PROPOSAL ON

ADVANCED AGRICULTURAL DRONE PILOT TRAINING FOR OPERATION AND MAINTENANCE

CENTRE FOR WATER AND GEOSPATIAL STUDIES
TAMILNADU AGRICULTURAL UNIVERSITY
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I. Background

Drones are rapidly becoming a valuable tool for agriculturalists in India. They can be used for a variety of applications, including crop monitoring, precision agriculture, seeding and planting, irrigation, and harvesting as the technology develops. The market size of the drone industry in agriculture in India is still in its early stages and is growing rapidly. Drones can be used to improve agricultural productivity and efficiency in a number of ways.

The market size in 2023 is estimated to be $100 million and is expected to grow at a Compound Annual Growth Rate (CAGR) of 38.5% in the next 5 years, reaching $600 million by 2028. In the next 10 years, the market is expected to grow at a CAGR of 27%, reaching $1.5 billion by 2038. There are number of factors driving the growth of the drone industry in India especially in agriculture, which include a. increasing demand for food production in India, b. need for more efficient and sustainable agricultural practices and c. government's support for the development of the drone industry.

The government of India has been supportive for the development of the drone industry in agriculture. In 2021, the government released a new drone policy that is designed to promote the use of drones in a variety of sectors, including agriculture. The policy includes measures to simplify the regulatory framework for drone use, provide financial incentives for drone adoption, and promote the development of drone-based solutions for agriculture. As the drone industry in agriculture in India continues to grow, we can expect to see even more innovative and efficient drone-based solutions being developed and the widespread adoption of drones by farmers. These solutions will help to improve agricultural productivity and efficiency, and they will also help to protect the environment.

The vantage of using drones in agriculture is felt by the Indian farmers in recent years which are reflected on the proliferation of drone companies across the country. Some of the main challenges faced by the Drone Industry in Agriculture are a) Lack of skilled operators who are trained to use drones in agriculture make it difficult for farmers to get the most out of drones. b) Shortage in service centres for repair and maintenance of agricultural drones which restricts the purchase of drones by the farmers and c) Lesser availability of agricultural inputs suitable for drone applications.

In order to overcome these challenges, Director General for Civil Aviation (DGCA) with Government of India (GoI) is facilitating capacity building programs to develop trainers for trainees and providing certification for pilot training. There is an increase in the usage of Drones in the rural areas of India and the need for Drone Maintenance and Service professionals. To cater the needs of the growing Agricultural Drone Industry in India, TNAU has initiated a capacity building program **"Advanced Agricultural Drone pilot training for operation and maintenance"**.

II. Objectives

1. Inculcate technology know how's of Drone to ensure holistic drone knowledge for proper handling during crisis and to follow DGCA norms.
2. Impart Pilot training and Licensing through simulations and hands on experience in mapping and agricultural drones.
3. Empowering professionals with drone operation, Maintenance and servicing skills.

III. Facilities at TNAU

With a vision to transform the landscape of agriculture and address the evolving needs of farmers, Tamil Nadu Agricultural University has consistently pushed the boundaries of knowledge and technology in the agricultural domain. Our faculty comprises a dedicated team of experts, researchers, and scholars who work tirelessly to develop cutting-edge solutions and practical insights that benefit farmers and promote sustainable agricultural practices.

TNAU has been working extensively with Farmers, FPO, Pesticide and Agro chemical manufacturers, and other stakeholders in the agriculture industry and understood the need for introducing high-tech solutions to address day to day needs. One area where we have identified a significant gap is the integration of drone technology in agriculture. Drones have emerged as a powerful tool with the potential to revolutionize farming practices, offering a multitude of applications that can enhance productivity and optimize resource utilization. However, the lack of adequate training and knowledge in utilizing drones effectively has hindered their widespread adoption among farmers.

Understanding the importance of addressing this gap and harnessing the transformative potential of drone technology, TNAU conduct comprehensive drone training programs to various sectors of the farming community, aiming to empower stakeholders with the necessary skills and expertise to leverage drones for various agricultural tasks, thus enabling them to make informed decisions and achieve higher yields and profitability.

To cater the training program needs and to facilitate a hassle-free environment, TNAU has developed sufficient infrastructure viz.,

1. **DGCA Type Certified Indian made Training and Agricultural Drones:**

TNAU has acquired various types of Drones which are used both in mapping and agricultural input delivery to provide through knowledge to the trainees on pros and consof using them. The Number of drones available with TNAU, sensors and its uses are presented below.

Sl. No.	Model	Number	Applications
1.	Fixed Wing drone	1	Large scale mapping & Disaster assessment
2.	Quad Copter with **multispectral, Thermal and RGB** Sensor (Small category)	1	Crop Health Monitoring and water stress detection
3.	Quad Copter with **Thermal and RGB** sensor (Very Small category)	1	Crop phenotyping studies
4.	Fuel Operated Hybrid **spraying** drone (Medium category)	2	Smart delivery of Agricultural Inputs
5.	Battery Operated **spraying** drone (Small category)	4	Smart delivery of Agricultural Inputs
6.	Battery Operated **seeding** drone (Small category)	1	Delivery of seed materials
7.	Training drones	2	For remote pilot training
8.	Training simulators	6	For remote pilot training

Battery Operated Spray Drone

Fixed Wing Mapping Drone

Quad Copter mapping Drone

Training Drone

2. **Smart classrooms for Interactive learning:**

To facilitate effective teaching of Drone technology, know how's, a well-equipped smart classroom with interactive display, audio and video systems, facility for conducting online class is available to accommodate around 60 trainees at a time.

