florida: University of Central Florida, Center for Applied Human Factors in Aviation.
1. Rantanen, E. M. (1993). Operational concerns of air traffic control automation. In D. J. Garland & J. A. Wise (Eds.), *Human Factors and Advanced Aviation Technologies* (pp. 175-176). Daytona Beach, Florida: Embry-Riddle Aeronautical University, Center for Aviation/Aerospace Research.

Invited Presentations

16. *Applied Experimental and Engineering Psychology*. Presented at the Rochester Institute of Technology Psychology Club Explorer Program meeting on October 25, 2007.
15. *Human Factors in Wide Area Power Systems Display Design*. Presented at the ABB User's Group Spring 2006 Meeting, Hyatt Regency Chicago, Chicago, IL, June 12, 2006.
14. *Reality Check: Designers, Users, and Their (Mental) Models*. Presented at the 92nd Annual Transportation and Highway Engineering Conference, University of Illinois at Urbana-Champaign, Urbana, IL, February 22, 2006.

13. *Human-Automation Interaction and Civil Aviation Security Challenges*. Presented at the International Air Transport Association (IATA) AVSEC World 2005 Conference, Geneva, Switzerland, October 26-28, 2005.
12. *Human Factors in Aviation Systems*. Presented at the Associated Colleges of the Chicago Area (ACCA) seminar series on human-computer interaction, Wheaton College, IL, October 18, 2005.
11. *Measuring Temporal Awareness: Implications for Performance Prediction Within Air Traffic Control*. Presented at American Psychological Association Convention, Washington, DC, August 21, 2005.
10. *A Human Factors Evaluation of Illinois Compass*. Presented at the University of Illinois at Urbana-Champaign Campus Information Technologies and Educational Services (CITES) Educational Technologies Brown Bag, Champaign, IL, April 13, 2005.
9. *Human Interaction with Complex Dynamic Systems: A case of Air Traffic Control*. Presented at the First Midwest Institute of Industrial Engineers (IIE) Exchange meeting, Urbana, IL, April 8, 2005 (sponsored by IIE, SME, and Alpha Pi Mu societies).
8. *An Industry-University Partnership on the Human Factors of DeltaV*. Two presentations at the Emerson Global Users Exchange 2004 Conference, Dallas TX, October 27, 2004.
7. *American Psychological Association Academic Career Workshop: Advice from Experts*. Invited speaker; 48th Annual Meeting of the Human Factors and Ergonomics Society, September 20, 2004, New Orleans, LA.
6. *Time-Based Measures of Taskload, Workload, and Performance in Air Traffic Control*. Presented at the University of Iowa College of Engineering Industrial Engineering program Graduate Seminar, Iowa City, IA, February 5, 2004
5. *American Psychological Association Academic Career Workshop: Advice from Experts*. Invited speaker; 47th Annual Meeting of the Human Factors and Ergonomics Society, October 13, 2003, Denver, CO.
4. *Human Factors Certification of Cockpit Displays of Traffic Information*. Presented at the FAA General Aviation, Aviation Maintenance, and Vertical Flight Human Factors Research Program Review Conference, University of Nevada Reno, September 10-11, 2003.
3. *Human Factors in Systems Design*. Distinguished Lecture Series, Sensis Corporation, Dewitt, NY, August 6, 2003.
2. *Selected Topics in Human Factors Engineering*. Presented at Sensis Corporation, Dewitt, NY, August 6, 2003.
1. *Time-Based Measures in ATC Human Factors Research*. A white paper presented at the Federal Aviation Administration Civil Aerospace Medical Institute in Oklahoma City, OK, on August 1, 2001.

Technical Reports:

17. Rantanen, E. M. (2006). *Development of an Air Traffic Control Measures Database*. (HFD-06-08/FAA-06-01). Savoy, IL: Human Factors Division.
16. Rantanen, E. M., Yeakel, S. J., & Steelman, K. S.^s (2006). *En Route Controller Task Prioritization Research to Support CE-6 Human Performance Modeling; Phase II: Analysis of high-fidelity simulation data* (HFD-06-3/MAAD-06-2). Savoy, IL: Human Factors Division.
15. Xu, X.^s, Rantanen, E. M., Huo, Y.^s (2006). *Relative Importance of Conflict Geometry Variables in Influencing Pilots Conflict Detection Using a Cockpit Display of Traffic Information* (HFD-06-02). Savoy, IL: Human Factors Division.
14. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Jr., & Rantanen, E. M. (2005). *Effectiveness of Flight Training Devices Used for Instrument Training* (AHFD-05-9/FAA-05-4). Savoy, IL: Aviation Human Factors Division.
13. Rantanen, E. M., Levinthal, B. R.^s, & Yeakel, S. J. (2005). *En Route Controller Task Prioritization Research to Support CE-6 Human Performance Modeling* (AHFD-05-03/MAAD-05-3). Savoy, IL: Aviation Human Factors Division.
12. Rantanen, E. M., Johnson, N. R.^s, & Talleur, D. A. (2004). *The Effectiveness of a Personal Computer Aviation Training Device, a Flight Training Device, and an Airplane in Conducting Instrument Proficiency Checks. Volume 2: Objective Pilot Performance Measures* (AHFD-04-16/FAA-04-6). Savoy, IL: Aviation Human Factors Division.
11. Taylor, H. L., Talleur, D. A., Rantanen, E. M., & Emanuel, T. W., Jr. (2004). *The Effectiveness of a Personal Computer Aviation Training Device, a Flight Training Device, and an Airplane in Conducting Instrument Proficiency Checks. Volume 1: Subjective Pilot Performance Evaluation* (AHFD-04-12/FAA-04-5). Savoy, IL: Aviation Human Factors Division

