



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Food Engineering & Technology

Subject Code: 3175101

Subject Name : Automation and Robotics in Food Processing

WEF Academic Year :	2022-23
Semester :	7
Category of the Course :	Professional Elective Course-IV

Prerequisite:Nil

Rationale: This subject introduces students to the applications of automation and robotics in food processing industries to improve efficiency, safety, hygiene, and product quality. It covers automated systems, robotic handling, packaging, sorting, and smart control technologies essential for modern food production. The course prepares factories by integrating theoretical knowledge with practical exposure to advanced food processing equipment and operations.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	P	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	UNIT I Automated evaluation of food quality, food quality quantization and process control, typical problems in food quality evaluation.	5	10
2	UNIT II Data acquisition: Sampling elaboration with examples, concepts and systems for data acquisition such as: ultrasonic signal acquisition, electronic nose data acquisition, frying data acquisition for quality process control, Image acquisition.	6	12
3	UNIT III Data analysis: Data preprocessing, Static data analysis, Dynamic data analysis, Image processing: Image segmentation, Image feature extraction.	4	10
4	UNIT IV Modeling & prediction: Modeling strategies: Theoretical and empirical modeling, Static and dynamic modeling, Linear statistical modeling, ANN modeling, fuzzy logic, artificial intelligence and machine learning. Prediction and classification, Sample classification based on linear statistical and ANN	8	13



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	models, Electronic nose data; One-step- ahead prediction.		
5	UNIT V Control: Process control, Internal model control, Predictive control, Neuro-fuzzy PDC for snack food frying and other processes, Systems integration: Food quality quantization and process control systems integration.	6	10
6	UNIT VI Automation in sorting, thermal processing, fresh produce; Automation in food chilling and freezing; In storage, transport, retail systems; fruit vegetable processing; cleaning, grading, canning etc.	5	15
7	UNIT VII Automation in meat processing, carcass production, separation; before and after chilling; Automation in poultry industry; hanging, conveying, processing, packing; Automation in sea food processing, in unit operations associated.	4	15
8	UNIT VIII Automatic process control in food industry. Process control methods in food industry, current, future trends. Robotics in food industry, specification of food sector robot, control law algorithms.	5	15

Reference Book:

- Caldwell, D. G. (Ed.). (2012). Robotics and automation in the food industry: Current and future technologies. Elsevier
- Kuo, B.C., & Golnaraghi, F. (1995). Automatic control systems, 9e. Prentice-Hall
- Huang, Y., Whittaker, A. D., & Lacey, R. E. (2001). Automation for food engineering: food quality quantization and process control. CRC Press.
- Kress-Rogers, E., & Brimelow, C. J. (Eds.). (2001). Instrumentation and sensors for the food industry. Woodhead Publishing.



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Suggested Course Practical List:

- To study different types of sensors for measurement of temperature, pressure, flow and level
- To study interfacing systems for analogue to digital signals
- To study sensors for automated food process control
- To study different logic controlling systems
- To study computer vision systems used in industries
- To study machine vision systems used in industries
- To study optical sensors and online spectroscopy for automated quality and safety inspection of food products
- To study supervisory Control and Data Acquisition (SCADA) and related systems for automated process control in the food industry
- To study different configurations of industrial robots
- To study gripper technologies for food industry robots
- Case studies and field reports on Food Process Automation and Robotics.

List of Laboratory/Learning Resources Required:

Equipment:

- SCADA system
- Different sensors

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