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**Robert E. Karlsen
Douglas W. Gage
Charles M. Shoemaker
Grant R. Gerhart**
Editors

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Contents

vii	Conference Committee
xi	Introduction

PERCEPTION AND NAVIGATION I

8741 03	Dynamic, cooperative multi-robot patrolling with a team of UAVs [8741-3] C. E. Pippin, H. Christensen, L. Weiss, Georgia Institute of Technology (United States)
8741 04	Vegetation versus man-made object detection from imagery for unmanned vehicles in off-road environments [8741-4] J. Harguess, J. Larson, Space and Naval Warfare Systems Ctr. Pacific (United States)
8741 05	Landing spot selection for UAV emergency landing [8741-5] P. T. Eendebak, A. W. M. van Eekeren, R. J. M. den Hollander, TNO (Netherlands)
8741 06	Feature detection and SLAM on embedded processors for micro-robot navigation [8741-45] P. Robinette, T. R. Collins, Georgia Institute of Technology (United States)

PERCEPTION AND NAVIGATION II

8741 07	Robot mapping in large-scale mixed indoor and outdoor environments [8741-7] J. G. Rogers III, S. Young, J. M. Gregory, U.S. Army Research Lab. (United States); C. Nieto-Granda, H. I. Christensen, Georgia Institute of Technology (United States)
8741 08	Cooperative mobile agents search using beehive partitioned structure and Tabu Random search algorithm [8741-8] S. Ramazani, D. L. Jackson, R. R. Selmic, Louisiana Tech Univ. (United States)
8741 09	Cognitive patterns: giving autonomy some context [8741-9] D. A. Dumond, W. Stacy, A. Geyer, J. Rousseau, M. Therrien, Aptima, Inc. (United States)
8741 0A	Real-time adaptive off-road vehicle navigation and terrain classification [8741-11] U. A. Muller, Net-Scale Technologies, Inc. (United States); L. D. Jackel, North-C Technologies, Inc. (United States); Y. LeCun, New York Univ. (United States); B. Flepp, Net- Scale Technologies, Inc. (United States)
8741 0B	Multi-robot exploration strategies for tactical tasks in urban environments [8741-12] C. Nieto-Granda, Georgia Institute of Technology (United States); J. G. Rogers III, U.S. Army Research Lab. (United States); H. I. Christensen, Georgia Institute of Technology (United States)

- 8741 0C **Semantic data association for planar features in outdoor 6D-SLAM using lidar** [8741-13]
C. Ulas, TÜBİTAK (Turkey); H. Temeltas, Istanbul Technical Univ. (Turkey)

HUMAN-ROBOT INTERACTION AND COMMUNICATION

- 8741 0D **Robust leader tracking from an unmanned ground vehicle** [8741-14]
C. S. Monnier, S. German, A. Ostapchenko, Charles River Analytics, Inc. (United States)
- 8741 0E **Multimodal interaction for human-robot teams** [8741-15]
D. Burke, N. Schurr, J. Ayers, J. Rousseau, J. Fertitta, A. Carlin, D. Dumond, Aptima, Inc. (United States)
- 8741 0F **An intuitive graphical user interface for small UAS** [8741-16]
N. Stroumtsos, G. Gilbreath, S. Przybylski, Space and Naval Warfare Systems Ctr. Pacific (United States)
- 8741 0G **Evaluating the presentation and usability of 2D and 3D maps generated by unmanned ground vehicles** [8741-17]
J. Gregory, D. Baran, A. W. Evans III, U.S. Army Research Lab. (United States)
- 8741 0H **Evolution of a radio communication relay system** [8741-18]
H. G. Nguyen, N. Pezeshkian, A. Hart, A. Burmeister, K. Holz, J. Neff, L. Roth, Space and Naval Warfare Systems Ctr. Pacific (United States)
- 8741 0I **Multilateral haptics-based immersive teleoperation for improvised explosive device disposal** [8741-52]
D. Erickson, Defence Research and Development Canada, Suffield (Canada);
H. Lacheray, J. Daly, Quanser Consulting Inc. (Canada)

SESSION 6 INTELLIGENT BEHAVIORS

- 8741 0J **Position-adaptive MAV in emitter localization mission using RSSI and path loss exponent metrics** [8741-20]
M. Gates, R. Selmic, Louisiana Tech Univ. (United States)
- 8741 0K **Learning consensus in adversarial environments** [8741-21]
K. G. Vamvoudakis, L. R. García Carrillo, J. P. Hespanha, Univ. of California, Santa Barbara (United States)
- 8741 0L **Stable structures of coalitions in competitive and altruistic military teams** [8741-22]
M. Aurangzeb, The Univ. of Texas at Arlington (United States); D. Mikulski, G. Hudas, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (United States);
F. L. Lewis, The Univ. of Texas at Arlington (United States); E. Gu, Oakland Univ. (United States)
- 8741 0M **Adaptive neural network consensus based control of robot formations** [8741-23]
H. M. Guzey, J. S., Missouri Univ. of Science and Technology (United States)

