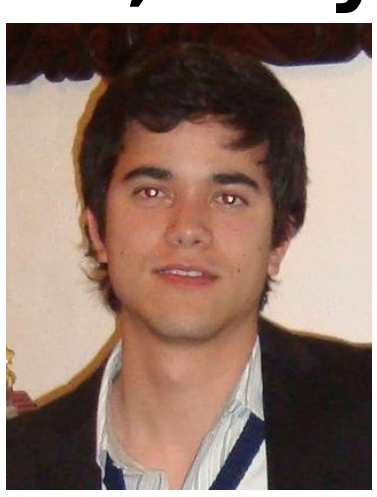
The Field Robotics Center

Seminar Series

Wed, May 22 **GHC 2109** **1:00-2:00 PM**



Food and Drinks will be served

Daniel Loret de Mola Lemus
Masters Student
Carnegie Mellon University

Slip Control on Extreme Slopes for a Rover with Plowing Capability

Abstract: Recent efforts in planetary robotic exploration aim toward craters, skylights, and other depressions with challenging terrain conditions. The access to such places requires traversing on extreme slopes where high levels of slip greatly hamper rover mobility and control. To successfully reach valuable targets such as water ice and mineral outcrops in these locations, slip must be promptly arrested. The work presented here develops an automatic system for a plowing-capable rover that controls slip during descent on steep unconsolidated slopes.

The slip control system is implemented around the robot's plow, and has two main components: a slip estimation subsystem and the slip controller. Slip estimation is performed through a visual odometry algorithm based on monocular optical flow. Two approaches were explored for the slip controller: PID and fuzzy logic control. The design of the controllers was aided by a model of the rover-terrain system formulated specifically for this purpose.

Field testing was carried out on conditions relevant to lunar crater exploration. The experimental results showed that the control system is able to keep slip to a minimum for different commanded vehicle speeds and slopes as steep as 31°. As a consequence, this work expands current rover mobility and control capabilities by enabling precise descent on steep slopes of unconsolidated material.

Speaker Bio: Daniel is a Masters student at the Robotics Institute working on controlled rover descent of lunar craters. He has a Bachelors degree in Mechatronics Engineering.

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