



Gian



Guru Nanak Dev University
Amritsar

Global Initiative on Academic Networks

Ministry of Human Resource
Development, Government of India

SHORT TERM COURSE UNDER GIAN PROGRAMME OF MHRD GOVT. OF INDIA

Course: Bio-Imaging for Food Quality Monitoring and Process Automation

(05-01-2018 to 09-01-2018)

Venue: Guru Nanak Dev University, Amritsar, India

Overview

When a person goes to purchase raw ingredients or processed food products, they use their intuitive methods to assess the quality of the food and sometimes such methods are used by food processors who convert raw ingredients into packaged food products. For example, while purchasing whole lentils consumer may look for the presence of non-lentil materials, uniformity of kernels, color of kernels and uniformity of color of kernels, insect or fungal damaged kernels, sprout damaged kernels etc. Similarly, a processor may monitor these factors and try to eliminate these factors through unit operations such cleaning, size grading, color grading etc. For proper functioning of these unit operations, the processor may monitor these factors manually or using instruments before and after one or more of the unit operations. Thus, the high quality raw ingredients and unit operations are the two main components that contribute to the preparation of nutritious, healthy, safe and wholesome foods for consumers. There are no unit operations which can produce high quality processed food products from poor quality raw ingredients; however, at times artificial or natural flavor compounds are used to mask certain unpleasant odors or taste. Hence, production, preservation and handling of raw ingredients must be done with great care and quality of raw ingredients must be maintained until processed as food products for consumption. Hazardous Analysis at Critical Control Points (HACCP) management program is commonly implemented to enhance food safety through determining and eliminating biological, chemical or physical hazards from raw materials and during processing and distribution of food products. For proper implementation of HACCP as well as to control many unit operations food quality parameters must be measured at many points within the food chain from producer to consumer. Sensors which convert an entity of interest or parameter to be determined such as color, pH, moisture content etc. into a measurable quantity such as electric current, capacitance, resistance or voltage, and bio-imaging which takes images of samples in certain range of the electromagnetic spectra and converts it into identified features based on intrinsic or extrinsic factors of a product are main tools and techniques for determining quality parameters for food products.

This course will provide attendees with an excellent opportunity to learn about the role of sensors and imaging of food products in quality assessment of foods and their role in automation of unit operations in the food industry. Furthermore, this workshop supports our mission to provide consumers with nutritious, healthy, safe and wholesome foods, microbiologically safe foods in domestic markets and safe foods for export. The proposed course will introduce participants to fundamentals of sensors and bio-imaging and how to use these in industrial as well as research setting.

The intended audience for this course will include: Undergraduate and graduate students in Food Technology, Food Science, Agricultural Engineering and Chemical Engineering who have an interest in food industry automation and food quality control.

Objectives

- ✓ To give an overview of fundamentals of sensors and bio-imaging
- ✓ To provide knowledge on image acquisition, image analysis and object classification
- ✓ To provide information about imaging in different electromagnetic spectral ranges.
- ✓ To explain how to incorporate sensors and bio-imaging for food quality monitoring and automation if the food industry (as well as in other industries where quality monitoring and automation are important such chemical processing, pharmaceutical industry).

Utility

This course will be very useful to enhance quality of the food products and automation of quality monitoring and controlling of unit operations in the food processing.

You should attend if:	<ul style="list-style-type: none"> ✓ You are a student (MSc/M. Tech./Ph.D.) of different subject areas including Food Technology, Microbiology, Biochemistry and Biotechnology ✓ Faculty from reputed academic institutions and technical institutions ✓ Researchers from manufacturing, service and government organizations including R&D laboratories
Fees:	<ul style="list-style-type: none"> ❖ Participants from abroad: US \$ 200 ❖ Industry/ Research Organizations: Rs. 5000 ❖ Academic Institutions: ❖ BSc Students: Rs. 500 ❖ MSc Students: Rs. 1000 ❖ PhD Students: Rs. 1500 ❖ Faculty members: Rs. 2000 <p>The above fee includes all instructional materials, computer use for tutorials, and 24-hr free internet facility. The participants will be provided with single bedded accommodation on payment basis.</p>



