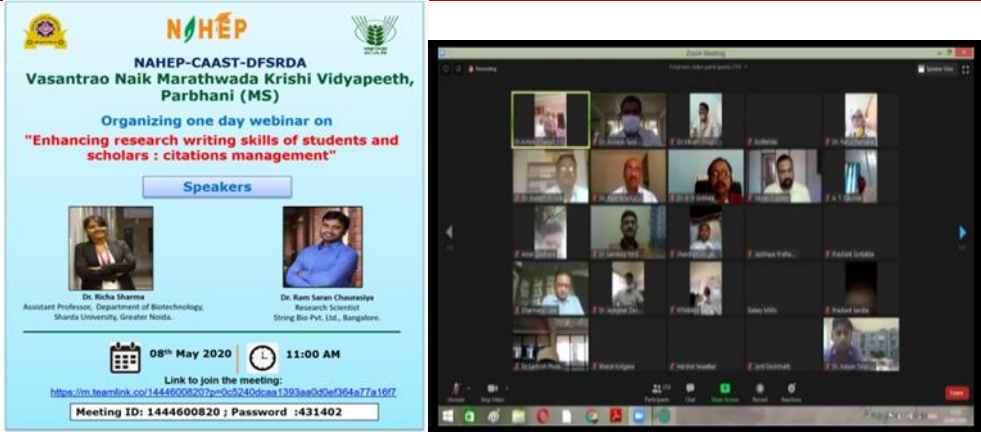# Indian Council of Agricultural Research
National Agricultural Higher Education Project (NAHEP)
Krishi Anusandhan Bhawan-II, Pusa Campus, New Delhi
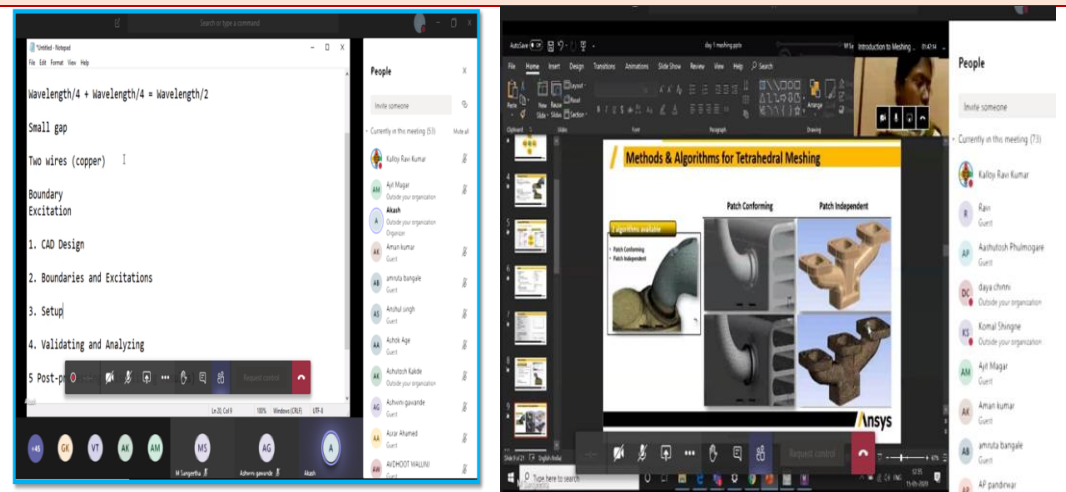
Proforma: Details of the pilot courses developed under NAHEP

Particulars	Response
Name of Au/ICAR Institute : Vasantrao Naik Marathwada Agricultural University,Parbhani	
Component of NAHEP : CAAST 1B	
Type of the course	Entrepreneurship Development Skills
Name of the course: International Workshop on "Digital Farming Practices by Agribots, Agri-Drones and Agri-AGV's")	
Core Subject of the course	Agricultural Drones, Agricultural Robots, Agricultural AGV
Purpose of this development/ upgradation	The objective of the workshop is to acquaint the participants with advance digital technologies like Robots,Drones,AGV used in precision agriculture
Course credit (L+P=Total)	3L+3P=6
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology
Number of beneficiaries so far	210

Course Content	1. **Day 1**: i. Precision agriculture: The catalyst for digital disruption in farming
	            ii.Apollo-11,Chandrayan –II & windmill
	            iii. Application of ANN in Agriculture,Modeling and control of Quad copters
	2. **Day 2**: i. Agri Drones
	            ii. Robotics Technology for Agricultural Sector- Recent developments
	            iii. Krishak bot, Farmers Companion,Demonstration on KINNOVA Arm from Canada
	3.**Day 3**: i. Industry 4.0: Digital Farming Applications
	            ii. Sustainable and Clean Energy for Digital Farming ,Applications of CAD/CAM
	            iv. Artificial Intelligence for agriculture,Agricultural Drone Demonstration by ASAP

Course commencement	15 – 17 March 2020
Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

