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Unmanned Systems Technology XVIII

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Editors

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Contents

- vii *Authors*
- ix *Conference Committee*
- xi *Introduction*

NAVIGATION FOR UNMANNED VEHICLES: JOINT SESSION WITH CONFERENCES 9849 AND 9837

- 9837 02 **Non-GPS full position and angular orientation onboard sensors for moving and stationary platforms** [9837-1]
- 9837 03 **Optimal vehicle planning and the search tour problem** [9837-2]
- 9837 04 **Incremental learning in trust-based vehicle control** [9837-3]
- 9837 05 **Mobility versus terrain: a game theoretic approach** [9837-4]
- 9837 06 **Ant-based distributed protocol for coordination of a swarm of robots in demining mission** [9837-5]

SPECIAL TOPICS

- 9837 07 **A new application for analyzing driving behaviour and environment characterization in transportation systems based on a fuzzy logic approach** [9837-6]
- 9837 08 **Probabilistic monitoring in intrusion detection module for energy efficiency in mobile ad hoc networks** [9837-7]
- 9837 09 **Human guidance of mobile robots in complex 3D environments using smart glasses** [9837-8]
- 9837 0A **Planning energy-efficient bipedal locomotion on patterned terrain** [9837-10]
- 9837 0B **High power free space optical link for rapid energy and data transmission** [9837-11]

PERCEPTION

- 9837 0D **LWIR passive perception system for stealthy unmanned ground vehicle night operations** [9837-13]
- 9837 0E **Obstacles and foliage discrimination using lidar** [9837-14]

9837 OF **Landmark-based robust navigation for tactical UGV control in GPS-denied communication-degraded environments** [9837-15]

ROBOTICS CTA I

9837 OH **Towards bipedal behavior on a quadrupedal platform using optimal control** [9837-17]

9837 OI **Gait development on Minitaur, a direct drive quadrupedal robot** [9837-18]

9837 OJ **Simulation tools for robotics research and assessment** [9837-19]

9837 OK **Interactive multi-objective path planning through a palette-based user interface** [9837-20]

9837 OL **Clustering social cues to determine social signals: developing learning algorithms using the "n-most likely states" approach** [9837-21]

ROBOTICS CTA II

9837 OM **A multimodal interface for real-time soldier-robot teaming** [9837-22]

9837 ON **Technological evaluation of gesture and speech interfaces for enabling dismounted soldier-robot dialogue** [9837-23]

9837 OO **Learning object models from few examples** [9837-24]

9837 OP **Incorporating polarization in stereo vision-based 3D perception of non-Lambertian scenes** [9837-25]

9837 OQ **Improving semantic scene understanding using prior information** [9837-26]

9837 OR **Video-based convolutional neural networks for activity recognition from robot-centric videos** [9837-27]

POSTER SESSION

9837 OS **An energy-efficient architecture for internet of things systems** [9837-28]

9837 OT **A fast and scalable content transfer protocol (FSCTP) for VANET based architecture** [9837-30]

9837 OU **Implementation of a large solar collector for electric charge generation** [9837-31]

9837 OV **Comparison of gradient methods for gain tuning of a PD controller applied on a quadrotor system** [9837-32]

- 9837 OW **LiPo battery energy studies for improved flight performance of unmanned aerial systems**
[9837-33]
- 9837 OX **Implementing a dynamometer system on electric motors for unmanned systems** [9837-34]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Abich, Julian, IV, 0N
Ahuja, Gaurav, 0D
Al-Shabi, Mohammad, 0X
Balloch, Jonathan C., 0F
Barber, Daniel J., 09, 0M, 0N
Barletta, Domenico, 0S
Bays, Matthew J., 03
Bednarz, Dave, 05
Berger, Kai, 0P
Best, Andrew, 0L
Bhounsule, Pranav A., 0A
Blackman, Daniel J., 0I
Brewer, Ralph, 0J
Bundy, M., 0W
Chang, K., 0W
Clark, Jonathan E., 0I
Collins, Emmanuel, 09
De, Avik, 0H
De Rango, Floriano, 06, 07, 08, 0S
Dhadwal, Harbans S., 02, 0B
DiBerardino, Charles A., 0J
Edge, Harris L., 0J
Endo, Yoichiro, 0F
Fazio, Peppino, 07
Feng, Dake, 02, 0B
Fields, MaryAnne, 0J
Fiore, Stephen M., 0L
Gadsden, S. Andrew, 0V, 0W, 0X
Goodrich, Michael A., 0K
Grushin, Alexander, 0F
Gupta, Nikhil, 09
Handelman, David, 0F
Hanlon, David, 0X
Harris, Jonathan, 0N
Hebert, Martial, 0O, 0Q
Hirsch, Michael P., 0U
Hoehne, Joseph, 0K
Howard, Thomas M., 0M
Huertas, Andres, 0D
Imbrogno, Alessandro, 0S
Kapalo, Katelynn A., 0L
Karlsen, Robert E., 04
Kattoju, Ravi Kiran, 0N
Kim, Jinho, 0V
Koditschek, Daniel E., 0H
Kopinsky, Ryan, 09
Kwok, Philip, 02, 0B
Laddha, Ankit, 0Q
Leake, Skye, 0U
Lee, Andrew, 0X
Lee, Daren, 0D
Lee, Mun Wai, 0F
Lupia, Andrea, 08
Matthies, Larry, 0D, 0P, 0R
McGuire, Thomas, 0U
Mikulski, Dariusz G., 04
Miller, Bruce D., 0I
Misra, Ishan, 0O
Morris, Daniel D., 0E
Muench, Paul, 05
Nash, Jeremy, 0D
Nicholson, John V., 0I
Ordonez, Camilo, 09, 0I
Palmieri, Nunzia, 06
Parsons, Michael, 0U
Patel, Dilip G., 0J
Pereira, Carlos M., 02
Pusey, Jason L., 0J
Raimondo, P., 0T
Ramos, P., 0W
Rankin, Arturo, 0D
Rastegar, Jahangir, 02, 0B
Ryoo, M. S., 0R
Santamaria, Amilcare Francesco, 07, 0T
Scala, F., 0T
Serrianni, Abdon, 07
Shaikh, Meher T., 0K
Sharma, Aneesh, 09
Sottile, C., 0T
Straub, Jeremy, 0U
Taha, Ahmad, 0A
Topping, T. Turner, 0H
Tropea, Mauro, 07, 0T
Vasilopoulos, Vasileios, 0H
Voorhies, Randolph, 0P
Walter, Matthew R., 0M
Wang, Yuxiong, 0O
Warta, Samantha F., 0L
Weller, Ed, 0J
Wettergren, Thomas A., 03
Wilkerson, Stephen A., 0V, 0W, 0X
Yi, Daqing, 0K
Zamani, Ali, 0A