3. State of the Art Technology Simulator Room:

With the latest advancements in virtual reality, augmented reality, and other cutting edge technologies a simulator room to train the trainees in piloting different Drones and to understand handling of Drones during crisis is set up exclusively. These high-tech tools allow users to engage with a wide range of scenarios and simulations, replicating real-world situations with astonishing realism.

4. Advanced learning enabled Laboratories:

Knowledge on Drone piloting is important for better handling of different sectors of Drones as and when needed. Similarly, knowledge on maintenance of these Drones is equally important in order to overcome minor issues that may occur during the flight. Hence the trainees are also given with hands on experience to maintain and service the Drones.

5. Airfield of 10+ acres dedicated to Advanced Drone flying Training:

Hands on experience in flying Drones are the foremost objective of the program. The trainees are exposed with more number of flying hours with various categories of Drones in order to get acclimatized with the flying techniques. TNAU has a dedicated area for catering this need.

IV. Program Overview

Advanced Training on Drone Piloting is conducted for different category of stakeholders based on the requirement and also the expertise required. In this Proposal, Two types of training program is proposed, one for the Staff/Professionals of SAU's and ICAR, which will be an 12 days training with pilot licensing and the next one with 24 days period which include maintenance and servicing of Drones apart from pilot training and license. The overviews of the proposed programs are detailed below.

S.No	Program Details	Advanced Pilot Training & Licencing	Advanced Pilot Training for flying, Maintenance, Service & Licencing
1.	Type	Residential Program	Residential Program
2.	Trainees per Batch	20 nos.	20 nos.
3.	Cost/Fee Per Trainee	Rs. 62,000	Rs. 1,00,000
4.	Location	Tamil Nadu Agricultural University	Tamil Nadu Agricultural University
5.	Total Number of Days	12 – 15 days per Batch	21 days per Batch
6.	Materials Provided	Training Manual, Agricultural SOP document, Log Books for Pilots, and Drone Related Reference Materials	Training Manual, Agricultural SOP document, Log Books for Pilots, and Drone-Related Reference Materials
7.	TheoryClass	24 hours	32 hours
8.	Lab &	08 hours	24 hours

	Practicals		
9.	Simulator	08 hours	08 hours
10.	Airfield Flying Hours	50 hours	110 hours
11.	Highlights	- Trainees are trained by **flying the advanced survey grade and agricultural grade drones** on fields - Participants are tested with different operations and aspects of Drone technology and application - On successful completion will be awarded **DGCA Approved Remote Pilot Certificate** - Training is conducted in actual Agricultural fields to create better awareness of **Crop monitoring and Spraying** - Trainees are trained to perform **Spraying on different types of crops** including Rice, Banana, Coconut tree, etc. Training is provided with different types of high- precision drones to make sureparticipants can configure thepayloads as per the Land areas.	- Trainees are trained by flying advanced **survey-grade and agricultural-grade drones on fields.** - Participants are made to perform multiple advanced operations and assessed to learn various aspects of Drone technology and its application. - On successful completion, trainees will be awarded **DGCA Approved Remote Pilot Certificate** - This Programme specializes in Providing hands-on skills for trainees **to become maintenance and service providers for the Drone Industry**. - Trainees are also trained to perform maintenance and service activities in various drones. - Training enables them to **become approved Maintenance Personnel** in the Villages for Kisan Drones - This training enables the trainees to set up an approved service center in the near future to support thegrowing market of Drones in Rural areas. - Training is provided with different types of high-recision drones to make sure they can configure the payloads as per the Land areas
12.	Expected Outcome	- Skill Enhancement - Research Advancement - Teaching and Curriculum Development	- Skill Development - Hands-on Experience flying different Drones - Regulatory Knowledge on

		- Industry Collaboration - Campus Management - Professional Development - Interdisciplinary Opportunities - Public Relations and Marketing - Engagement and Outreach - Emergency Response and Safety - Innovation Hub - Professional Networking - Adapting to Future Trends	operating drones - Safety - Industry-Specific Knowledge - Entrepreneurial Opportunities - Networking opportunities that can help in future careers. - Technology Familiarity - Aerial Photography and Videography - Environmental Applications - Problem-Solving Skills - Maintenance and servicing skills

* Fee includes accommodation.

V. Management

The Program will function in the Department of Remote Sensing and GIS, Centre for Water and Geospatial Studies, TNAU, Coimbatore. Reporting and final documentation will be submitted by the Department of Remote sensing and GIS. The Progress of work will be reviewed by the Vice Chancellor, Tamil Nadu Agricultural University, Coimbatore, The Director of Research, and the Director (CWGS), TNAU, Coimbatore periodically.

Director (CWGS)