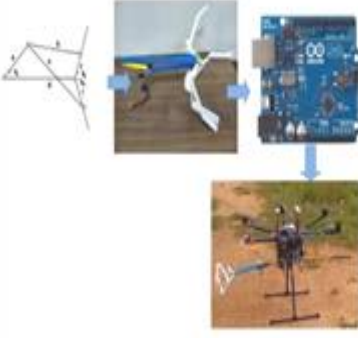| Particulars	Response
Type of the course	Remedial Course
Enhancing research writing skills of students and scholars: Citations Management	
Core Subject of the course	Writing Research Reports and Thesis, Writing Research, Review Papers
Purpose of this development/ upgradation	This course is designed to further develop students' reading and writing skills and strategies to enhance their knowledge about how to prepare research paper and Thesis
Course credit (L+P=Total)	1L+1P
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	345
Course Content	1Module 1:Overview of Research Module 2:Literature review & Selecting and defining a research problem Module 3:Conducting the research, Examples of Research at the University Module 4:Writing Research Reports and Thesis, Writing Research Proposals
Course commencement (Start date- 1st Batch)	8 May 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	
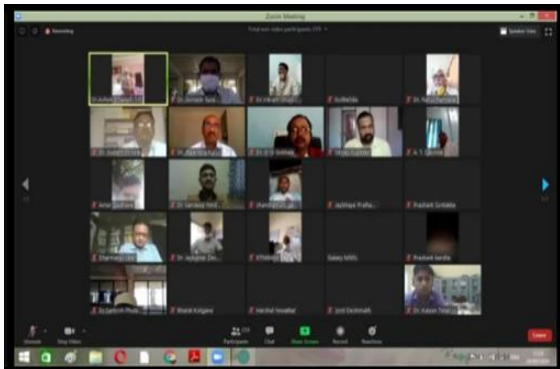
Particulars	Response
Type of the course	Industry Oriented Course
Three week E training on Basic Practices of Ansys 2020R1 for Agricultural Researcher	
Core Subject of the course	Ansys R1(CAD/CAM/CAE)
Purpose of this development/ upgradation	The aim of course is to impart simulation skills through ANSYS software to Faculty and PG/PhD student's and develop innovative Mechanical elements using different ANSYS Modules Viz. Structural, Space Claim Direct Modeller (SCDM) , Computational fluid dynamics (CFD), Electromagnetic (EM), meshing, High Frequency Structure Simulator (HFSS).
Course credit (L+P=Total)	5L+13P=18
Developed for	Faculties and PG/Ph.D students of Agricultural Engineering/Technology
Number of beneficiaries so far	170
Course Content	Module I. SCDM Module II.MESHING Module III.WORKBENCH Module IV. Geometry in SCDM Module V.CFD Module VI.EM Module VII.HFSS
Course commencement	12 May -29 May 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	
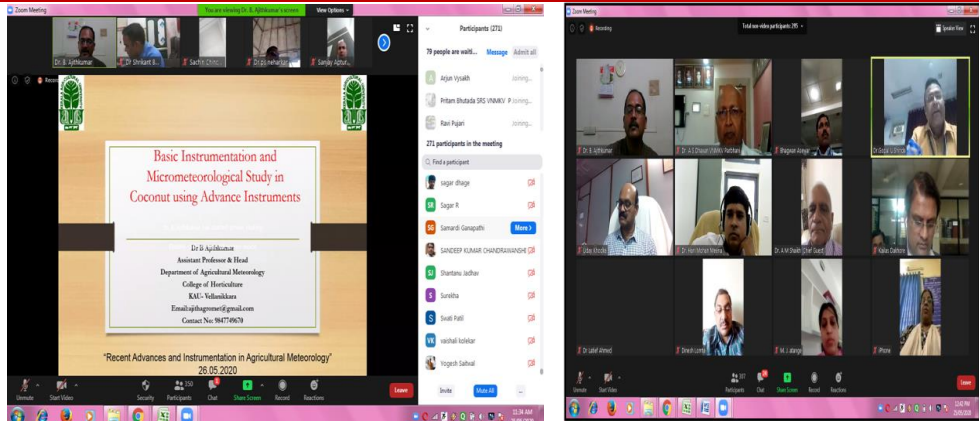
Particulars	Response
Type of the course	Entrepreneurship Development Skills
Online Farmers Workshop on "Soybean Cultivation"	
Core Subject of the course	Soyabean Cultivation(Marathi)
Purpose of this development/ upgradation	This workshop is organized to give information to participants about different seed variety and cultivation techniques for Soyabean
Course credit (L+P=Total)	1L+1P
Developed for	Farmers, Faculties and PG/Ph.D students of Agricultural disciplines
Number of beneficiaries so far	1000
Course Content	Different treatment for Soyabean seed before cultivation Selection of Soyabean seed before cultivation and availability of seed Use of different fertilizers dose after cultivation
Course commencement	18 May 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	Online Farmers Workshop on "Soybean Cultivation" on 18 May 2020 in presence of AgriculAgricultural Minister (Hon. Dadaji Bhuse), Maharashtra State

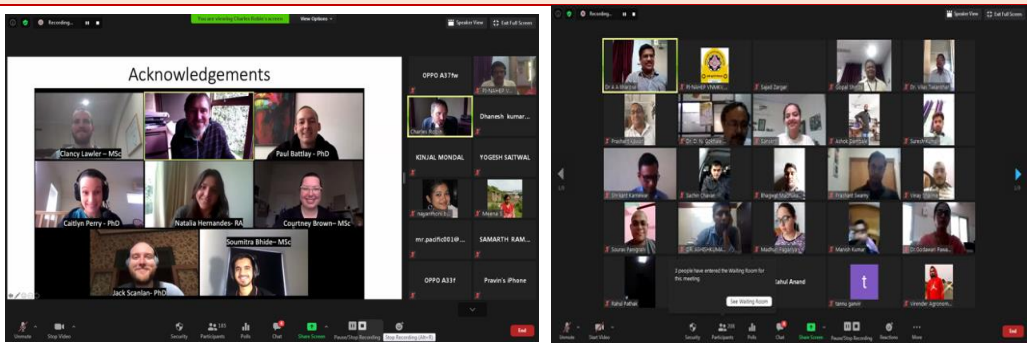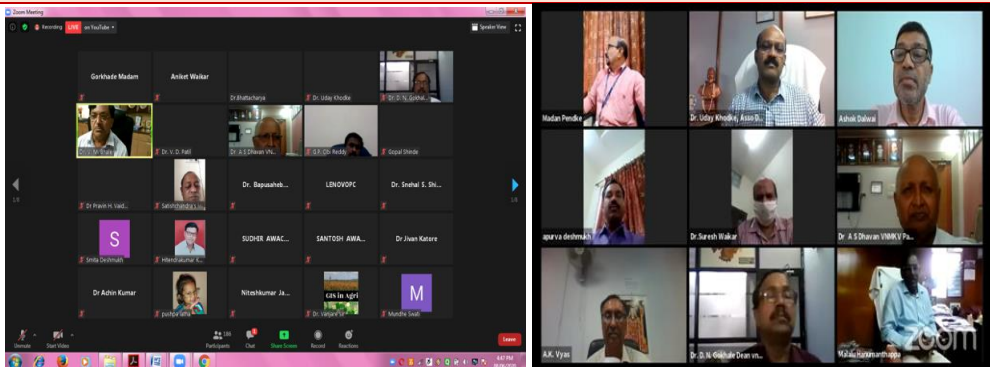| Particulars	Response
Type of the course	Creative and innovative Thinking
Aerial grasping Application for agriculture researchers-An Overview by UAV	
Core Subject of the course	Agricultural Drones
Purpose of this development/ upgradation	The aim of training to give Exposure to participants about basic working principal of drones and software used for controlling it.
Course credit (L+P=Total)	1L+2P=3
Developed for	PG/Ph.D students of Agricultural Engineering/Technology & Agricultural science disciplines
Number of beneficiaries so far	72
Course Content	Details about drones applications in agriculture and different software used for image processing of drones
Course commencement	23 May 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Remedial Course
One week E-training on Recent Trends in Academic writing	
Core Subject of the course	Agricultural Drones
Purpose of this development/ upgradation	The aim of training to give Exposure to participants about basic working principal of drones and software used for controlling it.
Course credit (L+P=Total)	2L+3P=
Developed for	PG/Ph.D students of Agricultural Engineering/Technology & Agricultural science disciplines
Number of beneficiaries so far	424
Course Content	1. Plagiarism Check Issues 2. Urkund Anti Plagiarism Software :Practical Session - How to upload thesis in Urkund for Plagiarism Check. - Generation of Plagiarism Report in Urkund. - How to edit the level of Plagiarism 3. Scientific Research Metrics :Impact Factor, Researcher ID , Citations (SCOPUS & Web of Science) and Visibility of Research Through Vidwan IRINS 4. Ethical aspects in quality publication 5. Cite while you write
Course commencement	20 -24 May 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Creative and innovative Thinking
Two week E Training on Recent Advances and Instrumentation in Agriculture Meteorology	
Core Subject of the course	Agricultural Instrumentation & Meteorology
Purpose of this development/ upgradation	The aim of training to give Exposure to participants about basic principal and applications of instruments in agriculture, use of real time weather data advance weather forecast for risk management in agriculture.
Course credit (L+P=Total)	10L+5P=15
Developed for	Farmers, Faculties and PG/Ph.D students of Agricultural science disciplines
Number of beneficiaries so far	457
Course Content	1. Basic Instrumentation and Emerging Technologies for Crop Science and Micro-Meteorology 2. Measurements and Sensing of Agrometeorological Variables and Processes 3. Free Air CO2 Enrichment (FACE) Technology for agriculture 4. Recent Satellite Agrometeorology advancement of instrumentation in Agrometeorology 5. Introduction to Meteorological Forecasting Products and their uses 6. "Evapo-Transpiration (ET) System – Basic Principles and Various Instrumentation for ET Monitoring" 7. Monsoon 2020 and Initiatives Meteorological Observational Network 8. Green House and Glass House Meteorological Soil & Gas Detection Instruments
Course commencement	26 May -02 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Creative and innovative Thinking
International E-training on Advance Digital and Biotechnological Tools in Modern Agriculture	
Core Subject of the course	Biotechnology
Purpose of this development/ upgradation	It was design to familiarize students and professionals in biotechnology about current research trends, relevant cutting-edge technologies for high-through put analysis and interdisciplinary areas that are embraced in leading laboratories.
Course credit (L+P=Total)	10L+5P=15
Developed for	Faculties and PG/Ph.D students of Agricultural science disciplines
Number of beneficiaries so far	485
Course Content	• Applications of Biotechnology in Interdisciplinary Agriculture • Genome editing: Technological Advancements for Designer Crops • NGS for Crop Improvement" or"Advances in biotechnological tools for Crop Improvement. • Selective sweeps and gene drives • Applications of modern biotechnological tools in crop improvement: Present status and future prospects • Research and Operations to trial innovation glass and photovoltaic technologies in protected cropping • Principals and applications of Plant genetic transformation • RNAi based insect control and current constraints • Bollworm Resistance to Bt Cotton in India • Plant Proteomics: Towards Understanding Biology
Course commencement	26 May -02 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