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- 1 Self-Organizing, Collaborative Unmanned Robotics Teams: Joint
Session with conferences 9837 and 9849

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Robert E. Karlsen, U.S. Army Tank Automotive Research,
Development and Engineering Center (United States)

- 2 Navigation for Unmanned Vehicles: Joint Session with conferences 9849 and 9837
Robert E. Karlsen, U.S. Army Tank Automotive Research, Development and Engineering Center (United States)
Raja Suresh, General Dynamics Mission Systems (United States)
- 3 Special Topics
Douglas W. Gage, XPM Technologies (United States)
Charles M. Shoemaker, U.S. Army Communications-Electronics Research Development and Engineering Command (United States)
- 4 Perception
Hoa G. Nguyen, Space and Naval Warfare Systems Center Pacific (United States)
Camille S. Monnier, Charles River Analytics, Inc. (United States)
- 5 Robotics CTA I
Dilip G. Patel, General Dynamics Land Systems (United States)
Jonathan A. Bornstein, U.S. Army Research Laboratory (United States)
- 6 Robotics CTA II
Dilip G. Patel, General Dynamics Land Systems (United States)
Jonathan A. Bornstein, U.S. Army Research Laboratory (United States)

Introduction

The Unmanned Systems Technology XVIII conference consisted of six official sessions (and two unofficial joint sessions) that spanned a full two days and covered a variety of areas within robotics. The conference list of papers shows a wide breadth of applications for unmanned systems, primarily in the defense arena, which are predicted to increase in future years. This year's conference also shows that, while there is still interest in the standard unmanned technologies, there is also great interest in other forms of robotics, such as micro air vehicles, which have become very ubiquitous in terms of commercial availability and capability.

This year the conference kicked off with a pair of (unofficial) joint sessions with Conference 9836, Micro- and Nanotechnology Sensors, Systems, and Applications VIII, consisting of work performed under the Army Research Laboratory's (ARL) Micro-Autonomous Systems and Technology (MAST) Collaborative Technology Alliance (CTA). The first session focused on vision-based techniques for navigation of micro air vehicles, including the sensing to support perching and grasping behaviors and attempts to achieve high speed operation. The second session looked at the important issue of combining human feedback with the control algorithms of autonomous vehicles, including research involving trust in autonomy and the use of eye-tracking and EEG data.

Wednesday afternoon began with a pair of joint sessions with Conference 9849, Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2016. The first session was on Self-organizing Collaborative Unmanned ISR Teams, where we heard about efforts in creating open architectures for air and underwater vehicles. The second session was Navigation for Unmanned Vehicles and included papers about measuring the angular orientation of a projectile using a polarized RF source, optimal search patterns for underwater vehicles, trust-based control of convoy vehicles, a game theory approach to mobility, and ant-based coordination.

The poster session took place on Wednesday night and had an energy theme, with papers on energy efficient architectures, solar collector for energy harvesting, and battery energy management, as well papers on a fast data transfer protocol, and PD controllers and electric motors for quadrotors. The session was well attended, and there were many pockets of discussion around the posters.

Thursday morning commenced with the special topics session that resulted in the usual potpourri of papers, including an on-board system for recognizing poor driving behavior, energy consumption minimization for network intrusion

detection, human-robot interaction with smart glasses, energy-efficient bipedal locomotion, and a high-power optical link for energy transfer.

The Thursday late morning session was on perception and involved a mix of techniques, including stereo range sensing using LWIR, foliage discrimination using LIDAR, and landmark detection for bio-inspired GPS-denied navigation.

The conference concluded with the afternoon sessions on Thursday, which were devoted to ARL's Robotics CTA, where papers were presented on a variety of subjects, including bipedal walking and gait control for a quadruped, a discussion of simulation environments for robotics, an intuitive interface for path planning, and on detecting social cues in regards to human robot interactions. Additional areas included gesture and speech recognition, vision-based learning for semantic labeling, polarization detection to help with specular reflections in stereo imaging, and deep learning for activity recognition.

This year's conference once again covered a variety of unmanned systems technologies and demonstrated why robotics is such an interesting and exciting area to work in. We want to thank all those that helped make the conference a success this year, and we hope that you enjoy these proceedings and are able to attend and participate in the conference next year in Pasadena, California.

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