Brief Communication

All Terrain Robot for Nuclear Installations
(Design, Manufacturing & Automation Group)

An All Terrain Robot with a standard retractable telescopic radiation detector for remote radiation mapping inside nuclear installations has recently been developed. The robot has been designed to negotiate rough terrain including staircases. The drive mechanism of the radiation detector offers multiple degrees of freedom to facilitate maximum flexibility in measurement and logging of radiation data.

The Robot is driven by six tracked belts with a differential drive and has a payload of 22 kg. It’s self weight is 60kg and it can climb ramp/staircases up to 30 deg. with the help of Tele-operative swing arms. It has multiple cameras for navigation including infrared cameras for low light operation. The robot carries onboard batteries for a continuous run time of one hour.

The radiation detector is composed of two GM tube sensors. One tube covers the range from 0.01μSv/h to 10mSv/h and the other tube covers the range from .01mSv/h to 10Sv/h. The sensors are placed on a remote controlled electrically driven retractable telescopic mechanism with three degrees of freedom (Fig.1).

Both the robot and the retractable telescopic mechanism are controlled from a Joystick attached to remote computer via an RF link. A separate RF link is provided for collecting and logging the measurement data from the radiation sensors. The remote computer provides multiple camera view panes, graphical display of the robot pose, real time display of radiation measurement, video and data logging, remote range selection, sensor linearity calibration via keyboard and configurable alarm set points for dose as well as dose rate.

The first successful demonstration of the robot has been carried out at WIP, Trombay for measurement of radiation level inside one HEPA filter bank room (Fig. 2) as well as outside the pre-filter bank area.

Fig. 1: All Terrain Robot with Retractable Radiation Detector
Fig. 2: Robot scanning HEPA Filter bank at WIP, Trombay