



Agricultural technologies from IIT's to fields

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Introduction:

Indian Institutes of Technology (IITs) are known nationally and internationally for excellence in technical education, innovation, entrepreneurship, and research. IITs, with their rich legacy and global branding, are the best place to pursue research in agricultural technology.

The IITs encourages multi-disciplinary research and facilitates financial support for the presentation of research outcomes in international fora that ultimately helps interdisciplinary and international collaborations. The major domain of research and development includes Precision agriculture, biofuel and bioenergy, modern food processing, plasticulture and micro-irrigation, Climate Change, hydrological modeling, groundwater management, water management, agricultural biotechnology, Pollution abatement, extrusion technology, intelligent and high-pressure packaging, soil mapping and image analysis for plant phenotyping.

Rural Different Departments of Agricultural and development in IITs in India

Centre for Rural development and Technology:

Centre for Rural development and Technology is one of the renowned academic units of IIT Delhi for agriculture research & technology. It came into existence in 1979 with the aim of becoming an outreach center of IIT Delhi to address challenges faced by rural communities and to improve their quality of life.

It has made significant contributions by developing and transferring technologies in areas including algal bioenergy, biomass technologies, biogas technologies, ecological sanitation, food quality, and safety, sustainable agriculture, sustainable housing, value-added food products, water, and waste management, sustainable agriculture research, and education, etc.

School of Agro and Rural Technology (SART):

SART renamed from Centre for Rural Technology in the year 2021, at IIT Guwahati promotes multidisciplinary activities such as

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teaching, research and provides consultancy in various facets of rural sectors with special emphasis on training and research needs of the Indian rural sector and contributing to International research in Appropriate Technology for the rural community. The Centre for Technology Alternatives for Rural Areas (CTARA) of IIT Bombay now has an M.Tech Program in Technology and Development and a Ph.D. Program. Agriculture and Water Technology Development Hub (AWADH) is a research center at IIT Ropar established with support from the Department of Science and Technology (DST) to carry out cutting-edge interdisciplinary research in the field of agriculture and water.

The Bio X center at IIT Mandi serves as an ecosystem to facilitate collaborative research in various areas of agriculture, environment, and human health. The Centre's mission is to pursue excellence in research, innovation, and discovery with a focus on life sciences and technology development by promoting multi-institutional and interdisciplinary research activities in health-related and Agri-based challenges. The department of Water Resource Development & Management of IIT Roorkee is actively involved in research, development, and extension activities in the areas of water

resources, hydropower, and irrigation management.

Objective of IITs Technologies in Agriculture:

IITs Technologies in agriculture developed to increase production, resolve chemo-physical, biological and socioeconomic constraints related to crop production. The technology covers everything from powered machinery that does work formerly performed by people and animals to enhanced seed technologies that support crop growth and protect plants from insects.

The challenge of climate change and increased need to better protect and manage natural resources is driving research and development in agriculture technologies that allow farmers to more efficiently utilize resources. The resources can be water and nutrients, build soil health through precision agronomic systems, enhanced seeds that will produce crops that positively impact human health as well as animal Husbandry breeding and Tramadol practices that will safely and humanely increase the output of meat and protein products such as milk and eggs.

Role of IITs Technologies in agriculture:

The role of IITs technology is very important in agriculture also. Higher output or crop yield would depend upon the nature of

technology. The main factor in agricultural production land which is limited in supply so. Technology plays a crucial role in agriculture.

Agricultural technology mainly refers to technology for the production of machines used on a farm to help with farming. Agricultural machines have been designed for practically every stage of the agricultural method. They consist of machines for tilling the soil, planting seeds. Irrigation the farmland cultivating crops. And also consists of plants protecting from pests, harvesting. Livestock feeding, and sorting and packaging the products People who are trained to design agricultural machinery, agricultural equipment, and structures are known as agricultural engineers.

New Agriculture Technology Invented by IIT KANPUR For farmer:

Design and Development of Autonomous Robot for Crop-Monitoring and Localized Pest Neutralization.