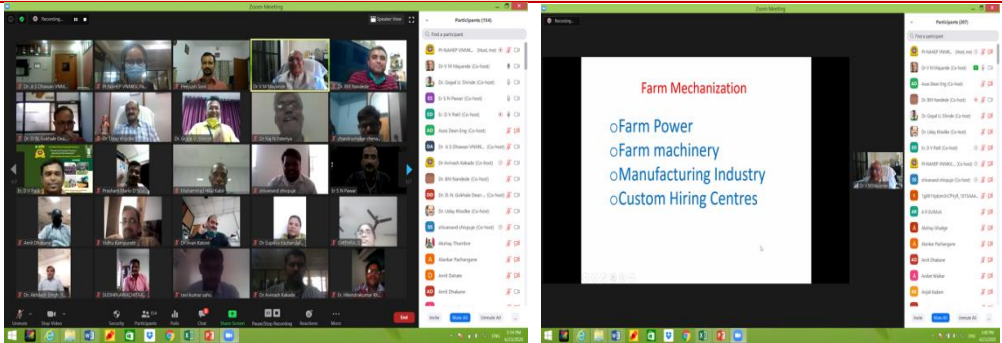| Particulars	Response
Type of the course	Creative and innovative Thinking
E-training on Applications of Remote sensing & GIS in Digital Agriculture	
Core Subject of the course	Remote sensing and GIS
Purpose of this development/ upgradation	This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Expose participants in GIS and RS applications in Water management disease/pest management and agriculture resource management in agriculture.
Course credit (L+P=Total)	6L+4P=10
Developed for	Faculties and PG/Ph.D students of Agricultural science disciplines
Number of beneficiaries so far	340
Course Content	- Geospatial Technology Application in Agriculture - Bhuvan Geoportal for Agriculture research and applications in Digital Agriculture - Remote Sensing and GIS technologies for Ground water Development & Management - Geospatial Technologies in Land Resource Management - Monitoring Nutritional Status by Using Hyper Spectral Remote Sensing - BHOOMI Geoportal : An Innovative IT Platform Towards Digital Agriculture - Space Technologies in Earth Sciences & Societal Issues related to the Oceans. - Role of Remote Sensing and GIS in Decision Support System in Agriculture - Use of Geospatial Technology in Digital Soil Mapping
Course commencement	04 -08 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

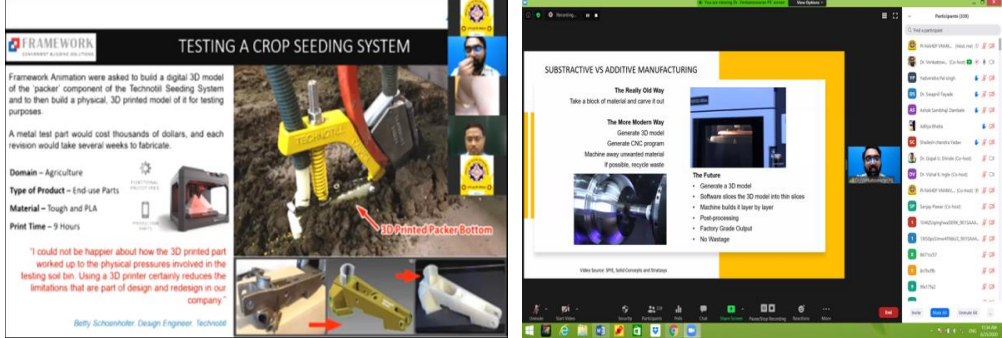| Particulars	Response
Type of the course	Creative and innovative Thinking
E training on COVID 19 Pandemic: Impact and strategies for Agricultural Education	
Core Subject of the course	COVID 19 Virus Awareness and Precautions
Purpose of this development/ upgradation	The E-training was created awareness about nutritional care in women workers and students to fight against pandemic situation. Even after percolation of knowledge base to grass root level, it maintained social distance among the trainer and participants through this digital platform.
Course credit (L+P=Total)	L+P=10
Developed for	Farmers, Faculties and PG/Ph.D students of Agricultural science, Engineering,Technology disciplines
Number of beneficiaries so far	403
Course Content	• Corona virus infection, prevention and control World updates • COVID-19 Present and Future Situational Analysis • Diagnosis of COVID-19 • Current clinical scenario of COVID-19 • Present therapeutic options in Indian context in COVID -19 • Nutritional Deficiency and Management in COVID-19 • COVID 19: Cause, Treatment and Daily Management at Household level • Safeguarding emotional health during COVID-19 Pandemic • Immunity Sustenance in COVID-19 Pandemic • Develop positive psychology during COVID-19 pandemic
Course commencement	09 -13 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

