I-FA07 Control Application 1

09:00-11:00 **Chair : Aoyama Tomoo (Miyazaki Univ.)**
Room : C207 **Co-Chair : Y.G. Zhang (ISS)**

09:00 – 09:20 **I-FA07-1**

Towards the Distributed Brain for Collectively Behaving Robots

P. Sapaty, and M. Sugisaka
(Oita Univ.)

The paper describes a new approach to the organization of an artificial brain for mobile multi-robot systems, where individual robots are not considered as independent entities, but rather forming together a universal parallel and distributed machine capable of processing both information and physical matter in distributed worlds. This spatial machine, operating without any central control, is driven on top by distributed mission scenarios in WAVE-WP language. The scenarios can be written on a variety of levels, and any mixture of them, supporting the needed system flexibility and freedom...

09:20 – 09:40 **I-FA07-2**

Look at the future's control from artificial life

Y.G. Zhang
(Academia Sinica)

In this paper Author introduce a new field named Artificial Life and its main directions of research. That is the research of evolutionary robot and artificial brain. Then author explored the advanced scientific thought hidden in them. Furthermore, the author tries intuitively to show a new type of control that is heuristically raised from artificial life research. It could be named as evolutionary control. This type of control is more like human body's structure, and it is self-organized.

09:40 – 10:00 **I-FA07-3**

Multi-sensor Visual inspection for Seamless Steel Pipe's Straightness

Rongsheng Lu(City University of Hong Kong)

In this paper, an on-line multi-sensor visual inspection technique for seamless steel pipe's straightness is developed. The basic principle of the visual measuring method is detailed. The modeling of visual sensor, measurement system and data processing are presented. In order to test the accuracy of the multi-sensor visual inspection, an experiment inspecting the straightness of a 1500mm long seamless steel pipe is made. The experiment results show that the visual inspection technique can achieve on-line measurement and offers high precision and stability.

10:00 – 10:20 **I-FA07-4**

A neural network solver for differential equations

Qianyi WANG, Tomoo AOYAMA(Miyazaki Univ.),
Umpei NAGASHIMA(NIAIST, Japan),
Eui-Sung KANG(Sunchon Univ.)

In this paper, we propose a solver for differential equations, using a multi-layer neural network. The multi-layer neural network is a transformer function originally where the function is differential and the explicit representation has been developed. The learning determines the response of neural networks; however, the response is not equal to the output values. The differential relations are also the response.The differential conditions can be also set as teaching data; therefore, there is a possibility to reach a new solver for the differential equations. Since it is unknown how to define the input data for the neural network solver during long terms, we could not derive the expressions. Recently, the analogue type neural network is known and it transforms any vector to another. The "any" must be...

10:20 – 10:40 **I-FA07-5**

Inverse optimization problem solver on use of multi-layer neural networks

Qianyi WANG, Tomoo AOYAMA(Miyazaki Univ.),
Umpei NAGASHIMA(NIAIST, Japan),
Eui-Sung KANG(Sunchon Univ.)

We propose a neural network solver for an inverse problem. The problem is that input data with complete teaching include defects and predict the defect value.
The solver is constructed of a three layer neural network whose learning method is combined from BP and reconstruction learning. The input data for the defects are unknown; therefore, the circulation of an arithmetic progression replaces them; rightly, the learning procedure is not converged for the circulation data vut for the normal data. The learning is quitted after such a learning status id kept. Then, we search a minimum of the differences between teaching data and output of the circulation. Then, we search a minimum of the.....