Robotic Games Society (Singapore)
http://guppy.mpe.nus.edu.sg/srg

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SRG 2003 Public Lecture

21 May 2003, 15:00-15:45
*LT7A, Faculty of Engineering, National University of Singapore**

The Design and Real-time Control of Autonomous Robots

by

Dr. Francis Nickols
Associate Professor, Nanyang Technological University, Singapore

Abstract:

An autonomous robot has no tether or umbilical. This means that the robot must carry its own power-supply and have sufficient intelligence to carry out tasks in its environment. This implies that the robot must be as lightweight as possible, and the power consumption of its actuators, sensors and on-board computers must be as little as possible. If not the designer gets caught in a defeating cycle of poor design giving a heavy robot which leads to more heavy actuators to support the robot. More heavy actuators lead to a more heavy robot which leads to more heavy power supplies which means an even more heavy robot which means even more heavy actuators and so the cycle repeats giving ever decreasing performance of the robot. The same goes for the on-board computers. Here the designer must concentrate on efficiency of computing in order to reduce the size, weight, electrical power consumption of the on-board computers and the time taken to carry out calculations in order to give real-time performance. Always the designer must pay attention to detail in the mechanical, electronic and computing aspects of the robot. The speaker will outline his experience and methodology in the design of such robots as applied to walking robots. Actual working robots and videos will be shown.

About the Speaker:

Francis Nickols is an Associate Professor at Nanyang Technological University where he carries out research into autonomous robots suited to underwater, land and air operation. He received a B.A. degree in Engineering Science from Cambridge University in 1978, followed by an M.Sc. from Cranfield Institute of Technology, and a Ph.D. from the University of Wales, Institute of Science and Technology, all being U.K. universities. He has designed and built many robots and actually builds his own prototypes. This ability came from his Royal Air Force apprenticeship and his many years of doing industrial research in the U.K with companies such as the Ford Motor Co., AMF, Lucas, Renishaw Research and Danfoss Flowmetering. Currently he is searching for a "holy grail" by attempting to build a 2-metre wingspan, protracting and retracting wing, hovering and flying, flapping wing, ornithopter bat robot.

*map of NUS available from http://www.nus.edu.sg/campusmap.
(free parking available at Kent Vale)