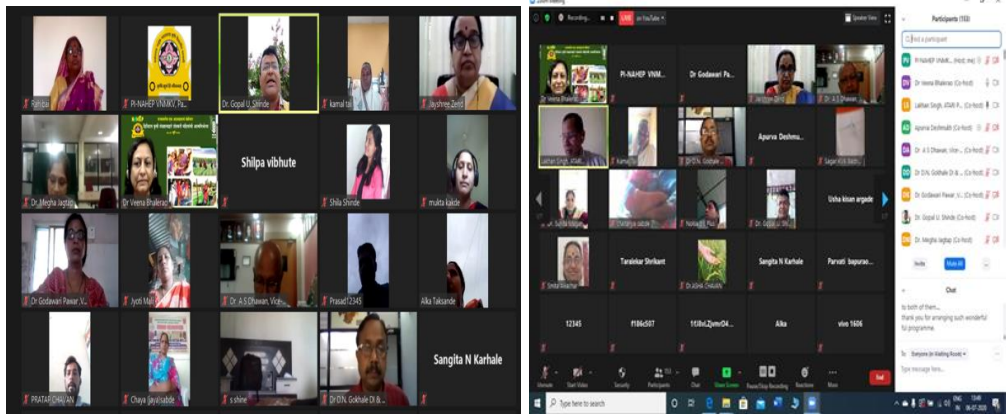| Particulars	Response
Type of the course	Specialized Taught Course
E training on Climate resilient Technology for Rainfed Agriculture	
Core Subject of the course	Dry land Agriculture
Purpose of this development/ upgradation	Goal of course was to give knowledge to participant so that they understand effect of climate change on rainfed Agriculture also get familiar with different soil and water conservation techniques under change in climate, protective irrigation, IFS, Dry land horticulture, organic farming etc.
Course credit (L+P=Total)	8L+4P=12
Developed for	Faculties and PG/Ph.D students of Agricultural science and Agriculture Engineering and technology
Number of beneficiaries so far	336
Course Content	• Monsoon Behavior, Variability in context of climate change and types of drought. • Nano herbicide formulation: A new means of weed management under changing climate behavior Scenario. • Role of bio fertilizers in enhancing soil health and productivity under climate change • IFS: A holistic approach for climate resilient farming • In-situ & Ex-situ rain water conservation and it's management for enhancing water availability in rainfed area • Maha PoCRA: An mega initiative for increasing resilience in rainfed farming • Conservation Agriculture: Option for rainfed agriculture under climate change • Scenario of rainfed agriculture in India and AICRPDA experiences • Climate resilient agro techniques for enhancing productivity and sustainability.
Course commencement	11 -15 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Entrepreneurship development Skill
Present and Futuristic trends in Agricultural Mechanization	
Core Subject of the course	Agricultural Mechanization,Agrucultuaral technology
Purpose of this development/ upgradation	Aim of course was to enhance awareness on advanced farm machineries among faculties and extension functionaries for conducting high end capacity research and effective dissemination of technologies.
Course credit (L+P=Total)	7L+5P=12
Developed for	Faculties and PG/Ph.D students of Agricultural science and Agriculture Engineering and technology
Number of beneficiaries so far	210
Course Content	I. Appropriate mechanization in small farm holdings with a special focus on rainfed agriculture II. Advancement in threshing,Camera applications in Precision Agriculture III. Artificial Intelligence and Robotics in Speciality Crops IV. COVID-19 pandemic push more Mechanization and Digitization of Farms V. Mechanized crop residue management technologies VI. Technologies for In-situ and Ex-situ management of agri VII. Hill Mechanization in India: Challenges and Opportunities VIII. Sugarcane Mechanization in India: Challenges and Opportunities IX. Gearing up for the New Normal Agriculture Automation Necessity X. Sensor for impact in crop improvement programs applications in phenomics XI. Status and Scope of vegetable Industry talk on farm equipment and precision agriculture transplanted in developing countries XII. Industry talk on farm equipment and precision agriculture
Course commencement	18 -23 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

articulars	Response
Type of the course	Industry Oriented Course
Power of Digital manufacturing for new product development-3D printing	
Core Subject of the course	Additive Manufacturing in Agriculture
Purpose of this development/ upgradation	The couse was designed for participants to acquaint with the various processes involved in acquiring, analysis and interpreting digital data used for various farm machinery equipment's.
Course credit (L+P=Total)	1L+2P=3
Developed for	Faculties and PG/Ph.D students of Agriculture Engineering and technology
Number of beneficiaries so far	340
Course Content	• Additive Manufacturing and the industry • Additive Manufacturing Technologies and their Possibilities. • SLA, FDM, Polyjet, SLS, PBF • Applications of 3D printing technology in Agriculture • Domain areas and success stories • How additive Manufacturing can help designers to make quicker decisions. • Why dimensional accuracy and turnaround time is important for prototyping. • How functional parts can be printed efficiently • Thermoplastic materials and their applications
Course commencement	25 June 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

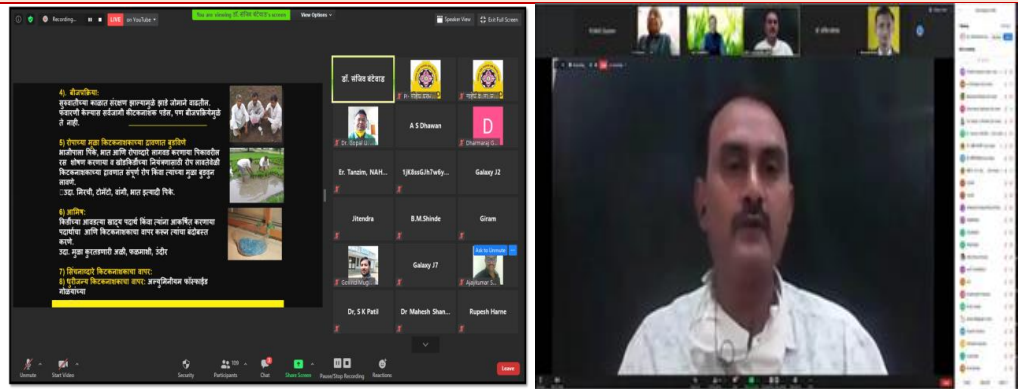| Particulars	Response
Type of the course	Remedial Course
"Recent Physio -Molecular Digital tools in Abiotic Stress Management for crop Modelling"	
Core Subject of the course	Agricultural Science
Purpose of this development/ upgradation	The course was to divulge the achievements of physio-molecular research and their impact on crop improvement and food security , Impart Knowledge for modelling crops using phonemics tools.
Course credit (L+P=Total)	4L+2P=6
Developed for	Faculties and PG/Ph.D students of Agriculture Science Disciplines
Number of beneficiaries so far	480
Course Content	• Water use and water use Efficiency in Dry land Cop Production by • Role of Plant Physiology in Enhancing Crop Productivity • Imaging Sensors for High Throughput Plant Phenotyping for Abiotic Stress Management • Plant Phenolic Tools for Enhancing Abiotic Stress Tolerance in Rainfed Crops • Phenotyping Crops for Combinations f Abiotic • Physiological, Digital and Remote Sensing Tools to Screen for Drought and Heat Tolerance • Chronology of Methods For Abiotic Stress Studies • Genomic Assisted Breeding for Chickpea Improvement • Functional Root Traits of improving Drought Tolerance in Rice • High-Throughput Root Phenotyping: From Lab to Field
Course commencement	29 June -03 July 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Entrepreneurship Development Skills
"Digital Agriculture Technologies for Self Reliance farm woman"	
Core Subject of the course	Agricultural Science(Course In Marathi)
Purpose of this development/ upgradation	Despite of the major productive women labour force in agriculture, their needs and problems are somewhat ignored. Hence keeping in view this rural scenario, this course was organized for farm women, young girls involved in various farming activities to empower them with advanced , digital technologies, ergonomic tools to create ease in their life.
Course credit (L+P=Total)	4L+1P=5
Developed for	Woman Farmers, Women entrepreneurs, Faculties and PG/Ph.D students of Agriculture Science Disciplines
Number of beneficiaries so far	740
Course Content	• Adoption of advanced technology in agriculture: Need of hour • Success story of Seed Bank creation • Women agri-based Housing industry opportunities • Government schemes for women farmers • Low cost, labour saving tools for women farmers • Economic empowerment of women farmers in agriculture industry. • Mental health care of rural women • Scientific cultivation methods of local crops through women's participation • The need for women's participation and digitalization in agriculture • Participation of women in agriculture work and need of Digitalization • Progress by using group farming • Role of up to date farming technology for women frame
Course commencement	06- 10 July 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry Oriented Course
Short Term course on Applications of digital Technologies in agriculture	
Core Subject of the course	Agricultural Engineering, Image Processing
Purpose of this development/ upgradation	This course was designed for participants to get acquainted with knowledge of Image processing and digital technology use in agriculture
Course credit (L+P=Total)	6L+4P=10
Developed for	Faculties, PG/Ph.D students of Agriculture Engineering and Technology
Number of beneficiaries so far	86
Course Content	1. Basics of Sensors ,Fundamentals of Sensor Development 2. Image Processing Basics ,Application of Sensors for Crop and Machine Parameters 3. Wireless Integrated Microsystems for Digital Farming Solutions 4. Computer Aided System for Detection of Crop Parameters 5. Machine Vision Applications in Agriculture 5G Technology and Its Possible Applications in Agriculture 6. Artificial Intelligence and Machine Learning Applications in 7. Agri-Robots and Their Application ,Unmanned Aerial Vehicles – Basics 8. General Optimization Techniques ,Application of Done based Technologies in Agriculture 9. Optimization Tools for Process Optimization of Agricultural Problems 10. Computer Aided Design using Solid Works - Assembly and Drawing Creation for an Agri-Implement
Course commencement	
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

