

CALL FOR PAPERS
IEEE Journal on Selected Areas in Communications
“Communications Challenges and Dynamics for Unmanned Autonomous Vehicles”

Scope of Proposal

Over recent years there has been increasing interest and engineering activity from academia, industry and governments in the design and deployment of Autonomous Unmanned (anywhere) Vehicles that are designed to operate underwater, airborne or across land/ice surfaces. Such AUxV platforms vary in architecture, capability, application and power and will have a variety of on-board sensors or attachments to support their role. The application scenarios may include search and rescue, threat surveillance, chemical/bio hazard sampling, underwater mine detection, bridging communications for ground command and control, natural disaster monitoring, emergency response target and report, border imaging or flood monitoring. Regardless of the role, all AUxVs share a set of common challenges including their communications strategy between each other and with command and control stations; hardware/software component resource management; communications signal outages and communications protocol failure; component power constraints, channel interference and ensuring safe operation in flight/swarm mode. Future deployments of AUxVs will see an increase in the level of autonomous functionality and behaviour as the human operators transition from being “in the loop” to “on the loop”, and this necessitates increased levels of robustness and real-time self management. In such situations, the complexity of coping with communications dynamics and failure when operating autonomously is further compounded when deployed in swarm configurations. As such, rapid fluctuations in the network topology may occur as a result of agents moving apart or when wireless transmissions are blocked by terrain features or atmospheric conditions. The planning and control of these AUxVs depends on good situational awareness and the communication network is used to enable coordinated estimation, path planning, and observation models. This Special Issue proposal is designed to stimulate further research that addresses the coupled problem of controlling a network of autonomous AUxVs, rather than the traditional paradigm of controlling autonomous components over a network. The goal of this special issue is to report on state-of-the-art multi-disciplinary research and achievements which address key dynamics for AUxVs communications and networks that are different from ground-based MANETS and WSNs. For example, whilst much MANET research has addressed issues of connectivity between nodes whose movement is independent of that connectivity, there is the possibility with AUxVs to cause nodes to move specifically to create bridges, repair routes, and maintain state. We are seeking papers that describe high-quality, original, and previously unpublished novel contributions.

Possible topics include, but are not limited to:

Radio signal propagation models for AUxV collision avoidance
Optical data communications architectures for high altitude endurance AUxVs
Ad-hoc routing protocols for dynamic AUxVs
AUxV swarm inter-networking and collaboration protocols
AUxV command and control protocols
AUxV self-protection and safety management protocols
AUxV self-configuration, self healing, self-optimization
Network management for cooperative AUxV communications
Trial systems and AUxV Testbeds

Review and Publication Schedule

Prospective authors should prepare their submissions in accordance with the rules specified in the 'Information for Authors' section of the JSAC guidelines (<http://www.jsac.ucsd.edu/Guidelines/info.html>). Prior to submitting their papers for review, authors should make sure that they understand and agree to adhere to the over-length page charge policy presented in the JSAC guidelines. Authors MUST submit their manuscripts through the EDAS peer review website <http://edas.info> and must be in PDF format. The key dates for authors are as follows:-

Initial paper submission: 7/1/2011
First reviews complete: 11/1/2011
Second reviews complete/acceptance letters sent: 12/16/2011
Final to publisher: 2/1/2012
Publication: Second quarter 2012

Senior Guest Editors:

Professor Gerard Parr
School of Computing and Information Engineering
University of Ulster
Coleraine, Northern Ireland
gp.parr@ulster.ac.uk

Professor Steve Hailes
Department of Computer Science
University College London, UK
s.hailes@cs.ucl.ac.uk

Professor Jonathan How
Department of Aeronautics and Astronautics
Aerospace Controls Laboratory
Massachusetts Institute of Technology, USA
jhow@mit.edu

Professor Joe McGeehan
Director
Centre for Communications Research
University of Bristol, England
j.p.mcgeehan@bristol.ac.uk

Professor Y Jay Guo
Theme Leader, Broadband for Australia
Director, Wireless Technologies Laboratory
CSIRO ICT Centre
Australia
Jay.Guo@csiro.au