



AGRITHON

COME WITH AN IDEA - LEAVE WITH A STARTUP

11th & 12th Feb, 2023



विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY

सत्यमेव जयते



भारतीय प्रौद्योगिकी संस्थान तिरुपति



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AGRITHON 2023

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on February 11-12, 2023 at IIT Tirupati

Agrithon 2023 aimed to provide a platform for students & researchers to develop innovative and smart Agricultural practices. This is a 24-hour challenge for students & researchers to work on novel, practical, economical, and eco-friendly ideas/practices for mitigating challenges and problems in agriculture using Positioning and Precision Technologies. Throughout these two days, these student teams work under the mentorship of Industry Experts Lt. Col. Velan, Mr. Ravikumar R, Mr. Amba Shankar, Setu Sharma and Tanvi Baddula, faculty members from IIT Tirupati Dr. Madan Mohan, Dr. Sunil Kumar, and faculty members from IISER Tirupati Dr. Srinivas Chavali, Dr. Ramireddy, and Dr. Annapurna Allu.

35 teams consisting of 116 students from various institutions across the country have come to present their ideas.

IIT Tirupati Director Prof KN Satyanarayana inaugurated Agrithon 2023 hosted by IIT Tirupati Navavishkar I-Hub Foundation in association with The GAIN and Absolute which is going to happen today and tomorrow. In the inaugural address, Prof Satyanarayana spoke about the current state of agriculture in India and mentioned major areas to improve and help the agri-community. He also talked more about the importance of agriculture in the Chittoor district. Along with the Director, CEO of The Gain Varad Rajan Krishnan, Project Director of IITTNiF Technology Innovation Hub Dr Roshan Srivatsav, Hub CEO Srinivasa Murthy Banda, faculty, industry experts, THE GAIN team, IITTNiF team, researchers and students were present.

After the inauguration, there was a technical session by Lt. Col. Velan where he emphasized on PNT, its uses and scope in agriculture followed by intense discussion, and a question & answer session. We also had a business session by Mr Varad Rajan Krishnan covering the intricacies of how to start a business, go to market strategies, and scale up a business followed by a question & answer session. Upon gaining familiarity with the concept of PNT and the challenges, participants conducted a thorough analysis of the selected challenge and designed solutions to the subsequent which were checked and mentored after the stipulated time. Based on the inputs received from the mentors, the participants created prototypes or solutions for the challenge. Curating the first phase of the presentation by designing, iterating, and refining was again checked and mentored, and then the student teams worked and compiled their solutions in the second and final phase of presentation to pitch. The jury panel got to hear the solutions pitch and announced the winners. The top three teams were awarded medals and prize money in the valedictory ceremony. Top five teams were taken on board as mentees. These teams will be mentored by the industry partners Absolute & The Gain and IITTNiF team.



Glimpses of Agrithon 2023



Agrithon 2023 Themes and Challenge Goals

1. Theme: Precision Agriculture

- a. Sub-Theme: More precise and better application of pesticides, herbicides and fertilisers controlling the spread of these chemicals through precision agriculture reduces costs, produces higher yields and creates a more environmentally friendly farm.
- b. Challenge goal # Utilizing PNT - Position, Navigation & Timing, Devise a method to aid farmers in improving their agribusinesses

2. Theme: Technology Adoption and Food Security

- a. Sub-Theme: Modern PA management systems have rarely been implemented on the small, low-mechanized farms that produce a large proportion of the world's agricultural output, and these farms are prevalent in the least food-secure regions.
- b. Challenge Goal # It is imperative that technology designed to improve productivity, efficiency, and sustainability plays a crucial role in the agriculture sector in order to feed a growing population while using fewer resources.

3. Theme: IOT Technology

- a. Sub-Theme: Automation of greenhouses. By delegating greenhouse management to a precision agriculture IoT platform, many greenhouse functions and processes can be fully automated. For example, humidity, temperature and lighting can be adjusted automatically. Thanks to precise cultivation systems, even the dose of soil or nutrient solutions can be controlled in the greenhouse without human supervision.
- b. Challenge Goal # Encouraging farmers to adopt the use of agricultural precision sensors to monitor soil moisture, crop health and nutrient levels so that valuable real-time data is available in the long term.

