

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 2 (3B)

Author: Mr. Matthew Cross
Faculty of Engineering, Carleton University, Canada, mcross8@uwo.ca

Prof. Alex Ellery
Carleton University, Canada, aellery@mae.carleton.ca

TOWARDS ADAPTABLE REFLEXIVE BEHAVIOUR FOR THE KAPVIK CANADIAN ANALOGUE
MICRO ROVER**Abstract**

The Canadian micro rover prototype – Kapvik – requires extensive autonomous reactive capabilities. Exploration rovers traditionally require several days to perform simple tasks as the limited communications and distance prevents online operations and commanding. An exploration rover must be capable of autonomous decision making to increase its scientific return and increase value to expensive planetary exploration missions; it must be able to independently plan paths and avoid obstacles. The Kapvik micro planetary exploration analogue rover is designed for reflexive obstacle avoidance. Reflexive behaviour algorithms utilizing the laser range finding sensors will enable the Kapvik rover to detect obstacles during its traversing phases. Kapvik is designed with a view to flight qualification and the reflexive behaviour is designed to adapt to different mission scenarios. Its trial operations will be in an unknown analogue environment – likely in the Canadian arctic – with an unknown obstacle field; it must be capable of adapting to varying obstacle conditions. Kapvik itself is an analogue testbed for operations on multiple planetary bodies – Moon, Mars, etc – as it must be capable of avoiding a variety of obstacles such as rocks and crevices. This paper will outline discuss the design, testing, and preliminary results of Kapvik's reflexive behaviour.