

Abstract

**Pioneer Robot Cold Testing Program**

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The environment inside the Chernobyl Shelter is hazardous due to ionizing radiation fields, high airborne contamination, and industrial safety issues. Discussions between the U. S. Department of Energy and Ukraine established an interaction to address the need for remotely operated systems for Shelter inspection and remote operations. From this interaction, Pacific Northwest National Laboratory and Lawrence Livermore National Laboratory along with the National Aeronautics and Space Administration (NASA), Carnegie-Mellon University (CMU), and RedZone Robotics, Inc. developed the Pioneer robotic vehicle system for potential application in the hazardous unstructured environments of the Shelter. The Pioneer robotic vehicle was based on the U. S. Department of Energy's experience in fielding the Houdini robotic vehicles which have been applied at the Oak Ridge National Laboratory for retrieval of waste from underground storage tanks. NASA and CMU provided three-dimensional (3-D) mapping and concrete sample drill capabilities based on developments for planetary exploration. These mapping and sample collection capabilities increase the functionality and suitability of the vehicle system for Chernobyl environmental survey and inspection applications.

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Oak Ridge National Laboratory has recently managed the execution of a series of Cold Tests and Demonstrations of the Pioneer system conducted in cooperation with Chernobyl Shelter Object at the Chernobyl Nuclear Power Plant Site. These tests were conducted in a non-radiation area and included simulated operations typical of those encountered in the unstructured environments of the shelter. This paper will report the accomplishments and conclusions from this testing and demonstration program.