



# NAHEP-CAAST-VNMKV-DFSRDA

## INFORMATION BROCHURE

### AGRI-DRONE DIVISION

NAHEP-CAAST-DFSRDA:

BRINGING DIGITAL FARMING EXCELLENCE THROUGH FOSTERING STUDENTS,  
TEACHERS, ENTREPRENEUR AND FARMERS BY  
AGRI-BOTS, AGRI-DRONES AND AGRI-AGVS



Dr. Gopal U. Shinde  
Principal Investigator (PI)

National Agricultural Higher Education Project  
CENTRE OF EXCELLANCE : DIGITAL FAMING SOLUTIONS FOR ENHANCING  
PRODUCTIVITY BY ROBOTS, DRONES AND AGVS

Vasantrao Naik Marathwada krishi Vidyapeeth Parbhani,  
Maharashtra (INDIA)  
[www.nahep.vnmkv.org.in](http://www.nahep.vnmkv.org.in)

## INTRODUCTION

### AGRI-DRONES DIVISION

An agricultural drone is an unmanned aerial vehicle used to help optimize agriculture operations, increase crop production, and monitor crop growth. Sensors and digital imaging capabilities can give farmers a richer picture of their fields. Using an agriculture drone and gathering information from it may prove useful in improving crop yields and farm efficiency.

Agricultural drones let farmers see their fields from the sky. This bird's-eye view can reveal many issues such as irrigation problems, soil variation, and pest and fungal infestations. Multispectral images show a near-infrared view as well as a visual spectrum view. The combination shows the farmer the differences between healthy and unhealthy plants, a difference not always clearly visible to the naked eye. Thus, these views can assist in assessing crop growth and production. Figure 1 shows the spraying in the agriculture crop field.

Additionally, the drone can survey the crops for the farmer periodically to their liking. Weekly, daily, or even hourly, pictures can show the changes in the crops over time, thus showing possible “trouble spots”. Having identified these trouble spots, the farmer can attempt to improve crop management and production.



### **Agri-Drones Division Objectives:**

- I. Establishment of laboratories training hall, training material, manuals of Agri-Drones.
- II. Preparation and Publication of digital tutorials, books, articles and leaflet and extension material for NAHEP-VNMKV Centre.
- III. NAHEP faculty/PG/Ph.D. student's & faculty capacity building program through national and international training, conference and workshop for Computing, IT, Mechatronics and mechanical engineering perspective.
- IV. Development of course modules under Agri-Drones, division for certificate courses.
- V. Development and training of PG/Ph.D. students and farmers for entrepreneurship (small start-ups).
- VI. Revenue generation through conducting various courses related to mapping, scouting and spraying through the drones.
- VII. The integration of the drone technology in the research objectives of PG/Ph.D. Students and faculty research.



## COURSE MODULE FORMULATED DFSRDA AGDRONE: FIRST SEMESTER (COURSE STRUCTURE)

Subject Code	Subject Name	Teaching Scheme			Examination Scheme								
		Hours per Week		No. of Credits	Theory					Practical			
		Theory	Practical		Duration of Paper (Hrs.)	Max. Marks University Assessment	Max. Marks Internal Assessment	Total Marks	Min. Passing Marks	Max. Marks University Assessment	Max. Marks Internal Assessment	Total Marks	Min. Passing Marks
DFSRDA-AGDRO-101	Fundamentals of Agri-DRONE	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-102	CAD/CAM in Agri-DRONE	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-103	Agri-DRONE Mechatronics	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-104	Agri-DRONE Computing	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-105	Agri-DRONE Maintenance	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-107P	Mini Project	-	02	1	2 Hrs	-	-	-	-	25	25	50	25
DFSRDA-AGDRO-108P	Mechatronics Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25
DFSRDA-AGDRO-109P	Image Processing Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25
DFSRDA-AGDRO-110P	Sensors, Actuators and PLC Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25

