

**A Proposal for Two Sessions on
Intelligent Systems
World Automation Congress
ISSCI**

Intelligence is generally defined as the ability to complete a task or achieve a goal in an uncertain environment. Hence, some characteristics of intelligence include adaptability, capability of self-optimization based upon some goal or goals, ability for performing self-diagnostics and self-maintenance and the ability to learn and reason. Currently there are many systems which can play chess, perform character/image recognition, have decision-making capabilities and do control/compensation. These systems may be characterized as having some form of intelligence. The idea of intelligence has been applied to robotics and automation to enhance the applicability to a variety of problems.

Some systems try to mimic human intelligence (e.g., understand speech or recognize handwriting). New technologies have advanced the field of artificial intelligence including faster computational power, new algorithms based upon cognitive science, better sensors and smaller devices requiring less power. The field of intelligent systems has also advanced because of the integration of several disciplines in neuro-computing, evolutionary computing, probabilistic algorithms, fuzzy, neural architectures and machine learning techniques. Research progressed from simple symbolic manipulation to information fusion, syntactic ontologies, smart multi-agents, information re-use and embedded intelligent systems.

Question:

Have these new machines become *more intelligent*? Example: *Machines that understand natural language*

In answering this question we can look at several parameters including: (a) randomness or uncertainty of the environment; (b) complexity of the goals; (c) time-dependency of the system; (d) resources available; (e) desired efficiency of the action (accuracy, speed, quantity); and (f) constraints (rules, number of agents).

Performance metrics for intelligence could be formulated including application-specific measures (accuracy for a given set of tests; speed in resolving problems; repeatability); capability to adapt; capacity to generalize; ability to relate to other systems (social characteristic); and transitivity: ability to compare performance between systems. Other measures are: ability to acquire new knowledge (learning); ability to solve new problems; ability to understand (knowledge); ability to plan and predict consequence of actions; ability to know limitations as well as abilities (self-awareness); ability to synthesize new concepts and ideas; and the ability to be perceive and model external world.

In the proposed sessions on *Intelligent Systems*, we will examine the notion of intelligence and associated applications from several disciplines including computer science and control systems.

The first session focuses on intelligent systems in robotics:

Session Chair: Gordon Lee, San Diego State University

Co-Chair: R. Lal Tummala, San Diego State University

“INVESTIGATION OF AN INTELLIGENT ALGORITHM WITH BOTH KNOWLEDGE EVOLUTION AND NATURAL EVOLUTION”

by Tang and Lee

“AN EFFICIENT POTENTIAL FUNCTION ROBOT PATH PLANNING ALGORITHM”

by Graham and Woodcock

“RECURSIVE HYPERSPHERICAL BEHAVIORAL LEARNING FOR ROBOTIC CONTROL”

by Reed, Nicolescu, and Dascalu

“ADAPTIVE AJAX-BASED STREAMING VIDEO FOR THE IROBOT CREATE PLATFORM FOR USE IN BUILDINGS WITH INFRASTRUCTURE MODE 802.11 NETWORKS”

by Paolini and Natarajan

The second session focuses on applications of intelligent systems:

Session Chair: Gordon Lee, San Diego State University

Co-Chair: Jinshi Cui Peking Univ. (China).

“INTELLIGENT TESTING SYSTEMS”

by Burgin and Narayan

“HIGH DIMENSIONAL PATTERN RECOGNITION USING THE RECURSIVE HYPERSPHERIC CLASSIFICATION ALGORITHM”

by Reed and Dascalu

“MEASURING RESULTS OF ENHANCEMENTS TO A REAL-TIME VOIP TELECONFERENCE SYSTEM”,

by Pheanis

“DESIGN OF AN INTELLIGENT VISUAL SOFTWARE TOOL FOR ENHANCED MODEL INTEROPERABILITY IN CLIMATE CHANGE RESEARCH”

by Dascalu, Harris, Fritzinger, Okamoto, and McMahon