

## “COOPERATIVE MULTIPLE ROBOT SYSTEMS BASED ON GAME THEORY”



**Speaker: Dr. Sidney Givigi**

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**Day/Time:** Monday, Oct. 19, 2009 2:00-3:00pm

**Location:** RMC, s4200

### Abstract:

Robots have been a reality for the past several decades. Factories are equipped with robots that are responsible for assembling cars and other manufactured goods. The Canadarm has shown its importance in missions involving the Space Shuttle. Robots have been used in supervision tasks in the sea as well as under ground. A correlated field of investigation, although with some important differences, regards the use of multiple robots in the solution of complex tasks. Each robot must still be modeled individually for its dynamic behaviour; however their interactions with each other and the environment must take into account other aspects, such as communications, division of labor, fault tolerance, etc. These problems may be solved in a decentralized fashion. Similar problems also arise in the field of Game Theory.

This presentation introduces the use of Game Theory in the modeling of multiple robotic environments. The concept of personality trait is also explored. Simulations and experiments demonstrate that the use of such concepts lead to a variety of individual and group behaviours that provide a suitable division of labour. Then, the use of differential game theory coupled with fuzzy controllers in the problems of swarm formation and pursuit-evasion is discussed. Again, simulations and experiments show the power of the techniques. Finally, the use of Markov chains in the context of finite multiple player games is presented and its relationship with differential games established.

### Biography:

Sidney Givigi received a B.Sc. Degree in Computer Science and M.Sc. in Electrical Engineering from Federal University of Espirito Santo, Vitoria, Brazil in 1999 and 2003 respectively; and a Ph.D. in Electrical and Computer Engineering from Carleton University, Ottawa, Canada in 2009. He also has 10 years of experience in industry working as software developer, research scientist and control engineer in several different companies. His research interests include adaptive and intelligent control systems, nonlinear control and cooperative swarm robotics.

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**Seminar is open to the public. Free admission. Refreshments will be served.**