10. Rantanen, E. M. (2004). *Development and Validation of Objective Performance and Workload Measures in Air Traffic Control* (AHFD-04-19/FAA-04-7). Savoy, IL: Aviation Human Factors Division.
9. Xu, X.^s, Rantanen, E. M., & Wickens, C. D. (2004). *Estimation of conflict risk using cockpit display of traffic information* (AHFD-04-11/FAA-04-4). Savoy, IL: Aviation Human Factors Division.
8. Xu, X.^s, Wickens, C. D., & Rantanen, E. M. (2004). *Imperfect conflict alerting systems for the cockpit display of traffic information* (AHFD-04-8/NASA-04-2). Savoy, IL: Aviation Human Factors Division.
7. Rantanen, E. M., Wickens, C. D., Xu, X.^s, & Thomas, L. C.^s (2004). *Developing and validating human factors certification criteria for cockpit displays of traffic information avionics* (AHFD-04-1/FAA-04-1). Savoy, IL: Aviation Human Factors Division.
6. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Jr., Rantanen, E. M., Bradshaw, G. L., & Phillips, S. I. (2002). *Incremental training effectiveness of personal computer aviation training devices (PCATD) used for instrument training*. (ARL-02-5/NASA-02-3). Savoy, IL: University of Illinois, Aviation Research Lab.
5. Taylor, H. L., Talleur, D. A., Emanuel, T. W., Jr., Rantanen, E. M., Bradshaw, G. L., & Phillips, S. I. (2002). *Incremental training effectiveness of personal computers used for instrument training: Basic instruments*. (ARL-02-4/NASA-02-2). Savoy, IL: University of Illinois, Aviation Research Lab.
4. Wiegmann, D. A., & Rantanen, E. M. (2002). *Defining the relationship between human error classes and technology intervention strategies: Year 1 technical report* (ARL-02-1/NASA-02-1). Savoy, IL: University of Illinois, Aviation Research Lab.
3. Rantanen, E. M., McCarley, J., Xu, X.^s, & Yeakel, S. (2001). *The effect of audio throughput delay of the NEXCOM system on air traffic controller performance and workload* (ARL-01-19/FAA-01-5). Savoy, IL: University of Illinois, Aviation Research Lab.
2. Taylor, H. L., Talleur, D. A., Bradshaw, G. L., Emanuel, T. W., Jr., Rantanen, E. M., Hulin, C. L., & Lendrum, L. (2001). *Effectiveness of personal computers to meet recency of experience requirements* (ARL-01-6/FAA-01-1). Savoy, IL: University of Illinois, Aviation Research Lab.
1. Taylor, H. L., Talleur, D. A., Bradshaw, G. L., Emanuel, T. W., Jr., Hulin, C. L., Rantanen, E. M., & Lendrum, L. (2000). *Evaluation of a personal computer aviation training device to meet recency of experience requirements* (ARL-00-9/FAA-00-6). Savoy, IL: University of Illinois, Aviation Research Lab.

Other Publications:

7. Rantanen, E. M. (In press). Book review: Human Performance Modeling in Aviation, by D. C. Foyle and B. L. Hoey (Eds.). *Ergonomics in Design*.
6. Yurcik, W., Thompson, R.^s, Twidale, M. B., & Rantanen, E. M. (2007). If you can't beat'em join'em: Combining text and visual interfaces for security system administration. *ACM Interactions*, 14(1), January/February 2007, 12-14.
5. Rantanen, E. M. (2004). Book Review: Control Theory for Humans: Quantitative Approaches to Modeling Performance, by R. J. Jagacinski and J. M. Flach. *Theoretical Issues in Ergonomics Science*, 5(2), 179.
4. Rantanen, E. M. (1998). Book review: Cognitive reliability and error analysis method: CREAM, by Erik Hollnagel. *International Journal of Cognitive Ergonomics*, 2(4), 383-384.
3. Rantanen, E. M. (1998). Book review: The future of air traffic control: Human operators and automation, edited by Christopher. D. Wickens, Anne. S. Mavor, Raja Parasuraman, and James. P. McGee. *International Journal of Cognitive Ergonomics*, 2(3), 297-298.
2. Rantanen, E. M., & Tomaskovic, L. A. (1995, May). University programmes offer alternative approach to meeting future ATC training and research needs. *ICAO Journal*, 50(4), 10-13.
1. Tomaskovic, L. A., Rantanen, E. M., Petschauer, K. P., & Laflin, D. A.^s (Eds.), (1993). *Eagle TRACON: Standard operating procedures*. Daytona Beach, Florida: Embry-Riddle Aeronautical University.