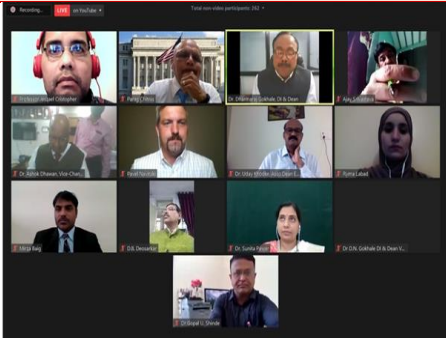| Particulars	Response
Type of the course	Creative and Innovative Thinking
"सुदृढ पर्यावरणसाठी पीक संरक्षक कृषि रसायनाचा संतुलित वापर" **"Balanced use of crop protection agrochemicals for a healthy environment"**	
Core Subject of the course	Agricultural Science(Course was Schedule in Marathi)
Purpose of this development/ upgradation	To familiarized and motivate young professionals, farmers about organic management practices with special focus on soil health base crop management, nutrient management and plant protection including formulation techniques for traditional Biofertilizer, Biopesticides and Soil health promoters.(Course is in Marathi)
Course credit (L+P=Total)	16 L+ 6 P = 22
Developed for	Farmers, Entrepreneurs, Faculties and PG/Ph.D students of Agriculture Science Disciplines
Number of beneficiaries so far	100
Course Content	• Identification of chemical pesticides and Balanced use • Safety Handling of chemical pesticides • Soybean stalks Management • cotton stalks Management in current situation • Importance and use of Trichoderma • Pest Management for Cereals crops • Biological management of weed • Pest Management for Turmeric and Ginger crops • Friendly insects importance for pest management • Pink boll worm management for Cotton crops,Integrated Pest Management
Course commencement	25 July – 03 October 2020 (Every Saturday)
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Entrepreneurship Development Skills
Application of Digital technology for Agri Business: Success stories of Agroneers	
Core Subject of the course	Agricultural Science, Agricultural Engineering/Technology
Purpose of this development/ upgradation	To motivate young professionals, farmers about use of digital technologies for agricultural products processing, marketing and exporting process.(Course is in Marathi)
Course credit (L+P=Total)	4L+ 2 P = 06
Developed for	Progressive Farmers, Entrepreneurs, Faculties and PG/Ph.D students of Agriculture Science Disciplines
Number of beneficiaries so far	996
Course Content	- Success story of Group farming for Papaya, Guava, Turmeric crops - Online techniques for marketing and processing of Agricultural Products - Turmeric processing :Curcumin Processing - Organic farming products processing and certification process - Agricultural products marketing and Exporting process
Course commencement	27-31 July 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Innovative and Creative Thinking
American arm worm attack on maize ,its pest management and Awareness Programme	
Core Subject of the course	Agricultural Science
Purpose of this development/ upgradation	Aim of course was to gives information about pest and disease management on Maize crop
Course credit (L+P=Total)	3L+2P=05
Developed for	Farmers ,Faculties and PG/Ph.D students of Agricultural science
Number of beneficiaries so far	560
Course Content	Different techniques used for preventing attacks of Arm worm on maize crops Use of pesticides for protecting attacks Integrated Pest management at early stages
Course commencement	0 5 – 08 August 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry Oriented Course
International E- training on Digital Technologies for smart Agriculture: futuristic plan	
Core Subject of the course	Agricultural Mechanization, Agricultural Engineering and Technology
Purpose of this development/ upgradation	Aim of course was to enhance awareness on advanced farm machineries used all over world among faculties ,Researchers, PG/Ph.D students
Course credit (L+P=Total)	3L+2P=05
Developed for	Faculties and PG/Ph.D students of Agricultural science and Agriculture Engineering and technology
Number of beneficiaries so far	339
Course Content	- Internet of things (IOT) and Integrated farming - Online natural resource management. - Digital tools and equipment's in plant protection. - Digital Agricultural Marketing. - Advanced post harvesting and food processing method. - Digital tools in plant genetics resource management. - Digital farming tools and technologies
Course commencement	10 – 13 August 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry oriented courses
Name of the course: Short term Course on Applications of Digital Technologies for Smart Agriculture in collaboration with IIT Bombay	
Core Subject of the course	Precision Agriculture
Purpose of this development/ upgradation	The objective of short term course was to acquaint the participants with the know-how Digital technologies contribution in agriculture automation.
Course credit (L+P=Total)	20L+10P =30
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology
Number of beneficiaries so far	52
Course Content (List down the number of modules/ contents)	- Introduction to Indian Agriculture, Advances in Crop - E-Yantra and K-yantra - Sensors in Agriculture ,Electronics 101 - IoT Applications in Agriculture , Let's learn Circuits - Precision Agriculture ,Automation in Agriculture - Automation in Food Processing - Introduction to Artificial Intelligence - Automation in Food ,Crop Planning (Case study) - Climate Smart Storage Structures (Case Study) - Application of GIS and RS in agriculture (Part-1) - Data Analysis (Part-1) & (Part -2) - Bioinformatics by Shruti Kaushikbhai Bhatt - Application of GIS and RS I Agriculture Spatial Statistics ,
Course commencement (Start date- 1st Batch)	10 -28 August 2020
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.nmkv.org.in
Batch photograph of the beneficiaries attending course	

