# Technology 2003
# Paper Abstract

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Developed under contract of NASA Code R

Category: Robotics

Paper Title: Applying Robotics to HAZMAT

The use of robotics in situations involving hazardous materials can significantly reduce the risk of human injuries. The Emergency Response Robotic Project, started in 1991 at the Jet Propulsion Laboratory, is refining a teleoperated mobile robot allowing HAZMAT teams to remotely response to incidents involving hazardous materials. The robot can assist in locating, characterizing, identifying, and mitigating hazardous material incidence without risking entry team personnel. The system is based on the commercially available REMOTEC ANDROS V robotic vehicle, but has been significantly redesigned to meet the needs of HAZMAT Teams. JPL Fire Department/HAZMAT personnel have been closely involved in the development and testing of the system. The direct involvement of a potential customer of such a robotic systems has been instrumental in the success of the project,

This paper will discuss the mobile robot being developed at JPL, called HAZBOT III, and the

potential commercialization of such technology. HAZBOT 111 consists of a tracked base with articulated front and rear sections allowing the vehicle to climb stairs and other obstacles, as well as maneuver in tight surroundings. A six-degree of freedom manipulator allows HAZBOT 111 to perform a variety of manipulation tasks including the unlocking and opening of doors which may be encountered during a HAZMAT mission. Two video cameras provide feedback to the system operator: one camera is located on the gripper and the other on a movable pan/tilt platform which can be position to best meet the task at hand, A commercial specific gas detector incorporate in to the manipulator aids in material identification, A unique feature of HAZBOT HI is its special design for operations in combustible environments. This includes the use of all solid state electronics, brushless motors, and internal pressurization.

The potential commercial application of robotics in the hazardous environments in high. Industries of all sizes use hazardous materials on a day to day basis and remote robotic handling could greatly increase the safety of workers. There area huge number of waste sites that must be continuously monitored, an ideal job for mobile robots. Robots, such as HAZBOT 111, are well suited for first entry into new sites when the type of the materials are unknown. As has been specifically demonstrated in this project, teleoperated robotic vehicles can be used by HAZMAT teams safety response to incident involving hazardous materials. There are many other commercial application of this type of robotic system including law enforcement and mining operations.