BIOENGINEERING

SEMINAR

From Glowworms to Robots: Searching the Physical Space

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Glowworms or fireflies use bio-luminescence, which is caused by the presence of luciferin in their bodies, to emit light to attract prey or mates. A simple model of this phenomenon identifies two behaviour patterns: (i) attraction towards a nearer companion having a brighter glow and (ii) ignoring those at far distances. These behaviours are used to devise a novel swarm intelligence algorithm called Glowworm Swarm Optimization (GSO). Unlike most other swarm algorithms, GSO is designed so that it is implementable by robots equipped with sensing ability to sense their environment and search the physical space around them. The applications are numerous, ranging from electronic signal detection to detection of multiple contaminant sources and even boundary of oil spills, ash clouds from volcanic eruptions, and harmful algae blooms in oceans. This talk will introduce GSO and its use in multi-modal function optimization, multiple signal source detection, and boundary monitoring with robots.

About the speaker:

Debasish Ghose is a professor in the Department of Aerospace Engineering at the Indian Institute of Science in Bangalore and heads the Guidance, Control and Decision Systems Laboratory. His main research interests are in the area of guidance and control of unmanned aerospace vehicles and multi-agent system dynamics and control as applied to multi-robot systems. He also works on developing and applying vision based algorithms in robotic systems. In the past, he has been a visiting professor in several universities including the University of California at Los Angeles He is on the editorial board of several journals and has co-authored a highly cited book on distributed scheduling algorithms by the IEEE Computer Society Press. His book on Glowworm Swarm Optimization Algorithm is due to be published by Springer soon. He is a Fellow of the Indian National Academy of Engineering.