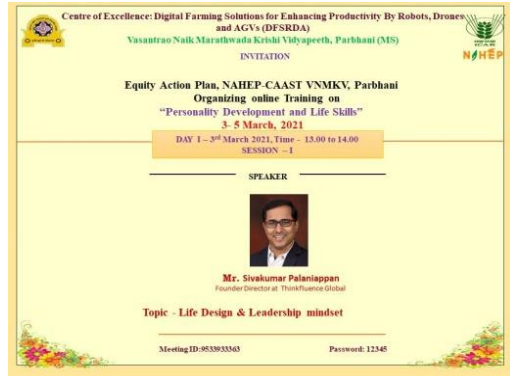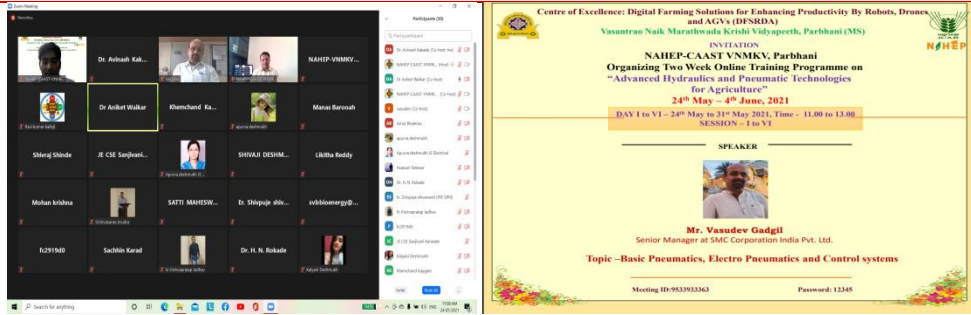| Particulars	Response
Type of the course	Specialized Taught Course
Name of the course: Hands on Course on ANSYS 2020 R2 PART I,PART-II for State Space Electromagnetic Analysis	
Core Subject of the course	CAD/CAM(Agricultural Engineering/Technology)
Purpose of this development	This hands on course was designed to acquaint the participants with different software tools used in ANSYS for Mechanical Electrical design
Course credit (L+P=Total)	5L+15P=20
Developed for	NAHEP Staff and VNMKV Faculties
Number of beneficiaries so far	30
Course Content	ANSYS for Mechanical Design ANSYS for Electromagnetic Design
Course commencement (Start date- 1st Batch)	20 Dec 2020 to 14th Jan 2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Creative and innovative thinking
Name of the course: One week Hands on training on GIS & Remote Sensing Application in Agriculture	
Core Subject of the course	GIS, Remote sensing, Q GIS Field introduction
Purpose of this development	The main aim of organizing this hands-on training to develop a basic skill in the various applications of Remote Sensing and GIS in digital agriculture.
Course credit (L+P=Total)	4L+6P =10
Developed for	Faculties and PG/Ph.D. students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	45

Course Content (List down the number of modules/ contents)	Day 1:
	• Introduction to GIS
	• Basic of remote sensing
	• Applications of remote sensing
	• Satellite based remote sensing, drones and ways forward
	• Applications of remote sensing
	• Remote sensing indices (e.g. NDVI, NDWI, SIWSI, NDSI) + demo qgis Bhuvan NDVI thematic products
	Day 2:
	• GIS Theory
	• Hands on About QGIS, AGIS Installation, QGIS user interface introduction Vector, Raster, Plugins, WMS, FREEWAT/SWAT/MODFLOW
	Day 3:
	• Q Field introduction
	  - Theory, GUI and framework
	  - Hands on Collection, Storing data, Bringing data in QGIS
	• Important data in QGIS
	Day 4
	• Problem statement formulation by students
	• Visualization of Collect data (Field)
	• Points, polygons and line shape files
	• Waypoint data to QGIS and importing data and imagery
	• Tutorials
	Day 5: (Introduction to Google Earth Engine, map making and Q &A)
	• Map composer
	• Aerial imagery
	• Attribute Tutorial
	• Map making from field data collected
	• Tutorial on Attribute selection
	• Tutorial on Cropping imagery
	• Tutorial on data editing and data entry
	• Tutorial on estimating raster area
	Day 6: (Discussion with VNMKV and students for future work) and Q &A
	• Q &A with students and identifying data for specific research statements
	• Meeting with VNMKV team on further ideas for NAHEP
	• Associate Dean's speech
	• Interaction with students
	• Conclusion

Course	20 Jan 2021 to 25 Jan 2021
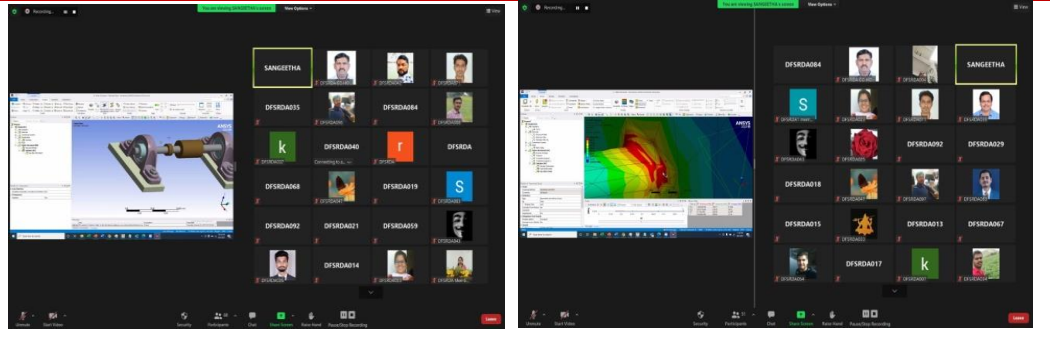
commencement (Start date- 1st Batch)	
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Leadership skill and personality development
Name of the course: Online Training on Personality Development and Life Skills	
Core Subject of the course	
Purpose of this development/ upgradation	To develop an impressive personality and makes stand apart from the rest. It helps to improving students communication skills.
Course credit (L+P=Total)	3P = 3
Developed for	Faculties and PG/Ph.D. students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	86
Course Content (List down the number of modules/ contents)	• Personality Development • Communication Skills • Soft Skills • SWOT Management • Human psychology and Ethics
Course commencement (Start date- 1st Batch)	03/03/2021 to 05/03/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry Oriented Course
Name of the course: Two Week Online Training Programme on "Advanced Hydraulic And Pneumatic Technologies For Agriculture"	
Core Subject of the course	Hydraulic and pneumatic system, PLC
Purpose of this development/ upgradation	To impart the knowledge of basic hydraulics, pneumatics and control system. To study the basic of PLC.
Course credit (L+P=Total)	5L+5P
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology
Number of beneficiaries so far	15
Course Content (List down the number of modules/ contents)	• Basic Pneumatics, Electro Pneumatics and Control systems - Part 1 • Basic Pneumatics, Electro Pneumatics and Control systems - Part 2 • Hydraulics and Electro hydraulics • Positioner and Pneumatic Servo system • Basics of PLC
Course commencement	24/05/2021 to 04/06/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