- 8741 ON **Maintaining robust connectivity in heterogeneous robotic networks** [8741-24]
P. Cruz, R. Fierro, The Univ. of New Mexico (United States); W. Lu, S. Ferrari, Duke Univ. (United States)

ROBOTICS CTA I

- 8741 OO **Common world model for unmanned systems** [8741-25]
R. M. S. Dean, General Dynamics Robotic Systems (United States)
- 8741 OP **Using expectations to monitor robotic progress and recover from problems** [8741-26]
U. Kurup, C. Lebiere, A. Stentz, M. Hebert, Carnegie Mellon Univ. (United States)
- 8741 OQ **Terrain identification for RHex-type robots** [8741-27]
C. Ordonez, J. Shill, Florida State Univ. (United States); A. Johnson, Univ. of Pennsylvania (United States); J. Clark, E. Collins, Florida State Univ. (United States)
- 8741 OR **An architecture for online semantic labeling on UGVs** [8741-28]
A. Suppé, L. Navarro-Serment, D. Munoz, D. Bagnell, M. Hebert, Carnegie Mellon Univ. (United States)

ROBOTICS CTA II

- 8741 OT **Performance of a scanning laser line striper in outdoor lighting** [8741-30]
C. Mertz, Carnegie Mellon Univ. (United States)
- 8741 OU **Visual and tactile interfaces for bi-directional human robot communication** [8741-31]
D. Barber, S. Lackey, L. Reinerman-Jones, Univ. of Central Florida (United States); I. Hudson, U.S. Army Research Lab. (United States)
- 8741 OV **Dynamic whole-body robotic manipulation** [8741-32]
Y. Abe, B. Stephens, M. P. Murphy, A. A. Rizzi, Boston Dynamics (United States)
- 8741 OW **Free-standing leaping experiments with a power-autonomous elastic-spined quadruped** [8741-33]
J. L. Pusey, U.S. Army Research Lab. (United States); J. M. Duperret, Univ. of Pennsylvania (United States); G. C. Haynes, Carnegie Mellon Univ. (United States); R. Knopf, D. E. Koditschek, Univ. of Pennsylvania (United States)

SPECIAL TOPICS I

- 8741 OX **Collaborative experiments of small autonomous systems at the SOURCE ATO capstone experiment** [8741-34]
J. Gregory, D. Baran, J. Rogers III, J. Fink, J. Delmerico, U.S. Army Research Lab. (United States)

- 8741 0Y **Achieving integrated convoys: cargo unmanned ground vehicle development and experimentation** [8741-35]
N. Zych, Oshkosh Corp. (United States); D. Silver, D. Stager, C. Green, T. Pilarski, Carnegie Mellon Univ. (United States); J. Fischer, Oshkosh Corp. (United States)
- 8741 0Z **UGV: security analysis of subsystem control network** [8741-42]
S. Abbott-McCune, P. Kobezak, J. Tront, R. Marchany, A. Wicks, Virginia Polytechnic Institute and State Univ. (United States)
- 8741 10 **A preliminary cyber-physical security assessment of the Robot Operating System (ROS)** [8741-41]
J. McClean, Harvard Univ. (United States); C. Stull, C. Farrar, D. Mascareñas, Los Alamos National Lab. (United States)
- 8741 11 **Development of a non-contextual model for determining the autonomy level of intelligent unmanned systems** [8741-38]
P. J. Durst, W. Gray, U.S. Army Engineer Research and Development Ctr. (United States); M. Trentini, Defence Research and Development Canada, Suffield (Canada)
- 8741 12 **Simple but novel test method for quantitatively comparing robot mapping algorithms using SLAM and dead reckoning** [8741-39]
N. S. Davey, Montgomery Blair High School (United States); H. Godil, Univ. of Maryland, College Park (United States)

POSTER SESSION

- 8741 18 **An open-source scheduler for small satellites** [8741-44]
D. Torgerson, J. Straub, A. Mohammad, C. Korvald, D. Limesand, Univ. of North Dakota (United States)
- 8741 19 **Human and tree classification based on a model using 3D ladar in a GPS-denied environment** [8741-46]
K. Cho, Univ. of Science & Technology (Korea, Republic of); S.-H. Baeg, S. Park, Korea Institute of Industrial Technology (Korea, Republic of)
- 8741 1A **Universal framework for unmanned system penetration testing** [8741-47]
P. Kobezak, S. Abbott-McCune, J. Tront, R. Marchany, A. Wicks, Virginia Polytechnic Institute and State Univ. (United States)

Author Index

Conference Committee

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Brian M. Yamauchi, iRobot Corporation (United States)