4. Theme: Drone Technology

- a. Sub-theme: One of the latest developments is the growing use of small unmanned aerial vehicles (UAVs), commonly known as drones, in agriculture. Drones are remote-controlled aircraft without a human pilot. They have enormous potential in agriculture as a supporter of evidence-based planning and spatial data collection. Drones could use computer vision to analyze field conditions and deliver precise interventions such as fertilizers, nutrients and pesticides where plants need them most. Or they can plant seeds in remote locations, reducing equipment and labor costs. By reducing costs and improving revenues, drone use could generate \$85-115 billion in value. How to enhance agritech via subsequent?
- b. Challenge goal # Encouraging farmers for the deployment of precision agriculture sensors to monitor soil moisture, crop health and nutrient levels to provide valuable real-time information over the long term.



Problem Statements & Proposed Solutions of Top five teams

Team 1: AI4N

Problem Statement: AI based solution for N-Fertilizer Recommendation

Proposed Solution: Detection of nitrogen using image processing and AI based technology. The objectives of this proposed solution are to give a personalized recommendation (soil type, climate, crop type, local weather, soil pH and region of cultivation is taken into consideration), help optimize fertilizer use which could reduce waste, and promote sustainable agriculture practices, improve crop yield and quality, and reduce costs and increasing revenue. To execute this solution, we will use technologies like machine learning, deep learning and IoT.

Team 2: Kshetrajna

Problem Statement: The farmer is unable to get good crop yield due to lack of proper crop management. Crop management can be done by building a workflow model consisting of various stakeholders, thus integrating the diversified agriculture domain. The farmer will be able to use the platform built for proper crop management.

Proposed Solution: We propose a platform that allows service based interactions between different stakeholders (Farmers, Consultant, Model builder, Banks/Insurance, Agricultural Literacy, Virtual Mandi, Agri Tourism). Each stakeholder is an Individual entity and has his own dashboard. plug n play stakeholders. The platform allows everything to be at one place with customizable workflows. Farmer field Inspection using data of the field (images taken) at various stages of crops at various locations. Consultant will monitor the workflow compliance [digital discipline]. Consultant fee concession will be based on tie up with logistics and farming services.

Team 3: Agility at Work

Problem Statement: Artificial Groundwater Recharge Optimization is to educate and inform the audience about the current state of groundwater resources, the challenges and opportunities for improvement, and the potential benefits of implementing artificial recharge techniques.

Proposed Solution: We provide innovative and sustainable solutions that help improve the productivity and sustainability of agricultural operations, while also conserving and protecting groundwater resources for future generations.

Team 4: Tech Rusher

Problem Statement: Farmer Suicides and Poverty due to limited access to financial services such as loans, insurance, and savings and can't get all facilities from Government Entities and Disconnection between Farmer-Godowns-Bank.

Proposed Solution: App where farmers can get the access to the information directly without Dealer/3rd Parties.



Team 5: Fruit Ninja

Problem Statement: To develop a machine that cuts fruit by using a drone-based Global Navigation Satellite System (GNSS). To build a fruit-cutting machine that works on solar and electric energy. To make an automatic height adjacent machine for cutting fruit. In minimum time to cut large quantity amount of fruits by using image processing system. Without cutting the branch free we cut fruit by standing on the ground

Proposed Solution: The primary objective of the present invention is to disclose the automatic fruit-cutting machine based on Global Navigation Satellite System (GNSS). Another objective of the present invention is to disclose the automatic fruit-cutting machine capable of detecting ripe fruits by means of IR sensors and cutting them from their trees. Another objective of the present invention is to disclose the automatic fruit-cutting machine that is simple, easy to operate accost-effective. Yet another objective of the present invention is to disclose the automatic fruit-cutting machine which reduces the wastage of time during the fruit harvesting season is and helpful in supplying the harvested fruit on time in the market without any delay advantages like as Cost saving Time-saving Without cutting the branch free we cut fruit by standing on the ground Self-operation We also use this machine as a source of light in farm Height adjacent safety cutting