## DFSRDA-AGBOT: SECOND SEMESTER (COURSE STRUCTURE)

Subject Code	Subject Name	Teaching Scheme			Examination Scheme								
		Hours per Week		No. of Credits	Theory					Practical			
		Theory	Practical		Duration of Paper (Hrs.)	Max. Marks University Assessment	Max. Marks Internal Assessment	Total Marks	Min. Passing Marks	Max. Marks University Assessment	Max. Marks Internal Assessment	Total Marks	Min. Passing Marks
DFSRDA-AGDRO-201	Agri-DRONE in CDKS	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-202	Agri-DRONE in SSPN	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-203	Agri-DRONE in SPM	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-204	Agri-DRONE in FPA	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-205	Elective-I	04	-	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-206	Elective-II	-	02	2	3 Hrs	80	20	100	40	-	-	-	-
DFSRDA-AGDRO-207P	Major Project	-	04	2	4 Hrs	-	-	-	-	50	50	50	50
DFSRDA-AGDRO-108P	Agri-DRONE Hardware Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25
DFSRDA-AGDRO-109P	Agri-DRONE Software Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25
DFSRDA-AGDRO-110P	CAD/CAM/CAE Lab	-	02	1	2 Hrs	-	-	-	-	25	25	50	25



## Events/Achievements

NAHEP/CAAST Project “Centre of Excellence for Digital Farming Solutions for Enhancing Productivity by Robots, Drones and AGVs” was sanctioned by ICAR, New Delhi on dated 12<sup>th</sup> July 2019. The project work for the develop the excellence in the field of Education and Research Using the digital technology for PG/PhD and Faculty



Inauguration Ceremony of NAHEP Centre at VNMKV, Parbhani



NAHEP-CAAST-VNMKV-DFSRDA Team along with national coordinator

## Planning Meetings with Knowledge Partners

One day planning meetings were organised with IIT Kharagpur and IIT Powai for mutual collaborative activities and Technology Transfer. The MOA were framed and signed between both Knowledge partners and NAHEP CAAST DFSRDA VNMKV Parbhani.



Meeting with Knowledge Partner-Indian Institute of Technology, Powai, Mumbai regarding MOA



Meeting with Knowledge Partner - IIT Kharagpur regarding MOA

## International Workshop

The severity of global population and climate change necessitated for application of automation like Drones, Robotics automated, guided Vehicle (AGV's) Artificial Intelligence(AI), Internet of Things (IoT), Information Technology (IT) in agriculture sector. Digital farming comprises applications of modern automation machines for clean sustainable growth of food for the rapid growth of population. Digital farming solutions are used for crop cultivation, growth monitoring, transportation and agricultural management applications. These advanced machines/devices are most useful in embedded farming activities right from nursery to post harvesting process and can be more effectively used in IoT. So, there is need to understand what is digital farming solutions and their applications in the agriculture field for researchers, faculty/students to develop and enhance in the agricultural productivity.



**Moments in “Digital Farming Practices by Agri-bots, Agri-Drones and Agri-AGVs” from 13<sup>th</sup> March to 15<sup>th</sup> March 2020**

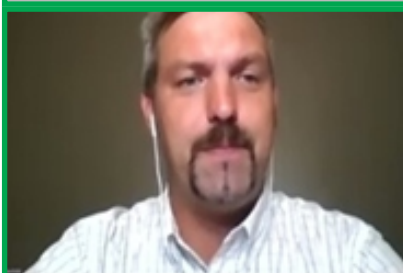
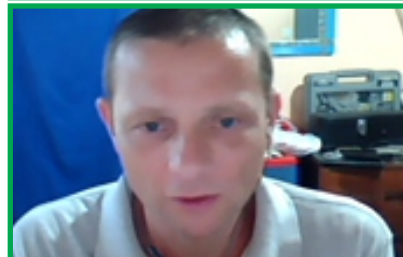
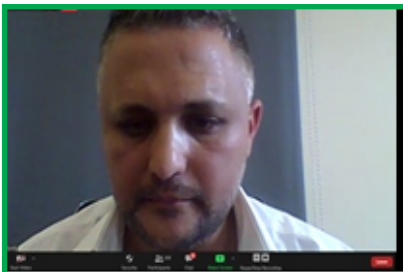
## International Seminar (Online) on “Digital Technologies for Smart Agriculture: A Futuristic Plan” from 10<sup>th</sup> August to 13<sup>th</sup> August, 2020

The NAHEP CAAST-DFSRDA Parbhani centre is engaged in development of human resources in the area of agriculture through various academic, research and extension activities for students, scientists and faculties. As a part of this, various online Training programmes, Seminar and other activities are being planned and conducted during COVID-19 pandemic lockdown Period. In this regard, it is proposed to organize International Seminar in collaboration with **ISA-Parbhani chapter** and **ISGPB-Parbhani chapter** entitled “**Digital Technologies for Smart Agriculture: A Futuristic Plan**”. The proposed International Seminar will cover the recent advances and Robotic Technologies used in the discipline of Agronomy and Agricultural Botany which will benefits students and faculties of all relevant disciplines of agriculture. This training includes theory, research based lectures were delivered by identified experts from various national and international organizations.

