Non-Facial and Non-Verbal Affective Expression in Appearance-Constrained Robots for Use in Victim Management: Robots to the Rescue!

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ABSTRACT
This video presents a visual summary of large-scale, complex human study in Human-Robot Interaction (HRI) designed to evaluate whether humans would view interactions with two non-anthropomorphic robots more positively and calming when the robots were operated in an emotive mode versus a standard, non-emotive mode. The video presents actual participants' reactions, the study design, and images from search and rescue operations.

Categories and Subject Descriptors
I.2.9 Robotics, J.4 SOCIAL AND BEHAVIORAL SCIENCES – *Psychology*.

General Terms
Measurement, Performance, Design, Experimentation.

Keywords
Human-Robot Interaction, Affective Robotics, Experimental Design, Victim Management, Urban Search and Rescue.

1. The HRI Study
This video is a visual summary of a large-scale, complex human study in HRI conducted in fall 2008. The hypothesis for this study was that humans interacting in close proximity with non-anthropomorphic robots would view the interactions more positively and calming when the robots were operated in an emotive mode versus a standard, non-emotive mode. This study distinguished standard versus emotive modes of operation based on non-verbal and non-facial affect using the heuristics in [1]. The test domain for this study was victim management in urban search and rescue (US&R). From observations of victim management experiments [2], a medical assessment path was developed. The movements, postures, and orientation for the standard mode of operation were pre-programmed based on observations of medical responders operating the robots during these experiments [2].

In the emotive mode the robots approached more slowly, lower to the ground, and remained oriented toward the 'victim" to demonstrate caution, attentiveness, and caring. A light blue illuminated light was placed on the undercarriage of the robots to provide better visibility in the darkness and to produce a calming effect. The standard operated robots had no additional lighting and the robots approached more quickly, raised to full height, would turn away from the "victim" to evaluate the surroundings, and moved erratically.

The methods of measurement for this study were self-assessments, video observations, psychophysiological measurements, and follow-up interviews. The study involved 128 participants (79 females and 49 males ranging from ages 18–62). Each participant interacted with two robots (Inuktun Extreme-VGTV and iRobot Packbot Scout) that were modified to carry IR devices for operating and recording in the dark. The robot interactions were conducted in the dark to simulate an actual disaster environment and participants were placed in a confined space box during the interactions. Participants were randomly assigned to robots that were programmed in either a standard, impersonal mode or an emotive mode with robot order counterbalanced.

3. REFERENCES
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