Problem Statements & Proposed Solutions of other participating teams

- ✓ This project aims to address the challenges faced by healthcare providers in managing large amounts of data obtained from IoT-connected devices in hospitals. The proposed solution is to store the data in a secure and decentralized manner using blockchain technology. This approach not only protects sensitive patient information but also allows for quick and easy access to data by authorized personnel. The competition seeks to encourage the development of innovative and practical applications of IoT and blockchain in healthcare, with the goal of improving patient outcomes and the efficiency of data management in hospitals. The competition is open to individuals and teams with a background in technology, healthcare, or both, and offers a unique opportunity to showcase their skills and contribute to the advancement of the healthcare industry.
- ✓ The farm-consumer divide refers to the lack of direct communication between producers and consumers of agricultural products causing issues such as inefficient distribution, lack of transparency, a decline in farmer profitability, and poor food quality. Connecting farmers and consumers through a website can create a more sustainable and efficient food system. A proposed solution to the farm-consumer divide is a website connecting farmers and consumers for direct communication and trade. The website features produce listings, location-based search, payment and shipping systems, and a feedback and review system. By connecting farmers and consumers, the website aims to build a sustainable, efficient, and transparent food system.
- ✓ Farming with the help of drones such as spraying pesticides and noticing the crops whether there is any damage in plants and watering crops and analyze field conditions.



- ✓ Plant Disease detection and fertilizer recommendation which helps in cost reduction, increasing the productivity.
- ✓ Our project idea is a blockchain-based Agriculture platform that aims to improve efficiency, transparency, and market access in the agriculture sector. The platform will allow for secure and transparent tracking of products from farm to market, provide a direct link between farmers and godowns, and allow for accurate record keeping. Additionally, it will simplify regulations and make it easier for farmers to access finance. The platform will also allow for the efficient distribution of seeds and raw ingredients from government entities to farmers, further improving the efficiency of the value chain. Our goal is to bring benefits to all stakeholders in the agriculture value chain and make a positive impact on the industry.
- ✓ Smart Crop Protection from Animals: Finding the movement of Animals like Rabbits, Rats and Wild Boars in the crop through their movement. Our idea is to identify them through motion sensors integrated with Artificial Intelligence and Internet facilities.
- ✓ Irrigation management using precision agriculture sensors, Farming polishes off over 70% of water across the world. There is a water shortage and cautious conveyance of water at cultivating sites is important. To utilize the water productively precision agriculture sensors can be utilized to follow soil dampness and increment the ranch's efficiency and natural manageability. For instance, assume that we consider a field that has paddy crops on one side and there are vegetable yields on the opposite side. Paddy crops require more water contrasted with vegetable yields. At the point when there is precipitation, utilizing precipitation and dampness sensors one can quantify the expected measure of water vital for the field moreover.
- ✓ One project idea could be to develop a drone-based crop monitoring system. The system would use multispectral cameras and other sensors to collect data on crop health, including plant vigor, chlorophyll content, and stress levels. This information could be used to create high-resolution, multispectral maps of fields, which could help farmers optimize irrigation and fertilizer applications, reduce input costs, and improve yields. The system could also be used to detect and respond to crop diseases and pests, by using AI algorithms to identify and track outbreaks, and recommend control measures. The drone could also be used for seed planting and spraying. The project would require a combination of expertise in drone technology, precision agriculture, and computer vision.
- ✓ The idea is based on reducing the troubles and problems faced by *Gloriosa superba* cultivating farmers in my native - Dindigul district. Introducing cost efficient microbicides and promote large scale cultivation with less expensive. Introducing microbicide resistant plant itself by genetic engineering. Introducing compact universal drone sprayer even from small scale farmers to large scale farmers. The second idea is geo-tagging the agricultural products to value added them and bring benefits to farmers.
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- ✓ Water Quality and Pipeline Monitoring System Using IOT: In recent times, most of the water is contaminated due to pollution. This contaminated water contains high pH value and other harmful substances to the crops. using some sensors we can control the damage to the crops. Water wastage is high because of leakage in water pipelines (Drip). using RTC we can control the leakages, using flow sensor we set the water flow to the plants.
- ✓ Since our Indian farmers perform agricultural activities by hand which is a lot time consuming and do not produce high yield. Though there are many machines but they can't afford them. So for this we have designed an electrically powered multipurpose machine which will do the things like (fertilization in soil, sowing, harvesting and stubble treatment) using positioning and precision technology. Some of the features will be driven by the pneumatics. For stubble treatment, our machine will be connected to cloud to know the requirement of stubble by the companies of wood pulp to manufacture paper and the rest stubble shall be crushed to be provided as a humus to the soil. We may also put self-driving mode. All the data related to crop(what it needs and at what time) will be stored in the software and Machine can be programmed for any crop. So we can store the data about a crop that how much resource we have spent on it and how much else it needs.
- ✓ A feature rich agriculture dashboard is being built to connect four types of stake holders - Farmer, Agro-consultant, Data Provider and AIML based Prediction modeler. The system facilitates different sources of data including drone based, IoT sensors, human labels, photographs, analytics of textual and formatted and model predictions as well. The agro-workflow module provides to define customized workflows for farmers, crop type, location type involving customized inclusion of other entities. The idea is to provide an SDK/library/platform that serves at B2B level to enable other start ups or academics to build and maintain their own agriculture use cases.
- ✓ To monitor the temperature humidity and CO2 levels that are present in the greenhouse and then automate tasks and make data available to farmers via gsm, Whatsapp,telegram and other social media
- ✓ The controlled atmosphere and modified storage bags reduce the application of chemicals for sprout inhibition by controlling the inside gas composition to extend the "shelf-life of the onions". PDMS-based modified cotton hydrophobic coating bags gives controlled ventilation that regulates moisture and gas levels in the storage environment and absorbs the moisture from inside (hydrophilic, water contact angle $\approx 105^\circ$). The gas transmission rate through the coated bags is dependent on pore size (\hat{I}^4m/nm), temperature (\hat{a},f), and coating thickness (\hat{I}^4m/nm).
- ✓ To develop and implement a model that enable personalized individual farm management with Geographic information at global levels integrated with multi-sensor, multi-platform, multi-resolution, high-performance computing framework.