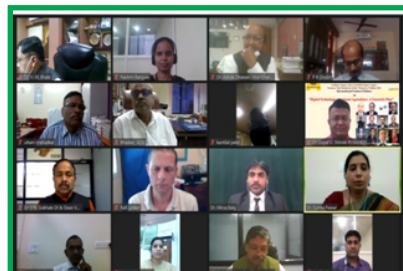
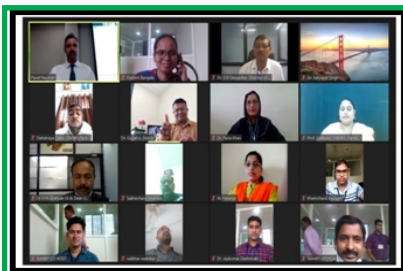
Date	Speaker Name	Subject
10.08.2020	Prof. Dr. PARAG CHITNIS Director, USDA, NIFA, USA	Keynotes Speech on “Global Scenario for Smart Agriculture”
	Prof. Dr. MOSTAFA AL KURDI Director of Tyre Campus, American University of Technology, Lebanon	Smart Farming and Precision Agriculture by using UAV and UGV Robots
11.08.2020	Prof. Dr. PAVEL NAVITSKI Associate Prof. Engineering Department Oral Roberts University Tulsa, Oklahoma, USA	Digital Technologies for Plant Protection in Precision Farming
	Prof. Dr. MIKHAIL TATUR Byelorussian State University of Informatics and Radioelectronics, Minsk, Belarus	SMART- Agriculture Educational Process for Specialists Belarus to India
12.08.2020	Prof. JESZAEEL CRISTOPHER Agricultural Science Faculty, National University of Rosario, Argentina.	Artificial Intelligence: Genetics Algorithms Applied to Optimization of Mechanization Systems
	Dr. LAV. R. KHOT Agricultural Automation Engineering, Department of Biological Systems Engineering, Washington State University, WSU, USA.	Precision Agriculture and Automation Technologies for Specialty Crop Production Management
13.08.2020	Prof. Dr. LABAD RYMA Department of Agronomy, Ferhat Abbas University –Sétif- Algeria.	Advanced Automated Herbicide Applicator Machineries in Algeria
	Dr. V. PRAVIN RAO Hon. Vice Chancellor, PJTSAU, Hyderabad, India President, ISA, New Delhi	Keynote Speech 1
	Dr. P. K. GHOSH National Director and Hon. Vice Chancellor, NIBSM, Raipur, Chhattisgarh, India	Keynote Speech 2



**Hon. VC Dr. A.S. Dhawan and Dr. Prabhat Kumar addressing the Gathering**

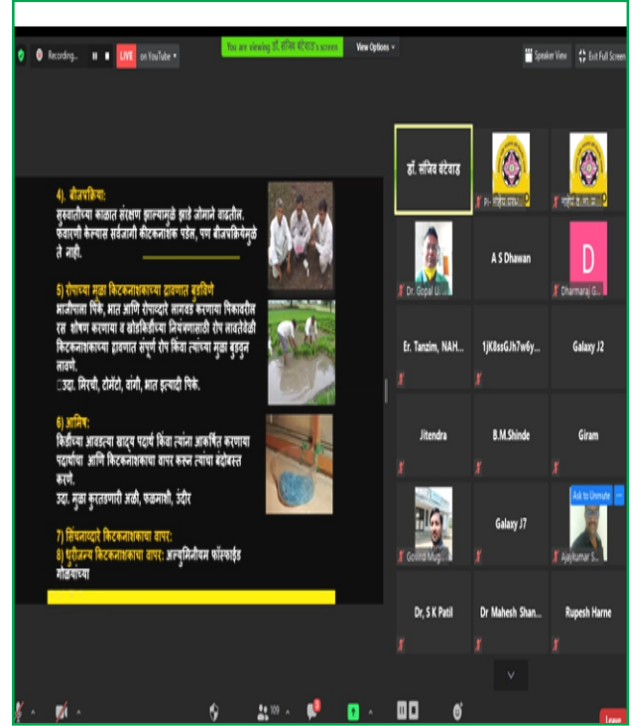


**Eminent Speaker in online International Seminar**



**Participant in Online International Seminar**





“सुदृढ पर्यावरणसाठी कृषि रसायनाचा संतुलित वापर”  
 (Safe use of Agricultural Chemicals for Sustainable Environment) (In Marathi)



