

Industrial Applications of Signal and Image Processing

Day 1: Tuesday, March 21

Inauguration:



The 4-day short term training program on industrial applications of signal and image processing was inaugurated at the hands of Prof. L. M. Waghmare in presence of Prof. R. S. Holambe, Prof. Y. V. Joshi, Prof. M. B. Kokare, Prof. S. T. Hamde. Prof R. S. Holambe briefed about the program.

Dr. R. H. Chile, Dr. B. M. Patre, Dr. R. R. Manthalkar, Dr. S. S. Gajre, Dr. V. R. Thool, Dr. V. G. Asutkar, Dr. R. V. Sarwadnya, Mr. J. G. Parkhe, Ms. S. R. Nandurkar, Mr. P. B. Ghule, Mr. T. Bhaskarwar, Mr. A. G.

Tamsekar attended the inauguration function.

80 participants took part in this program, out of which 59 were post graduate students, 9 Ph.D. research scholars, 6 faculty and 6 from outside S.G.G.S.I.E.&T.

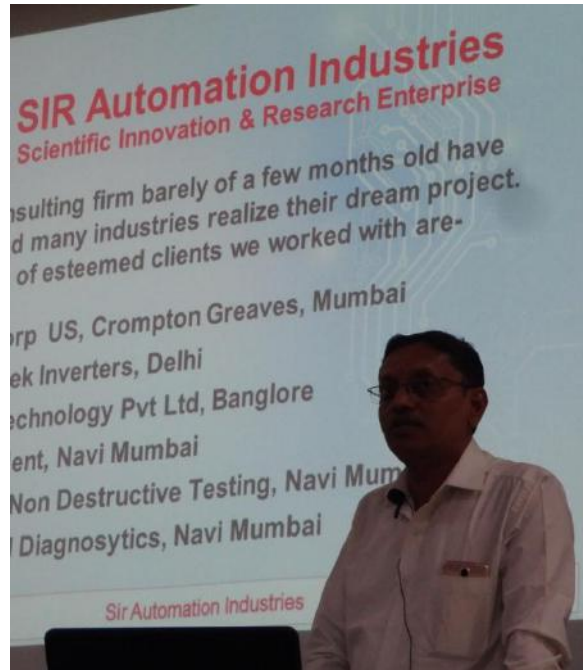


Session 1: Design and Implementation of Digital Filters on Microcontroller and PC

Mr. Shivaji Nawatake started with taking a case study of 200KVA Pure SPWM Inverter for Up-setter machine. He formulated the problem, and explained basics of digital filter design using MSP microcontrollers. Tool for the design of filters was shown.

Session 2: DSP based Vac and Iac measurement in High Frequency switching application

Basics of harmonics and it's causes and prevention using digital filters was discussed. Role of filters in inverter design was given with decomposition of a square wave into multiple sine waves. Filters for the application in case study were designed by the software.



Session 3: DSP Pure Sine wave Inverter design and advantages against simple PWM

Code for the filter designing software was shown. Three phase rectifier and H-bridge were explained in design of Inverter. Transmission of PWM signal is efficient than I2C or SPI communication. Superimposed sine wave of higher frequency on PWM signal of 50 Hz gives a SPWM, which can be used for switching application.

Session 4: Importance of signal presentation

The speaker showed the application in case study in working condition in form of photos and video. Filters, capacitor banks, transformer and microcontroller were shown. Importance of signal presentation using graphics software like SLD designer was highlighted.

Day 2: Wednesday, March 22

Session 1: Speech Processing

Prof. T. K. Basu was welcomed by Prof. R. S. Holambe. The speaker started with discussing speech processing in medical applications of musical signal for mental illness. Further discussion consisted of speech based language translators and language recognition. Need for the inter-language translator for Indian mainstream and tribal languages was highlighted. He showed some videos on conversational voice communication through translation and communication with animals. Ex-HoD of Instrumentation Department, Prof. C. B. Deshpande attended this session.