- ✓ My idea is to use remote Sensing, GIS and machine learning to locate the current fruit crops and find the suitable sites for fruit crops under current scenario and climate change scenarios in Himalayan landscape. Using remote sensing and machine learning will reduce the cost of resources and increase the farmers income many folds and give far better results than real survey.
- ✓ First of all India is a Agriculture Country that's why more technology are required but we do not provide agriculture technology fullfill. So As a Agriculturist at first we are provide agriculture technology in rural area as soon as possible. Another part Food security is more important in our country. Food security also a agriculture technology.
- ✓ As per my prospective Technology play very great role in Agriculture and but some of them also affected In Negative way also at last i want to say if there are Marits of Technology and derma it of technology.

Hear from the participants



Team Name: AI4N
Vellore Institute of Technology

I am happy because of the IIT Tirupati experience, Extraordinary Hackathon, Talented friends over there, smart water bottle as gift, speaking at IIT Stage, confidence, mentors (IIT Tirupati one), photos, and newspaper coverage (The Hindu) and the smiling environment.



Team Name: Responsecode 304
Velagapudi Ramakrishna Siddhartha Engineering College

I thought that killing an idea is end. But the mentors reached us that killing an idea is a starting point thank you to all the mentors.



Team Name: Nikshepa
Indian Institute of Technology Tirupati

Agrithon 2023 is a cutting-edge hackathon that brings together students, technologists, and academics to conceptualize, develop, and render notions of AI, IoT, ML, GNSS, and other technologies that will shape agriculture in the future. Agrithon 1day hackathon event creates a venue for creative minds to propose their work-in-progress answers to pressing Agritech problems. I'm thrilled to be taking part in this event.



Team Name: DreamHunters
Bannari Amman Institute of Technology

We are especially grateful to the AGRITHON team for providing us the chance to participate because we gained fresh knowledge and ideas for developing our product.



Team Name: Fruit Ninja
Vishwakarma Institute of Technology

As a participant in Agrithon - 2023, I was impressed with the diversity of attendees and the range of topics covered in the event. The conference provided an excellent opportunity for me to learn about the latest agricultural innovations and technologies and connect with experts in the field.





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