Session Chairs

- 1 Open Architecture (OA)/Open Business Model (OBM) Systems:
Joint Session with Conferences 8741 and 8754
Raja Suresh, General Dynamics Advanced Information Systems
(United States)
Douglas W. Gage, XPM Technologies (United States)
- 2 Perception and Navigation I
Douglas W. Gage, XPM Technologies (United States)
- 3 Perception and Navigation II
Camille S. Monnier, Charles River Analytics, Inc. (United States)
- 4 MAST: Software: Joint Session with Conferences 8725 and 8741
Paul D. Samuel, Daedalus Flight Systems, LLC (United States)
- 5 Human-Robot Interaction and Communication
Hoa G. Nguyen, Space and Naval Warfare Systems Center Pacific
(United States)
Camille Monnier, Charles River Analytics, Inc. (United States)
- 6 Intelligent Behaviors
Kyriakos G. Vamvoudakis, University of California, Santa Barbara
(United States)
Frank L. Lewis, The University of Texas at Arlington (United States)
- 7 Robotics CTA I
Robert R. Mitchell, General Dynamics Robotic Systems (United States)
Jonathan A. Bornstein, U.S. Army Research Laboratory (United States)
- 8 Robotics CTA II
Robert R. Mitchell, General Dynamics Robotic Systems (United States)
Jonathan A. Bornstein, U.S. Army Research Laboratory (United States)
- 9 Special Topics I
Douglas W. Gage, XPM Technologies (United States)
- 10 Special Topics II
Douglas W. Gage, XPM Technologies (United States)

Panel Discussion on Open Architecture (OA)/Open Business Model (OBM) Systems: Joint Panel with Conferences 8741 and 8754

Raja Suresh, *Moderator*, General Dynamics Advanced Information Systems (United States)

Bobby Junker, Office of Naval Research (United States)

Carlo Zaffanella, General Dynamics Advanced Information Systems (United States)

Howard Reichel, In-Depth Engineering Corporation (United States)

Nick Guertin, U.S. Navy (United States)

Introduction

The Unmanned Systems Technology XV Conference consisted of 10 sessions that spanned three days and were devoted to many areas of robotics. Although the vast majority of fielded unmanned systems are teleoperated, interest in autonomy has been especially high in recent years, perhaps because of recent advances that bring autonomous platforms from the laboratory to commercial viability. This year's conference submissions show that progress is being made along the entire autonomy spectrum, from improvements in teleoperation to teams of autonomous robots. And different levels of autonomous capability allow (or require) different methods for human/robot and robot/robot interactions. Progress is also being made in terms of alternative platform development, including robotic insects, birds, dogs, and mules. It is certainly an interesting time to be involved with unmanned systems!

The opening session on Wednesday was Open Architecture (OA)/Open Business Model (OBM) Systems, which was a joint session with Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2013, Conference 8754. Since robotics is a relatively new industry, it currently struggles with issues of interoperability and lacks widespread open standards. This session consisted of three keynotes and a panel discussion on this issue. The Perception and Navigation I session included papers on navigation and landing of unmanned air vehicles (UAVs), object detection, and navigation and localization for micro-scale platforms. The Perception and Navigation II session continued with papers on robot mapping experiments in large indoor and outdoor environments, UAV search patterns, navigation through knowledge reasoning and machine learning, and simultaneous localization and mapping (SLAM) with planar features. Perception and intelligence continue to be some of the thornier problems facing autonomous vehicles, especially in the ground domain.

The Thursday morning session was a joint session with Conference 8725, Micro- and Nanotechnology Sensors, Systems, and Applications V, and consisted of work performed under the Army Research Laboratory's (ARL) Micro-Autonomous Systems and Technology (MAST) Collaborative Technology Alliance (CTA). The papers described locomotion, sensing, and processing for bio-inspired micro-sized flapping wing air vehicles and legged ground vehicles. These smaller-sized platforms require paradigm shifts since many unmanned technologies do not scale well with size. The afternoon's Human-Robot Interaction (HRI) and Communication Session described work in vision-based dismounted leader/follower, multi-modal communication, map presentation experiments, communication relays, and control of a multi-armed ground vehicle. HRI is a key area for tightly integrating robots into a squad or for managing a distant team of unmanned vehicles, and will require methods beyond the current laptop and joystick controlling every action. The interplay between HRI and autonomous

functionality will be increasingly important in the coming years, as the commercial automobile industry has learned. To take full advantage of a team of autonomous assets, they also need to interact effectively amongst themselves. With that in mind, the final session of the day, Intelligent Behaviors, consisted of papers discussing research involving teams of autonomous robots, including communication-aware navigation and control, consensus learning, formation control, and coalition building.

Friday began with two sessions from ARL's Robotics CTA, which is performing research to enable squad-level robot team members. The papers described current research on building common world models, cognitive architectures, semantic labeling of imagery, outdoor laser-based structured light sensor, terrain understanding for legged robots, gesture recognition and tactile displays, whole-body manipulation, and quadruped jumping. The conference concluded with the Special Topics Session, which included papers on a variety of areas, such as experiments in autonomy with small robot navigation and large vehicles in convoys, testing of mapping algorithms, alternative levels of autonomy level, and cyber security for unmanned systems.

This year's conference covered a wide swath of unmanned systems technologies and demonstrates why robotics is such an exciting area. We want to especially thank those that stepped forward and assisted in making this a successful conference in spite of the issues with government funding and conference attendance regulations. We hope you enjoy these proceedings and are able to attend the conference next year.

Robert E. Karlsen
Douglas W. Gage
Charles M. Shoemaker
Grant R. Gerhart