SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
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Smart sensor systems

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Subject: Smart Sensor Systems

Course code: 18NTO308T

Term: 2023 Odd semester

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Course Days: I order - 4.00 pm – 4.50 pm

II order – 9.45 am – 11.30 am

Unit1	Unit2	Unit3	Unit4	Unit5
Definitions of Sensors and Smart Sensors	Acoustic waves: Fundamentals	Light Detectors	Biosensors definition	Fundamentals of MEMS/ fabrication:
Integrated Smart Sensors and Applications	Piezoelectric materials for acoustic sensors	Photodiodes, Photoresistors	Bioreceptors	Frequently Used Microfabrication Processes
Sensors classifications	Solid state SAW sensors	HgCdTe infrared sensors	Construction of different biosensors	Lithography, thin film deposition
Detection means used in sensors and conversion phenomena	Applications of SAW sensors	Visible-light color sensors, high-energy photodiodes	Immobilization of biological elements	Oxidation, Etching (wet and dry)
Measurements	Acoustic Sensors: Resistive Microphones, Condenser Microphones	Radiation Detectors: Scintillating Detectors	Transduction principles used in biosensing	MEMS fabrication technologies: Bulk micromachining and structures
Units of Measurements	Piezoelectric Microphones	Semiconductor Radiation Detectors	Lab-on-chip/Microsystems/MicroTAS	Surface micromachining and structures
Sensor Characteristics:Transfer Function, Calibration, Static Characteristics	Magnetic sensors	Thermal Sensors: Functional Principle	Microfluidics	High-aspect-ratio technology microfluidics microsystem components
Accuracy, Calibration Error, Hysteresis,Nonlinearity, Resolution, Dynamic Characteristics	Magnetic Effects and materials	Heat Transfer Mechanisms	Microfluidic unit operations	LIGA(Lithographie, Galvanoformung, Abformung)
Physical principles of sensing: electric charges	Integrated Hall sensors	Temperature Sensors	Microsystem Integration	Microsystem components
Electric fields, and potentials	Magnetotransistors	Thermoresistive Sensors	System organization and functions	Application of different Microsystem components
Capacitance, dielectric constant	Force, Strain, and Tactile Sensors	Thermoelectric Contact Sensors, Thermocouple Assemblies	Interface electronics	Nanotechnology:

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Acquire knowledge on various sensor systems
CLR-2 :	Understand different conversion phenomena involved in sensors
CLR-3 :	Describe construction and function of different sensors
CLR-4 :	Gain knowledge on the material requirement for different sensing mechanisms
CLR-5 :	Gain knowledge on individual sensing devices and integration of technologies
CLR-6 :	Understand the basic requirements of basic microsystem technologies and MEMS fabrication processes

Course Outcomes (CO):	At the end of this course, learners will be able to:
CO-1 :	Explain basic concepts, principals and means of detection in smart sensing.
CO-2 :	Apply acoustic, magnetic and piezoelectric based sensing for different applications
CO-3 :	Explain the detection concepts and devices for light, thermal and chemical sensing
CO-4 :	Apply suitable techniques for biosensing and microsystem engineering and integration
CO-5 :	Explain Microsystem fabrication techniques and fundamental of Nanotechnology, future trends
CO-6 :	Utilize the different sensor concepts, system integration and future trends

3	3	3	3	3	3	Engineering Knowledge	1	Program Outcome
2	2	2	3	3	3	Problem Analysis	2	
						Design & Development	3	
						Analysis, Design, Research	4	
						Modern Tool Usage	5	
						Society & Culture	6	
						Environment & Sustainability	7	
						Ethics	8	
						Individual & Team Work	9	
						Communication	10	
						Project Mgt. & Finance	11	
						Life Long Learning	12	
				3	2	PSO-1	13	
		3	3			PSO-2	14	
3	2					PSO-3	15	