Session 2: Early Detection of Oral Cancer: A Computer Vision Theoretic Technique

Prof. A. K. Ray was welcomed by Prof. Y. V. Joshi. The discussion started with types of oral cancers and occurrence of them in different parts of the world. He showed how Surface Epithelium layers are arranged and where the cancerous part is observed. Emphasis was given on OSF type of cancer which is most commonly found in India. A computational approach to detect OSF and usefulness of texture feature were discussed. The importance of Indian database and standards along with medical expert's supervision was highlighted. Ex-Principal of SGGSI&T, Prof. B. M. Naik attended this session.

Session 3 and 4: Felicitation of Prof. A. K. Ray

The Padma awards are conferred on the recommendation made by the Padma awards committee, which is constituted by the Prime Minister every year. Prof. A. K. Ray is conferred Padma Shri award for his contribution in Science and Engineering. He has contributed to our institute in PG courses which were introduced since 1987.

President of the function was Director Prof. L. M. Waghmare, Chief guest was Ex-Principal Prof. B. M. Naik and Guest of Honor was Prof. T. K. Basu of IIT Kharagpur. Ex-HoD Instrumentation Prof. C. B. Deshpande, Ex-HoD Electronics and Telecommunication Prof. T. R. Sontakke and Prof. P. D. Jadhav were members on the dais.



The function was inaugurated at the hands of dignitaries on the dais. Prof. R. S. Holambe briefed about the Padma Shri awards and contributions of Prof. A. K. Ray to S.G.G.S.I.E.&T. Prof. Y. V. Joshi shared his memories.



Prof. C. B. Deshpande, Prof. T. R. Sontakke, Prof. P. D. Jadhav, Mr. S. Nawatake, Prof. T. K. Basu, Prof. B. M. Naik shared their memories and experiences. Prof. A. K. Ray was felicitated with the 'Maanpatra' by Prof. B. M. Naik. Prof. A. K. Ray shared his memories.

A MoU with Maritime Research Center, Indian Maritime Foundation, Pune was signed by Prof. L. M. Waghmare and Dr. (Cdr) Arnab Das.

Prof. L. M. Waghmare expressed gratitude towards Prof. T. K. Basu, Prof. B. M Naik and congratulated Prof. A. K. Ray.

Prof. P. S. Nalawade offered vote of thanks.

Day 3: Thursday, March 23

Session 1: Applications of DIP / DSP in Automation

Dr. A. V. Deshmukh started with possible applications of DSP in automation industry such as vibration measurement and quality control systems. He considered the case of electronic component quality control system based on image of capacitors, which had 100ms to process the data for each component. Signal Processing and Embedded system development goes hand in hand. Session was finished with example of autonomous vehicle based on real time image processing.

Session 2: Applications of DIP / SDP in Healthcare

MRI, CT scan, PET were explained. Construction and working of MRI machine was explained. Conversion of 1D signal to 2D image was discussed. Radon transform was briefed when a question from audience was raised.

Session 3: ...continued

Cardiac MRI and z plane were discussed. The cardiac motion was shown by slicing and strips changing directions. Displacement detection was explained.

Session 4: ...continued

1D to 2D signals and 2D to 3D signals conversion was further discussed. Day's sessions were ended with feedback and questions from audience.



Day 4: Friday, March 24

Session 1: Processing of Resting State MRI

Dr. Bhushan Patil was welcomed by Prof. R. S. Holambe. Session started with brief discussion of MRI and Independent Component Analysis. Need of preprocessing steps in MRI was emphasized. Cryography functional MRI, CT, PET, slice-timing correction, motion correction, special filtering, temporal filtering, rigid, non-rigid and affine transformations were discussed topics.

Session 2: Medical Image Registration

3D to 3D, 2D to 2D and 2D to 3D image conversion was discussed. Positron Emission Tomography (PET) was discussed with processing restricted dynamic range of intensity.

Session 3: Deep Learning, Convolutional Neural Network for Medical Image Analysis

Basics of Deep Learning and how it is different from Multilayer network are discussed. More layers mean more precision and more data, so for processing, GPUs are used. Applications such as Speech Recognition, Computer vision, Natural Language Processing were mentioned. CNN for image segmentation case application was discussed with detail diagram of U-net.



Session 4: Valedictory

Prof. L. M. Waghmare, Prof. M. B. Kokare and Prof. R. S. Holambe were the members on the dais. Participants expressed their reactions and feedback. Certificates of the program were distributed to participants. The program was concluded.