Expeditionary Maneuver Warfare & Combating Terrorism S&T Department

Code 30

DEVELOPING FUTURE NAVAL COMBAT CAPABILITIES

USMC   USN

SMALL UNIT EXCELLENCE
LETHALITY, SUSTAINMENT, HUMAN PERFORMANCE, AND COMBAT LOAD REDUCTION TECHNOLOGIES FOR NAVAL WARRIORS

MARITIME IRREGULAR WARFARE
NAVAL EXPEDITIONARY COMBAT TECHNOLOGIES FOR COMBATING TERRORISM AND DEFENDING THE HOMELAND

COMBAT TACTICAL VEHICLES
ADVANCED MOBILITY AND ARMOR TECHNOLOGIES FOR ENHANCED MANEUVER AND SURVIVABILITY

DISTRIBUTED OPERATIONS
INTELLIGENCE, SURVEILLANCE, AND C2 TECHNOLOGIES FOR LITTORAL DOMAIN AWARENESS

ONR
OFFICE OF NAVAL RESEARCH

Ground Robotics Capability Conference and Exhibit

ONR Code 30 Autonomy Science and Technology Efforts

Mr. Michael Bruch

Code 30 Autonomy Lead

Office of Naval Research

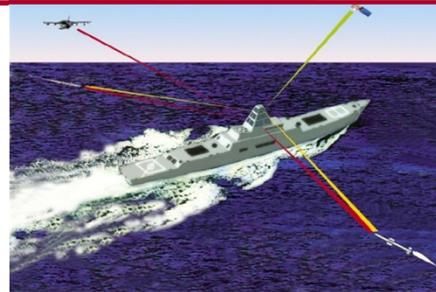**23 March 2011**

AVAL RESEARCH

ONR S&T Departments

Code 30

Expeditionary Maneuver
Warfare & Combating Terrorism

Code 31

C4ISR

Code 32
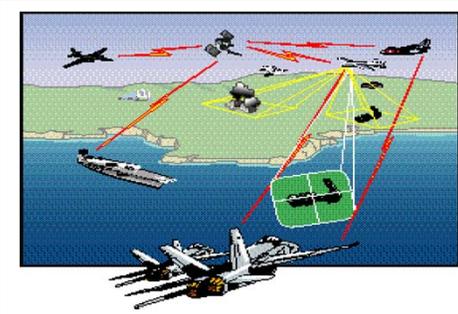
Ocean Battlespace Sensing

Sea Warfare and Weapons

Warfighter Performance

Air Warfare and Weapons

Code 33

Code 34

Code 35

OFFICE OF NAVAL RESEARCH

To move Unmanned Ground Systems from tele-operation and brittle autonomy to systems with reliable long-range autonomy and intelligent behavior models to reduce operator workload.

In addition to being more capable, the autonomy package must ultimately be affordable for the USMC. This requires investments in low-cost high-performance perception systems with full day/night capability, advanced world modeling and motion planning techniques, robust pose and localization algorithms, intelligent and adaptive behavior models, and innovative human-robot interaction models.

Increase Capability:

Provide Marines with highly autonomous systems designed to support widely distributed small units with logistics and close follower support

- ➢ Complex terrain navigation and environmental-context understanding

- ➢ 24-hour poor-weather operation

- ➢ GPS-denied navigation capability over long-range missions

- ➢ Real-time adaptive autonomous behavior generation

- ➢ Intuitive Marine-UGV interaction

Decrease Cost:

Develop solutions that will not only provide a positive cost-benefit but also fit within the increasingly constrained budget of the DoD

- ➢ Affordable sensor suites and computation architectures

- ➢ Easily tunable perception and autonomy algorithms for new environments and platforms

Specific Technology Areas of Interest:

- ➢ Cognitive models for adaptable autonomy, enhanced user interface, trust, and anticipation

- ➢ Context-based reasoning

- ➢ Day/night perception

- ➢ True 3D terrain traversability and planning

- ➢ Sensor fusion for robust perception

    - ➢ Fusion of multi-modal low-cost sensors

- ➢ Robust multi-sensor relative-localization techniques

- ➢ GPS-denied absolute-localization techniques

- ➢ Advanced world modeling

Other S&T barriers to UGV autonomy capability and cost?

Target UGV Missions:

➢ **Logistics Connector**

Highly autonomous logistics resupply platform in support of large numbers of widely distributed Marine small units.

➢ **Autonomous Wingman**

A close-follower platform with warfighter-focused autonomy in support of dismounted Marines to lighten the load, perform CASEVAC operations, and close combat support.

How to contact ONR

For more information about ONR:

http://www.onr.navy.mil/

For more information on ONR Code 30
Unmanned Ground Systems:

http://www.onr.navy.mil/Home/Science-Technology/Departments/Code-30.aspx

To submit a white paper:

http://www.onr.navy.mil/

Click on "Contracts and Grants"
Click on "Broad Agency Announcements"
Select "BAA11-001"