

AEROSPACE & MECHANICAL ENGINEERING



2005 COLLOQUIUM 2006

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INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365, ENGR. BLDG.

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Professor Dennis W. Hong**
Mechanical Engineering Department
Virginia Tech
Blacksburg, Virginia

TOPIC: **BIOLOGICALLY INSPIRED NOVEL LOCOMOTION
STRATEGIES FOR MOBILE ROBOTS**

DATE: Tuesday, November 8, 2005

TIME: 3:30 p.m.

PLACE: 129 DeBartolo Hall

Abstract

Several biologically inspired novel locomotion strategies for mobile robots currently under development at Virginia Tech are presented with a focus on a unique locomotion mechanism inspired by the motility mechanisms of amoebae. These single celled organisms use cytoplasmic streaming to generate pseudopods for locomotion, and the Whole Skin Locomotion, as we call it, works by way of an elongated toroid which turns itself inside out in a single continuous motion, effectively generating the overall motion of the cytoplasmic streaming ectoplasmic tube in amoebae. With an elastic membrane or a mesh of links acting as its outer skin, the robot can easily squeeze between obstacles or under a collapsed ceiling and move forward using all of its contact surfaces for traction, or even squeeze itself through holes with diameters smaller than its nominal width making this the ideal locomotion method for search and rescue robots that need to traverse over or under rubble, or for applications where a robot needs to move in and maneuver itself into tight spaces such as for robotic endoscopes.

This talk will summarize the many existing theories of amoeboid motility mechanisms, and examine how these can be applied on a macro scale as a novel mobile robot locomotion concept. Besides the whole skin locomotion concept, several other interesting robots under development at Virginia Tech's RoMeLa (Robotics & Mechanisms Laboratory) will be presented, including; an actuated spoke wheel system for unstructured environments, a hexapod crawler with dry adhesive feet for zero gravity space applications, a novel tripedal locomotion robot for sensor deployment, and a bipedal walking humanoid robot.

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NOTE: *If you are interested in meeting individually with Prof. Hong, please contact Evelyn at 631-5431.*