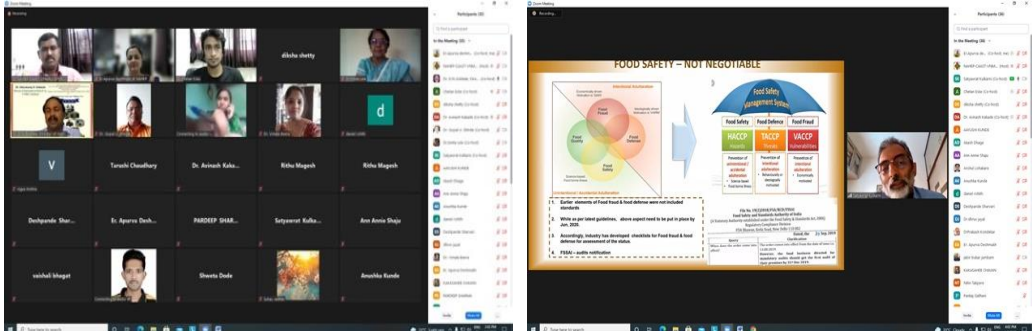| Particulars	Response
Type of the course	Specialized Taught Course
Name of the course: National level online hands on four week Training on "Applications of Computer Aided Engineering in Agriculture"	
Core Subject of the course	Computer Aided Design
Purpose of this development/ upgradation	To enhance the skill of post graduate students in the field of computer aided designing in agriculture domain and create awareness about the latest industry oriented technologies.
Course credit (L+P=Total)	3L+18P=21
Developed for	Faculties, PG/Ph.D. students of Agricultural desciplines and Engineering/Technology desciplines
Number of beneficiaries so far	100
Course Content (List down the number of modules/ contents)	Module 1: ANSYS Mechanical Module 2:ANSYS CFD Module 3:ANSYS LF EM Module 4: ANSYS HFSS
Course commencement (Start date- 1st Batch)	01/06/2021 to 03/07/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

articulars	Response
Type of the course	Industry Oriented Course
Name of the course: two week online course programme on Rapid prototyping and reverse engineering by 3d scanner and 3d printer in agriculture	
Core Subject of the course	Rapid prototyping and reverse engineering
Purpose of this development/ upgradation	To enhance the skill of students in the field of rapid prototyping and reverse Engineering in agriculture create awareness about the latest technologies.
Course credit (L+P=Total)	10L+10P (Per week)= 20
Developed for	Faculties and PG/Ph.D students of Agricultural desciplines and Engineering/Technology desciplines
Number of beneficiaries so far	30
Course Content (List down the number of modules/ contents)	- Introduction to Additive Manufacturing Process and 3D Printing - Types of Additive Manufacturing technology Materials associated in 3D Printing - Workflow for FDM 3DP Technology - Introduction to Meshing & Meshing controls - Industry accepted Files, formats and software for 3DP Lecture of Simulation of Model - Design Methodologies for Additive Manufacturing - Types of Applications done with 3DP (Contd.) Case Studies & Examples - Preparation and Scanning techniques with Artec Eva lite. - Introduction to CFD, Heat Transfer Analysis Model Analysis / Drone propeller - Dimensional measurements in Artec Studio - Introduction to Maxwell Solvers, Introduction to Motor CAD - PMSM analysis using Maxwell, Analysis of transformers in Maxwell - High frequency analysis software - Mesh Operations / HFSS Boundary Conditions and Excitations - Solution Setup & Optometric / HFSS Post Processing - Introduction to Ansys SIwave /Signal Integrity
Course commencement (Start date- 1st Batch)	07/06/2021 to 18/06/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry oriented courses
Name of the course: Eight Weeks Online Workshop on Embedded Systems and IoT in Agriculture	
Core Subject of the course	Robotics and Engineering
Purpose of this development/ upgradation	The objective of the workshop is to acquaint the participants with the know-how of embedded systems and Internet of Things (IoT), which is a small contribution towards agriculture automation.
Course credit (L+P=Total)	4L+2P (Per week)
Developed for	Faculties and PG/Ph.D students of Agricultural desciplines and Engineering/Technology desciplines
Number of beneficiaries so far	66
Course Content (List down the number of modules/ contents)	1. **First Session (10 days)**: 1. Basics of C programming 2. Digital electronics 3. Masking and shifting operators 4. Getting started with Software 2. **Second session(30 days)**: 1. Getting Started with Robotics 2. Introduction to ATmega2560 microcontroller 3. Embedded C Programming 4. Input-Output devices Interfacing - Switch, Buzzer, LCD 5. Analog-to-Digital converter in ATmega2560 6. Interrupts in ATmega2560 7. DC Motor Interfacing and its Control 8. Timers and PWM generation in ATmega2560 9. External Hardware Interrupts in ATmega2560 3. **Third Session (10 days)**: 1 Introduction to IoT 2. Exploring protocols (HTTP/MQTT) 3. Use of Visualization tools
Course commencement (Start date- 1st Batch)	17/06/2021 to 07/08/2021
Frequency/ Periodicity of the course	once
Registration Link	https://nahep.vnmkv.org.in/media/2021/06/revised-by-PI-NAHEP-CAAST-IIT-Bombay-Short-term-Course-Brochure-and-Schedule.pdf
Batch photograph of the beneficiaries attending course	