54<sup>TH</sup> ISAE Convension

**CENTRE OF EXCELLENCE FOR DIGITAL FARMING SOLUTIONS FOR ENHANCING PRODUCTIVITY BY ROBOTS, DRONES and AGVs.**  
**VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI (M.S.) INDIA**  
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**Former Vice Chancellor Dr. V. M. Mayande**



**ISAE-President Dr. Indramani**

**54<sup>th</sup> ISAE Convention and International Conference on Artificial Intelligence in Agriculture**

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**Dr. Lav Khot , WSU, Washington USA**



**Dr. ROSNAR, Dr. Balasubramyam Malaysia**



**Dr. Tyae Sam, Nigeria**



**Dr. Hazarika, AIT Bangkok Thailand**



**Dr. John Reid , John Deere, USA**




## 1. Activities Held under the Agri-Drone Division:

The regular activities are going on at the NAHEP centre related to Agri-Drones viz. field crop mapping, crop spraying and crop monitoring.

The Agri-drone division is continuously involved in the training and demonstration of Agri-Drones for the awareness of the researchers (PG/Ph.D. Students and Faculty) as well the farmers regarding the application of the drones in agriculture.

### “Hands on Agri-Drone Training for Spraying and Mapping” organised in collaboration with ASAP Agritech, Nashik, Maharashtra.

Classroom training for the identification of the various drone parts and handling of the drone with the checklist before flying to avoid any kind of collision.



### Demostration of the Spraying octacopter by Mr. Ajit Kharjul of ASAP Agritech to core team members for the spraying and mapping application



**Configuring drone GPS for the spraying drone at Department of Agriculture Metrology by Dr. Dheeraj Kadam**



**Spraying of the hericide in the field for the experimental trial of the agronomy students Ms. Pranshvi, Ms. Mahalaxmi and team**



**The demonstration of the mapping drone by Dr. Gopal U. Shinde Sir and Team to Smt. Varsha D. Thakur- Ghuge, I.A.S., CEO of Jila Parishad, Nanded, Researchers team from KVK Sagroli, and Farmers.**



**Demonstration and Presentation of Various parts of Agri-drone and their importance during the flight is presented to the researcher's team at KVK Sagroli.**



**Hands on drone flying Experience to Smt. Varsha D. Thakur- Ghuge, I.A.S., CEO of Jila Parishad, Nanded.**



**Experimentation on the field mapping through DJI Phantom Drone on Agriculture Entomology and Metrology Department and the M. Tech. Student Ms. Pornima Rathod.**



**Demonstration of the Agridrones and attachments to Mr. Satish Chavan, Member of legislative council, Dr. Rahul Patil, Member of Legislative assembly, Honourable Vice Chancellor Dr. A.S. Dhawan, Er. Ranjeet Patil, Registrar, Dr. D.N. Gokhale DI & Dean (F/A) and Dr. R.P. Kadam (Co-PI) NAHEP, VNMKV, Parbhani.**





**Inauguration Ceremony**



**NAHEP-CAAST-VNMKV-DFSRDA Team along with national coordinator**



**Demo of Agri-Drone in front of NAHEP-CAAST-VNMKV Team**



**NAHEP VNMKV Centre Parbhani MoU with Chatrapati Shahu College of Engineering Aurangabad MS India**



**Meeting with Knowledge Partner - IIT Kharagpur regarding MOA**



**Brainstorming Workshop at Department of Horticulture, VNMKV, Parbhani.**





**Brainstorming Workshop at Department of Horticulture, VNMKV, Parbhani.**



**GIS Training for Faculty**



**ISAE 54<sup>th</sup> Annual Convention and International Symposium on Artificial Intelligence Based Technologies in Agriculture**



**ISAE Annual Convention and International Symposium on Artificial Intelligence Based Technologies in Agriculture**



**3D Printing Demonstration at Big Zero Technology, Pune**



**3D Printing Demonstration at Big Zero Technology, Pune**



**Brainstorming Workshop at Department of Agronomy, VNMKV, Parbhani.**



**Demo of Agri-Drone for Spraying application at the Department of Agronomy**



**Brainstorming workshop for Department of Extension and Department of Agricultural Economics**



**Brainstorming workshop for Department of Extension and Department of Agricultural Economics**



**Demo of Robotic Robot at NAHEP-CAAST-DFSRDA Centre.**



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