

I-FE07

Control Application 3

15:20-17:20
Room : C207

Chair : Kyoung Chul Koh (Sunmoon Univ.)
Co-Chair : Miyauchi Hidekazu (NIAIST)

15:20 – 15:40

I-FE07-1

Robust Sliding Mode Control for Path Tracking of Intelligent Mobile Robot

LU Jiangzhou, Xie Ming
(Nanyang Technological Univ.)

This paper deals with the path following problem of car-like intelligent mobile robot. A robust sliding mode control law based on time-varying state feedback is performed via Lyapunov method for path tracking of nonholonomic mobile robot with uncertainties. At first, A sliding control law is designed by combing the natural algebraic structure of the chained form system with ideas from sliding mode theory. Then, a robust control law is proposed to impose robustness against bounded uncertainties in path tracking. The problem of estimating the asymptotic stability region and the sliding domain of uncertain sliding mode system with bounded control input is also discussed. The proposed sliding mode control law can ensure the global reaching condition of the uncertain control system.

16:00 – 16:20

I-FE07-3

Smoothed Local PCA by BYY data smoothing learning

Zhiyong Liu, Lei Xu
(Chinese Univ of Hong Kong)

The so-called curse of dimensionality arises when Gaussian mixture is used on high-dimensional small-sample-size data, since the number of free elements that needs to be specified in each covariance matrix of Gaussian mixture increases exponentially with the number of dimension d . In this paper, by constraining the covariance matrix in its decomposed orthonormal form we get a local PCA model so as to reduce the number of free elements needed to be specified. Moreover, to cope with the small sample size problem, we adopt BYY data smoothing learning which is a regularization over maximum likelihood learning obtained from BYY harmony learning to implement this local PCA model.

16:40 – 17:00

I-FE07-5

Adaptive IIR filter designed for the separation of scintillation and rain attenuation phenomena

O. Sangaroon, V. Chutchavong, K. Anekpongpan,
C. Benjangkprasert, P. Sooraksa(King Mongkut's Institute of
Technology Ladkrabang), Y. Moriya(Tokai Univ.)

The separation of scintillation phenomena concurrent with rain attenuation phenomena can be accomplished by filtering. Based on the analysis of satellite signal fading during rain, scintillation and rain attenuation phenomena are examined and extracting from raw data by using adaptive IIR high-pass filter and adaptive IIR low-pass filter. Adaptive IIR filter are designed by using the algorithm of Least Mean p -Power (LMP) Error Criterion which have been modified by Quantizing Gradient technique. This algorithm reduces amount of multiplication computational equal to the length of input data. It is prove here that the convergence speed, variance, bias independence on p values. For this application, $p=1$ is chosen. The procedure of application ...

15:40 – 16:00

I-FE07-2

Character Recognition Based on Adaptive Statistical Learning Algorithm

K. C. Koh, H. J. Choi, J.S. Kim(Sunmoon Univ.),
K. Koh, H. S. Cho(KAIST)

In the PCB assembly lines, as components become more complex and smaller, the conventional inspection method using traditional ICT and function test show their limitations in application. The automatic optical inspection(AOI) gradually becomes the alternative in the PCB assembly line. In Particular, the PCB inspection machines need more reliable and flexible object recognition algorithms for high inspection accuracy. The conventional AOI machines use the algorithmic approaches such as template matching, Fourier analysis, edge analysis, geometric feature recognition or optical character recognition (OCR), which mostly require much of teaching time and expertise of human operators. To solve this problem, in this paper, a statistical learning based part recognition method is proposed. The performance of the ...

16:20 – 16:40

I-FE07-4

Visualization of Elastic Waves Propagating on a Solid Surface with Fatigue Cracks by Laser Ultrasonic Technology

Masaaki Imade, Hidekazu Miyauchi, Saburo Okada, Shigeyuki Yamamoto, Jyunji Takatsubo (The National Institute of Advanced Industrial Science and Technology)

We have developed a laser ultrasonic system for visualization of elastic waves propagating on a solid surface, in order to visualize ultrasonic waves propagating on opaque media. This system can produce a series of successive images as an animation of wave propagation, because of scanning an optical heterodyne probe to measure surface transient displacements. Using this visualization technique, we observed the scattering and diffraction of ultrasonic waves around various shapes of artificial defects, and examined its application to nondestructive inspection. This imaging system provides various kinds of visualization images such as propagation image, amplitude image, arrival time image and velocity image. We have been confident that this technique is available for nondestructive inspection and materials ...

17:00 – 17:20

I-FE07-6

Introduction of RT-CORBA into Industrial Automation System

An Mo Kim, Myung Sun Ryou, Wook Hyun Kwon
(Seoul National Univ.)

This paper suggests a new industrial automation system architecture which adopts the Real-Time CORBA as a solution for the recently emerging problems, such as cost efficiency, interoperability with different networks, software productivity, etc. This paper shows how the adoption of RT-CORBA helps end-users to improve software productivity in the heterogeneous distributed system, integrate eldbus with different kinds of network easily and lower the cost of hardware modification and extension. Finally, CRECO - a real-time CORBA which is in development and suited to industrial automation system - is introduced. RT-Linux and Probus - two major components while implementing the CRECO - are dealt with primarily.