Department of Food Science and Technology, Guru Nanak Dev University Amritsar, Punjab

Name (Block Letters): M/F:

Designation/ Professional Title:

Organization:

Address:

Registration fee of Rupeeshas been paid via Demand Draft No.....datedin favour of "The Registrar," Guru Nanak Dev University, Amritsar or through online/offline banking bearing Transaction No.datedto Punjab & Sind Bank, Guru Nanak Dev University Campus (RTGS/IFSC code: PSIB0000288) A/Ct No. 0288100007953 of Guru Nanak Dev University. Demand Draft/ Fee Receipt have been enclosed herewith.



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Resource Person



Digvir S. Jayas, Vice-President (Research and International)

Distinguished Professor Dr. Digvir S. Jayas was educated at the G.B. Pant University of Agriculture and Technology in Pantnagar, India; the University of Manitoba, and the University of Saskatchewan. Before assuming the position of Vice-President (Research and International), he held the position of Vice-President (Research) for two years and Associate Vice-President (Research) for eight years. Prior to his appointment as Associate Vice-President (Research), he was Associate Dean (Research) in the Faculty of Agricultural and Food Sciences, Department Head of Biosystems Engineering, and Interim Director of the Richardson Centre for Functional Foods and Nutraceuticals. He is a Registered Professional Engineer and a Registered Professional Agrologist.

Dr. Jayas held a Canada Research Chair in Stored-Grain Ecosystems for seven years. He conducts research related to drying, handling and storing grains and oilseeds and digital image processing for grading and processing operations in the Agri-Food industry. He has authored or co-authored over 900 technical articles in scientific journals, conference proceedings and books dealing with issues of storing, drying, handling and quality monitoring of grains. He has collaborated with researchers in several countries but has had significant impact on development of efficient grain storage, handling and drying systems in Canada, China, India, Ukraine and USA.

Dr. Jayas has received awards from several organizations in recognition of his research and professional contributions. He is the recipient of the 2008 Natural Sciences and Engineering Research Council (NSERC) Brockhouse Canada Prize. In 2009, he was inducted as a Fellow of the Royal Society of Canada. He has received professional awards from Agriculture Institute of Canada, Applied Zoologists Research Association (India), American Society of Agricultural and Biological Engineers, Association of Professional Engineers and Geoscientists of Manitoba, Canadian Institute of Food Science and Technology, Canadian Academy of Engineering, Canadian Society for Bioengineering, Engineers Canada, Engineering Institute of Canada, Indian Society of Agricultural Engineers, Manitoba Institute of Agrologists, National Academy of Agricultural Sciences (India), National Academy of Sciences (India) and Sigma Xi.

Dr. Jayas serves on the boards of many organizations including: NSERC, ArcticNet, Composite Innovation Centre, Engineers Canada, Centre for Innovative Sensing of Structures (SIMTReC), Genome Prairie, Manitoba Centre for Health Policy, National Coordinating Centre for Infectious Diseases (NCCID), Research Manitoba, Cancer Care Manitoba Projects Grants and Awards Committee, Research Institute of Oncology and Hematology, and TRIUMF. He is also chair of the board of directors of RESOLVE, a prairie research network on family violence. He has served as President of Agriculture Institute of Canada, Association of Professional Engineers and Geoscientists of Manitoba, Canadian Institute of Food Science and Technology, Canadian Society for Bioengineering, Engineers Canada, and Manitoba Institute of Agrologists.