Posters, Demonstrations, and Presentations

10. Brougher, S. J.^s, & Rantanen, E. M. (2008). Types of creativity in design. *Poster presentation and demonstration in the inaugural Imagine RIT Innovation and Creativity Festival*, Rochester, NY, May 3, 2008.

9. Myers, J., Liu, Y., Minsker, B., Futrelle, J., Downey, S., Kim, I., & Rantanen, E. (2007). Evolving the NCSA CyberCollaboratory for distributed environmental observatory networks. *Poster presentation at the AGU 2007 Fall Meeting*, Dec. 10-14, 2007, San Francisco, CA.
8. Liu, Y., Myers, J., Minsker, B., Futrelle, J., Downey, S., Kim, I. & Rantanen, E. (2007). Building next-generation CyberCollaboratory for environmental observatories. *Poster presentation at the Microsoft eScience 2007 Workshop*, October 21-23 2007, Chapel Hill, NC.
7. Taylor, H. L., Emanuel, T. W., Talleur, D. A., & Rantanen, E. M. (2003). The Effectiveness of Personal Computer Aviation Training Device (PCATD), a Flight Training Device (FTD), and an Airplane in Conducting Instrument Proficiency Checks. *Paper presented at the FAA General Aviation, Aviation Maintenance, and Vertical Flight Human Factors Research Program Review Conference*, University of Nevada Reno, September 10-11, 2003.
6. Taylor, H. L., Talleur, D. A., Emanuel, T. W., & Rantanen, E. M. (2003). Transfer of Training Effectiveness of a Flight Training Device (FTD). *Paper presented at the FAA General Aviation, Aviation Maintenance, and Vertical Flight Human Factors Research Program Review Conference*, University of Nevada Reno, September 10-11, 2003.
5. Taylor, H. L., Talleur, D. A., Emanuel, T. W., & Rantanen, E. M. (2003). Effectiveness of Personal Computer Aviation Training Devices (PCATDs) for Instrument Training, Recency of Experience, and Instrument Proficiency Checks. *Paper presented in the American Psychological Association Division 21 Annual Midyear Symposium*, Fort Belvoir, VA, March 6-7, 2003
4. Wroblewski, L.^s, & Rantanen, E. M. (2001). Web-based information management: An open portal interface solution. *Demonstration at the 9th International Conference on Human-Computer Interaction*, New Orleans, LA, August 5-10, 2001.
3. Goldberg, J. H., Kotval, X. P., & Rantanen, E. M. (1996). A hypertext database for the design of visual inspection operations. *Demonstration at the Human Factors and Ergonomics Society 40th Annual Meeting*. Santa Monica, California: The Human Factors and Ergonomics Society.
2. Rantanen, E. M. (1995). Using medium-fidelity simulation for experimenting on air traffic controllers' picture. *Paper presented at the 6th IFAC/IFIP/IFORS/IEA Symposium on Man-Machine Systems*. Cambridge, Massachusetts: Massachusetts Institute of Technology.
1. Rantanen, E. M. (1994). The effect of active and passive control on air traffic controller dynamic memory. *A poster presentation at The Human Factors and Ergonomics Society's First Annual Space Coast Conference*. Cocoa Beach, Florida, February 11, 1994.

Workshops

4. Rantanen, E. M. (2007). *Human factors applied to the utility control center*. Presented at Power System Visualization Workshop, at Missionary Ridge Complex, Tennessee Valley Authority 1101 Market Street, Chattanooga, TN, on March 28, 2007.
3. Yurcik W., Thompson, R.^s, & Rantanen, E. M. (2007). Those Who Shield Others Are Users Too! Experience from User Studies of Security SysAdmins. *ACM CHI Workshop on Security User Studies: Methodologies and Best Practices (HCISEC)*. San Jose, CA, April 28.
2. *Special 'Brown Bag' lunch mentoring sessions to provide students and early-career and transitional professionals opportunities to develop mentoring relationships with established professionals in the HF/E field. Three sessions during the 49th HFES meeting, Sep. 27-29, 2005, Orlando, FL.*
1. *Workshop on Air Traffic Control Human Factors Research Methods*. Presented at the 12th International Symposium on Aviation Psychology, April 14, 2003, Dayton, OH.