

AGRICULTURAL AND FOOD ENGINEERING

DIVISIONS

Farm Machinery and		Land and Water Resources		Food Process Engineering		Agricultural		Aquacultural		Agricultural Systems and	
PROJECT/THRUST RESEARCH AREAS											
1	A-ML enabled Precision Applicators for Fertilizer, Pesticide and Insecticide	1	Hydrological Modelling and Watershed Management	1	Mechanized food processing	1	Enzymology and enzyme technology	1	Development of recirculatory aquaculture and Biofloc systems	1	Crop, water and nutrient uptake modeling & simulation
2	Computer Aided Design and 3D printed agri-machines	2	Precision Agriculture	2	High pressure processing	2	Protein and Food biotechnology	2	Development of ready to eat snacks and foods from aquacultural products	2	Organic farming and sustainable agricultural production
3	Application of Drones, Robots, UGVs in agriculture	3	Climate Change Impact Assessment on Surface and Groundwater Hydrology	3	Microwave & RF processing	3	Oleogenous (phyco-myc) biofuel production through biorefinery process	3	Design, development and testing of different aeration systems	3	Soil and soil process assessment
4	Solar energy operated agri-machines	4	Hydro-climatology and Extreme Weather and Climate Events (Floods, Droughts, Compound Extremes)	4	Mechanization of millets processing and value addition	4	1G, 2G and 3G bioethanol production through circular economy	4	Aqua- feed development using alternative sources of proteins	4	Hyperspectral soil characterization
5	Energy efficient tillage machinery	5	Simulation-Optimization Modeling at a basin scale, Groundwater Pollution Risk Assessment, Sea-Water Intrusion in Coastal Aquifer	5	Cryogenic grinding of spices	5	Microalgal biofuels & algal refinery	5	Mechanized systems for aquaculture and processing operations	5	Affordable and portable soil sensor development and smartphone-based soil characterization via AI-ML
6	Biofuels for power generation	6	AI/ML Applications in Extreme Events (Floods) Monitoring, Sub-Surface Hydrology	6	Nonthermal surface sanitization of foods	6	Biodegradable films from cyanobacteria	6	Modular-based aquacultural farming practices as sustainable eco-friendly approach	6	Digital soil mapping
7	IoT based smart agri-machines	7	Crop Modelling and Simulation	7	Solar drying	7	Plant volatiles biosynthesis and emission	7	Advanced smart aquaponics systems	7	Climate change adaptations & mitigations
		8	Diffuse Agricultural Pollution, On farm Water Management	8	Functional foods, nutraceuticals and RTE health foods	8	Abiotic stress signaling and promoter characterization	8	Seaweed farming and by-product recovery	8	Water and solute transport
		9	Land-Atmosphere Interactions, Atmospheric Moisture Transport during Monsoon	9	Extrusion processing	9	Varietal development through molecular marker	9	Freshwater pearl culture	9	Tea and betel leaf production & processing
		10	Application of Remote Sensing and GIS in Natural Resources Management	10	Extraction and encapsulation of Bioactives from plant sources	10	Variety development of Assam lemons			10	Economics of agro-production & processing, agricultural cash flow and marketing management
		11	Complex Networks Application to Food-Energy-Water Nexus	11	Modified atmosphere packaging and Intelligent/Smart packaging						
				12	Biodegradable packaging films						
				13	Algal Food Biotechnology						
				14	Microbial food safety						
				15	3D printing of food						
				16	AI and ML in food processing						

RESEARCH OUTCOMES

Farm Machinery and		Land and Water Resources		Food Process Engineering		Agricultural		Aquacultural		Agricultural Systems and	
1	Tractor operated micro-controller based variable rate fertilizer applicator	1	Wireless Sensor Networks for irrigation water management	1	Mechanized production of Indian milk sweets	1	Technology on different industrial enzymes namely, amylopullulanase, amylase, amyloglucosidase, cellulase, protease, laccase, lipase, xylanase, polygalacturanase, tannase to name a few	1	Aqua waste water treatment systems using different techniques	1	Developed enriched vermicompost production technology and established organic input management for improvement of crop yield and quality in the food chain.
2	Sensor based ultra-sonic pesticide sprayer for orchard crops	2	Satellite based Hydrological Model	2	Ready-to-eat Therapeutic Food for SAM children	2	Technology on 2G ethanol	2	Circular stepped cascade- pump (CSCP) aeration system	2	Crop simulation models are parameterized for yield forecasting, which supported weather-based agro-advisory for farmers for planning agricultural operations as climatic risk management.
3	On-the-go position sensing and controller predicted contact-type weed eradicator	3	Efficient drainage system for IIT Kharagpur	3	Improved quality fruit pulps and beverages using non-thermal protocols	3	Technology on starchy agro residues to lactic acids and PLA	3	Single screw extruder for fish feed pellets	3	Optimum weather variables for improving hybrid rice production system in subtropical India has been quantified.
4	Combined (active-passive and passive-passive) tillage implements	4	Image-based analytics for crop condition monitoring using UAV	4	Air-recirculatory tray dryer for fruits and vegetables	4	Technology on microbial cellulose production	4	Fish filleting system for Rohu	4	Drip irrigation with SPAD-based precision nitrogen management has been developed for rice and potato crops.
5	Hydrostatic continuous variable rate power transmission system	5	Improving crop productivity using precision irrigation & nutrients under open field and protected cultivation structures	5	RF dryer for tea	5	Waste utilization for the production of bioplastic and biodiesel from microalgae	5	Mechanized deboning system	5	Diffuse Reflectance Spectroscopy was used to predict soil physical, chemical, and biological properties.
6	Embedded system for indicating seed flow and choking in seed delivery tubes of tractor drawn seed drill	6	Scientific Framework for sustainable groundwater management at a basin scale	6	Solar dryer	6	Scent volatiles emission in evening-blooming flowers	6	Recirculatory aquaculture system	6	p-XRF was used to rapidly predict elements in soil, crop, and water.
7	Machine-vision based portable seed flow rate measurement system	7	Cost-effective techniques and improved management strategies for water conservation, groundwater augmentation and protection, and sustainable management of water and land resources in selected river basins.	7	Aloe vera gel filleting machine	7	Impact of light emitting diode on leafy vegetables and medicinal plants	7	Biofloc system	7	Smartphone and AI-ML were used to cost-effectively predict soil texture and soil organic carbon.
8	Automatic tractor slip-draft embedded system	8	Quantification of human intervention and climate change on natural flow regime	8	Healthy fruit bars			8	Smart Aquaponics	8	A portable acoustic sensor was developed and validated for in-situ soil moisture prediction.
9	Automatic sugarcane bud cutting-cum-bud planting machine			9	Iron fortified rice and other fortified food products					9	Digital soil map of India has been produced using internationally accepted norms.
10	Solar energy operated paddy weeder, paddy thresher and boom sprayer			10	Modified atmospheric packaging for perishable foods						
11	E-reaper for harvesting paddy			11	Bioactive film for food packaging						
12	Biodiesel production			12	Detection of adulteration in milk using FTNIR spectroscopy						
				13	Low cost food processing machineries for rural people						
				14	Essential oil extractor						
				15	Betel leaf based novel food products						
				16	Technology for preservation of fresh betel leaf						