SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

Author: Mr. Xiao Cheng
Beijing Aerospace Command and Control Center (BACCC), China, chengxiaovl@hotmail.com

Dr. Huicui Liu
National Key Laboratory of Science and Technology on Aerospace Flight Dynamics, China, vlcx26@gmail.com
Mr. Tianyi Yu
Beijing Aerospace Command and Control Center (BACCC), China, bacc.yuty@gmail.com
Mr. Desheng Shang
Beijing Aerospace Command and Control Center (BACCC), China, chengxiaovl@hotmail.com
Ms. Yingli Deng
Beijing Aerospace Command and Control Center (BACCC), China, dengyingli0604@yahoo.com.cn

AN ENVIRONMENT MODELING ALGORITHM FOR LUNAR ROVER PATH PLANNING WITH CONSIDERATION OF FACTITIOUS INTERVENTION AND STEERING COST

Abstract

Environment modeling is the key part of path planning for lunar rover's patrol and exploration. Rover's every activity on the lunar surface including moving steering and so on can be abstracted into a cost. Environment modeling is to generate such a cost graph which reflects the effect of the environment on rover's activity. Thus the following path searching can be carried on based on the cost graph. However two main problems are still to be solved: the searched path based on the model is usually hard to satisfy the controller's expectations and to be implemented because of frequent steering. This paper presents an environment modeling algorithm which generates a synthetic model reflecting controller's expectations and reducing rover steering times by weighted stacking the new factitious cost and steering cost with the traditional terrain cost. Firstly, high dimensional functions are used to describe the factitious cost, so the functions' characteristics can be varied to satisfy the controller's expectation by changing the functions' parameters, such as zero point, inflection point, derivable point and extreme point. Secondly, this paper defines a kind of rover steering cost which can reflect the costs of power, time and moving distance during each course deviation. Thirdly, the two new costs and the traditional terrain cost are stacked with a set of weigh values that shows path planning strategy. This algorithm is validated by simulation in this paper and the path searched according to the environment model can reflect the controller's expectation and has obviously less steering times. It is beneficial to the future lunar rover path planning.