Organizer

Prof. Dr. Narpinder Singh is Director of Research and Professor in the Department of Food Science and Technology, Guru Nanak Dev University, Amritsar, India. His expertise is in the field of starch chemistry, extruded products, modified starches, baked products, cereal and legumes quality, milling, honey processing, product development, and selection of raw material, etc. He has published 200 research papers in national and international journals of repute, 10 book chapters (nine international publishers and one national publisher), one book (The RSC), five book reviews, and five technical papers. Dr. Singh has held leadership positions in professional societies, notably the Fellow Association of Food Scientists and Technologist (AFSTI)(2012); S. Bishan Singh Samundri Memorial Lecturership Award (2012) by G.N.D.U.; Certificate of Appreciation by Punjab Agricultural University, Ludhiana (2012); J.C. Bose National Fellowship by Department of Science and Technology (DST), Ministry of Science and Technology (2011); the Rafi Ahmed Kidwai Award by ICAR (2010); Fellow National Academy of Sciences, India (NASI)(2011); Fellow of the Indian National Science Academy (INSA)(2010); Fellow of the National Academy of Agricultural Sciences (NAAS)(2005); Recognition Award-NAAS for contribution in Agricultural Engineering and Technology (2007-08); C.N.R. Rao Educational Foundation Award-G.N.D.U. for Excellence in Research (2007); Ramana Fellowship by DST, Ministry of Science and Technology (2007); Laljee Godhoo Smarak Nidhi Award-AFSTI (2005); Pran Vohra Award-Indian Science Congress Association (1997-98); Appreciation Certificate-Punjab State Council for Science and Technology (1990-93); and the INSA Medal for Young Scientist (1993).

Dr. Singh has an excellent academic record as Coordinator (UGC-SAP) (2012-present); Dean (Faculty of Applied Sciences) (2008-2009 and 2010-2012, G.N.D.U.); Coordinator, University-Industry Linkage Program (2008-2012); Professor, Dept. Food Science and Technology (2000-present, G.N.D.U.); The Royal Society Visiting Fellow, University of East Anglia, Norwich, UK (2007-2008); Visiting Professor, Kansas State University, USA (2006); Coordinator, Centre for Advance Research in Food Sciences, G.N.D.U., (2006-2007); Prof. and Head, Dept. Food Science and Technology, G.N.D.U. (2001-2004); Visiting Professor, Dept. of Human and Health Sciences, Osaka City University, Japan (2004-2005); Visiting Scientist, Institute of Food Research, Norwich, UK (1995-1996); Reader, Dept. Food Science and Technology, G.N.D.U. (1993-2000); Assistant Professor, Dept. Food Sci. and Tech., P.A.U., Ludhiana (1988-1993). He is also serving as Editor-in-Chief of Journal of Food Science and Technology (Springer).

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Broad Area of Interest: Chemical, Bio-Chemical & Food Safety

Resource Person: Digvir S. Jayas, Vice-President (Research and International)

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Date	Modules
Date: 05-01-2018	Lecture: 3.00 h <ol style="list-style-type: none"> 1. Workshop introduction 2. Role of sensor and bio-imaging in automation of food industry 3. Applications of sensors in the food industry 4. Bio-imaging fundamentals
06-01-2018	Lecture: 3.00 h Tutorial: 2.00 h <ol style="list-style-type: none"> 1. Image acquisition and processing 2. Illumination 3. Image processing 4. Image segmentation 5. Image representation and description 6. Image processing (Tutorials)
07-01-2018	Lecture: 3.00 h Tutorial: 2.00 h <ol style="list-style-type: none"> 1. Classification 2. Artificial neural networks 3. Statistical classifiers 4. Comparison of neural network and statistical classifiers 5. Fuzzy logic 6. Artificial neural networks, neural network and statistical classifiers etc. (Tutorials)
08-01-2018	Lecture: 3.00 h Tutorial: 2.00 h <ol style="list-style-type: none"> 1. Imaging under different Spectra 2. Imaging in visible spectrum 3. Hyperspectral imaging 4. Thermal imaging 5. X-ray imaging 6. Imaging in visible spectrum, thermal imaging etc. (Tutorials)
09-01-2018	Lecture: 3.00 h Tutorial: 2.00 h <ol style="list-style-type: none"> 1. Automation 2. Need for automation 3. Current uses of sensors and imaging 4. Advantages and limitations of using sensors and imaging 5. Close workshop: Evaluation sheet to obtain feedback from attendees 6. Uses of sensors and imaging etc. (Tutorials)
Closer of workshop	Conclusions: By Organizer of the GIAN programme: Professor Narpinder Singh Evaluation of "GIAN " by attendees and distribution of Certificates