

ASTM E54.08.01 Meeting
January 29, 2007
ASTM Committee Week, Anaheim CA

The E54.08.01 Task Group on performance standards for robots applied to Urban Search and Rescue met January 29, 2007, as part of the Operational Equipment Subcommittee meeting during the January ASTM Committee Week, held in Anaheim, California. Philip Mattson, Chair of the Operational Equipment Subcommittee, conducted the meeting, which included an overview of work being done by other task groups (namely working on Blast Resistant Trash Receptacles). This report only discusses information relevant to the robot standards.

Elena Messina, Task Group Chair, presented a brief overview of the project for the benefit of attendees who may not know the overall background and philosophy. At this point in time, 11 test methods have been piloted at least once by numerous responders and robot manufacturers and researchers at NIST-organized exercises at FEMA training facilities. These test methods address the bulk of the performance requirements deemed to be high priority and slated for Wave 1. Most test methods address more than one requirement.

An update on progress in the various working groups is recapped here:

Working groups that have been established, and their respective chairs:

- Terminology - Hui-Min Huang, NIST
- Logistics - Bob McKee, Texas A&M and FEMA US&R TF-1
- Operating Environment - Glen Keller, Allentown Fire Department
- Communications - Kate Remley, NIST
- Human-System Interaction - Sal Schipani, NIST
- Sensing - John Evans, John Evans LLC
- Mobility - Bill McBride, Southwest Research Institute
- Safety - Mark Micire, University of Massachusetts-Lowell and American Standard Robotics
- Power – TBD (looking for a volunteer)

The following Work Items have been entered into the system:

- WK10336 Standard Test Method for Evaluating Visual Acuity of Video Sensing for Robots for Urban Search and Rescue
- WK10830 Standard Terminology for Urban Search and Rescue Robots
- WK11331 Standard Test Method for Evaluating the Usability of the Human-robot Interface for Robots for Urban Search and Rescue
- WK12399 New Standard Test Method for Evaluating the Cache Packaging Weight and Volume of Robots for Urban Search and Rescue

The first two items have gone through balloting. WK10336 (visual acuity) was approved by the subcommittee with minor editorial changes; John Evans has forwarded edits to Timothy Brooke, the ASTM Staff Manager. The standard will now be balloted at the committee level (E54, Homeland Security Applications). At the committee level consideration is given to the process of development of the standard, representation from users and vendors, number of votes, the distribution between users and vendors and researchers. If all goes well this will be a formal ASTM standard this spring.

The first 10 terms of the terminology have been approved and are now a standard. Hui-Min Huang is soliciting input on terms that are considered high-priority for inclusion in the next round submitted for balloting. Some of you may recall that an initial group of well over 200 terms was initially submitted (based

on existing work by other groups). However this was overwhelming within the ASTM voting system, so we have taken an approach of submitting a small group of terms at a time.

There has been a change in leadership for the Human-System interaction Working Group due to Jean Scholtz's retirement last Spring. Sal Schipani took over this group in the Fall of 2006. This led to a deceleration in the development of WK11331, but the effort is picking up steam. A test method based on a random maze is being exercised by Sal at this time, in preparation for formalization.

The test method for WK12399 (Cache Packaging) is close to being submitted for balloting. The main body of the document is ready, but a few details are still being filed out.

Some new items are on the horizon as well. A communications work item has been submitted by Kate Remley and Galen Koepke and will be formally entered into the system by Tim Brooke shortly. It is entitled Standard Practice for Evaluating the Performance of Radio (Wireless) Communication Links used for the Control and Telemetry Systems on Urban Search and Rescue Robots. Also forthcoming is a work item on mobility entitled Standard Test Method for Evaluating Ground Mobility of Robots for Urban Search and Rescue Applications.

John Evans led a discussion on next steps for the Sensors Working Group, now that the initial test method is close to being a standard. It was decided to continue to focus on the top three application scenarios: aerial vehicles for wide area survey, ground robots for wide area survey, and peekbots¹. Relevant sensors for UAVs are video cameras, which have already been covered, Global Position System (GPS), Inertial Navigation System (INS) and altimeters. GPS, INS and altimeters could be subsumed in a performance specification for operation of the UAV and should not be considered in isolation. Sensors for ground robots for wide area survey include acoustic sensors and Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) sensors. Sensors for electric fields (downed power lines) were also proposed. The focus here could be interface standards for integration with robot power and telemetry and minimum performance standards. There are many organizations that have worked or are working on standards for CBRNE sensors, so there is great potential for leveraging other work. Specifically, the E54.01 subcommittee is on CBRNE sensors. Sensors for peekbots would include acoustic sensors. It is not clear that peekbots could carry additional handheld sensors without engineering the sensors for reduced size and weight. Feedback from working group members on proposed direction is welcomed by John.

Galen Koepke briefed the group on the status of the Communications work item. This led to a discussion about larger communications compatibility issues, pertaining to use of frequencies by other entities, including the military. Kathleen Higgins, Chair of E54, offered to facilitate organization of a meeting involving various stakeholders. This would address issues in wireless communications that are beyond the scope of our robotics Task Group.

Breakout working meetings were held by the Mobility Working Group, resulting in the definition of the work item for ground mobility and agreement among the participants on a suite of tests and associated fixtures/props/artifacts to be included in the initial suite.

Other breakout/sidebar discussions held included focusing the Operating Environment Working Group on decontamination issues for robots as well as some extent of submersion in water. Elena also made contact with the ASTM manager for the F38 Committee, which is on Unmanned Aerial Vehicles. This will hopefully lead to a liaison between the two efforts.

In summary, we can look back on the past year and see significant progress. The Working Group Chairs and the participants deserve kudos for their hard work. We look forward to seeing more significant steps forward in the standardization process in the coming months.

¹ For a description of these and other application categories, as well as the initial performance requirements, see [http://www.isd.mel.nist.gov/US&R_Robot_Standards/Requirements_Report_\(prelim\).pdf](http://www.isd.mel.nist.gov/US&R_Robot_Standards/Requirements_Report_(prelim).pdf)

Upcoming Events:

A Response Robot exercise will be held at Disaster City the week of June 18, 2007. Scenarios for deploying robots will be tried, along with test methods under development. This is a great opportunity for robot manufacturers and responders to work side-by-side and for all involved to try test methods and give feedback for improving them.

The next ASTM Committee Week will be the week of June 25th 2007 at the Norfolk Waterside Marriott; Norfolk, VA US.