Motivation:

Sustainable and profitable farming is essential for economic growth. Automation and AI/ML-based technologies can help farmers increase their productivity. It has the potential to increase agricultural yields and reduce losses. Farming is a major source of income in our nation's economy. As a result, raising agricultural output is essential. The use

of pesticides must be minimized, and disease-related losses must be prevented. Keeping these goals in mind, our lab has accepted the challenge of developing new technologies to help solve this critical issue.

Objectives:

- Autonomous Robot development for:
- Monitoring local conditions (temperature, humidity etc.) in the farm
- Autonomous navigation (manual override option available)
- Smart sensors (high resolution camera) and algorithms (AI/ML based) to detect local infestation of crops •Efficient deterrence by localized pesticides delivery mechanism to the affected area.
- Advance precision farming technique.
- Display for real-time image feeds from inaccessible regions on the farm.

Agricultural Environmental Observatory:

The first line of technology which we have developed is KriPaN (Krishi Parayavaran Nirikshak, Agriculture Environment observatory). It is a robot/observatory to monitor field conditions and collect field data. It can scan the entire field autonomously and can collect required data. It is one of the unique kinds of system and patent has been applied



Fig. 1: Agricultural Environmental Observatory
Plant Disease Investigator:

The proposed developed robot is able to identify the plant disease in potato and tomato field. It roams in the field and observes the plant which are disease prone or diseased. It keeps that information and shares with KriPaN or Surya.

Crop Treatment Robot:

This robot is in the final phase of development. This robot can apply to proper treatment to diseased plants. It works in the coordination with SaRP or KriPaN.

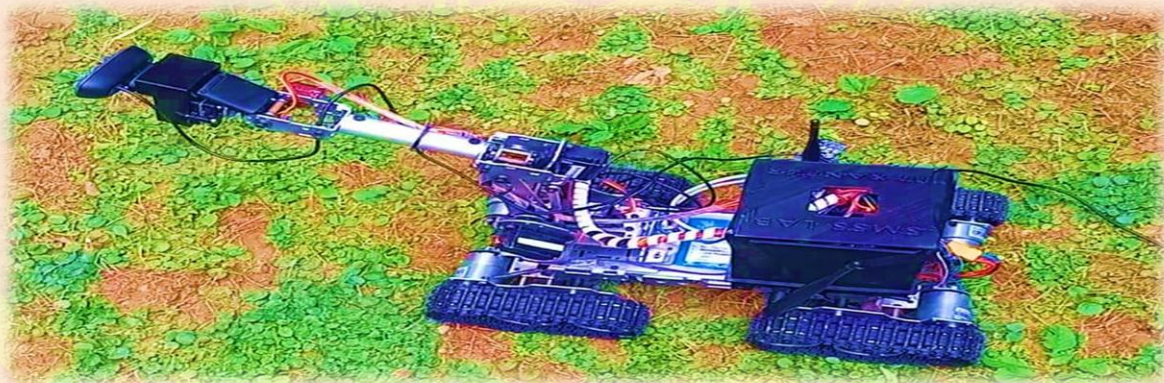


Fig. 2: Plant Disease Investigator



Fig. 3: Crop Treatment Robot

How can we more utilities IITs –

Technologies for farmers:

In India, the agricultural techniques of IIT can be reached to the farmers of the village in a better way, one of which is the Krishi Vigyan Kendra. The Government of India and the State Government together can bring together Krishi Vigyan Kendra and IIT, which will prove to be very useful for the farmers. For dissemination, by giving knowledge of technology to the Agricultural Extension Scientist in IIT, we can take it to the villages of Krishi Vigyan Kendra

Conclusion:

World population is slated to grow to about 9 billion by 2050. The challenge is to find ways and means to produce enough to feed it. The challenge of reducing acreage under agriculture and food wastage in production and distribution are having a major impact on the world. The increasing role of technology in addressing these issues is the only way forward to a food-secure future. Technology can help save foreign exchange for countries, increase productivity, and lead to an improvement in the overall standard of farmer communities. India has a long way to go in adoption of modern farming practices through technology. The pace is slow and path-breaking efforts need to be made to educate farmers about the benefits to be had

with technology. Transcending the barriers of archaic farming practices and medieval mindsets is the challenge that needs to be overcome for a better tomorrow. Technology in agriculture has the potential to truly lead India to be "Atmanirbhar Bharat" in all respects, and be less dependent on extraneous factors.