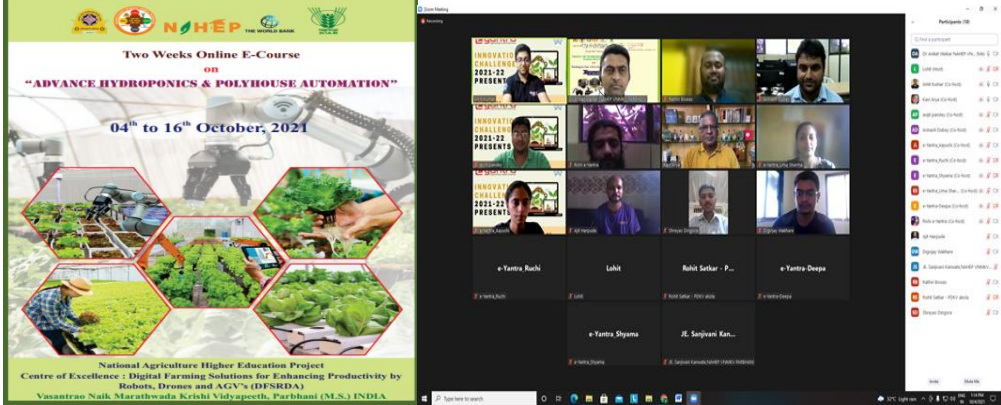| Particulars	Response
Type of the course	Specialized taught course
Name of the course: Two Week Online Certificate Course on "Food Processing & Automation"	
Core Subject of the course	Process and Food Engineering
Purpose of this development/ upgradation	Provide the knowledge of food process automation technologies. Expose the participants for advanced food processing, packaging methods, marketing strategies and export systems. Encourage the participants for establishing the processing units.
Course credit (L+P=Total)	6L+4P=10
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology
Number of beneficiaries so far	35
Course Content (List down the number of modules/ contents)	• Enhance food quality, operational productivity and compliance • IOT in food trade & retail management • Inventory Management • Food traceability solution and blockchain management • Design and implementation of Industry 4.0 solutions in traditional factory settings • Supply chain management, Traceability and product recall • R&D innovation in food processing • Certification and accreditation essential • Food safety and quality management • Packaging Technology
Course commencement (Start date- 1st Batch)	02/08/2021 to 14/08/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry Oriented Course
Name of the course: Online/Offline Two Week Training Programme on "Python programming Application using smart camera in Agriculture"	
Core Subject of the course	Artificial intelligence in agriculture, Python programming
Purpose of this development/ upgradation	To help the participants to familiarize with python programing language and data analysis. To train the participants in accessing data from various domains and by using smart cameras. To introduce the participants various application of smart cameras in agriculture with python programming.
Course credit (L+P=Total)	3L+7P=10
Developed for	Faculties and PG/Ph.D students of Agricultural desciplines and Engineering/Technology desciplines
Number of beneficiaries so far	38
Course Content (List down the number of modules/ contents)	- Fundamentals of python - Working with data and input and output - Lists and Loops - Numeric and date function and working with strings function - Selection of cameras, tools according to project and its data analysis - Smart project programming related to agriculture (Measuring height, lengths, no. of leaf, No. of fruits on plants)
Course commencement (Start date- 1st Batch)	01/09/2021 to 10/09/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Creative and innovative thinking
Name of the course: One Day online Workshop Jointly Organizing by IIT Bombay and NAHEP CAAST VNMKV, Parbhani	
Core Subject of the course	IOT applications in Agriculture
Purpose of this development/ upgradation	This course was designed so that participants get information regarding new technology used in IIT Bombay and they can use in their research work for new prototype
Course credit (L+P=Total)	2p=2
Developed for	Faculties and PG/Ph.D students of Agricultural disciplines and Engineering/Technology
Number of beneficiaries so far	70
Course Content (List down the number of modules/ contents)	Articulating Agricultural Problems
Course commencement (Start date- 1st Batch)	21/09/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

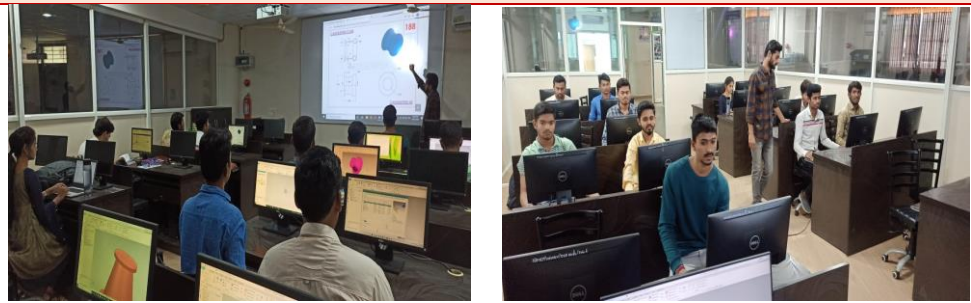| Particulars	Response
Type of the course	Specialized taught course
Name of the course: Online/Offline Two Week online E-Course on "Advance Hydroponics & Polyhouse Automation"	
Core Subject of the course	Hydroponics and polyhouse automation
Purpose of this development	Provide the knowledge about advanced hydroponics and polyhouse automation technologies. Impart the knowledge about the global hydroponics scenario and techniques in soil less farming. Encourage the participants for establishing the hydroponic unit and develop confidence to become successful entrepreneur.
Course credit (L+P=Total)	5L+5P=10
Developed for	Faculties and PG/Ph.D students of Agricultural desciplines and Engineering/Technology desciplines
Number of beneficiaries so far	85
Course Content (List down the number of modules/ contents)	- Basics of hydroponics, types, components, crop production and crop nutrition in hydroponics, - Entrepreneurial options in hydroponics growing - What is protected cultivation - Types of protected cultivation structures - Cladding materials in protected cultivation - Government schemes for protected cultivation
Course commencement (Start date- 1st Batch)	04/10/2021 to 16/10/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Industry oriented courses
Name of the course: One Month Hands on Training on Precision Agriculture by Advance Digital Technologies	
Core Subject of the course	Hands on practise on different models developed by NAHEP
Purpose of this development/ upgradation	Establish an advanced basic engineering hardware and software setup such as mechatronics, CAD/CAM/CAE, 3D printer. Strengthen the present PG/PHD courses in all disciplines by offering three elective course works such as robotics, drones or AGV.
Course credit (L+P=Total)	10L+15P=25
Developed for	PG/Ph.D. students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	156
Course Content	- Fundamentals and working of cameras and sensors, Field trials and data collection - Introduction to smart portable machines and its scope of applications - Theory of machines design and CAD - CAE by ANSYS workbench 2021 - Introduction to robotic grafting, construction and its working - Introduction of polyhouse automation and hydroponics - Mushroom cultivation and their by-products, Food texture analysis, Packaging technology - Introduction and working of hydraulic and pneumatic lab and mechatronics and automation lab
Course commencement	01/12/2021 to 30/12/2021
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	Creative and innovative thinking
Name of the course: Brainstorming Workshop for newly admitted PG/Ph.D. students.	
Core Subject of the course	Brainstorming Workshop regarding NAHEP project.
Purpose of this development/ upgradation	To introduce the knowledge about NAHEP to newly admitted PG/PHD students. To develop confidence and innovative ideas of students regarding their research work.
Course credit (L+P=Total)	Nil
Developed for	UG/PG and PHD students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	75
Course Content	Module 1
Course commencement	10/01/2022
Frequency/ Periodicity of the course	once
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	

Particulars	Response
Type of the course	In plant training
Name of the course: Four Months Institutional Internship/Training Programme of UG/PG/Ph.D. Students	
Core Subject of the course	Engineering and Technology
Purpose of this development/ upgradation	To enhance the skill of undergraduate students in the field of computer aided designing in agriculture domain and create awareness about the latest industry oriented technologies
Course credit (L+P=Total)	30L + 30 p =30
Developed for	UG/PG and PHD students of Agricultural disciplines and Engineering/Technology disciplines
Number of beneficiaries so far	13
Course Content	Module 1-CAD/CAE Module 2-Agriculrtral Robots Module 3-Agricultural Drones Module 4-Agricultural AGV's Module 5-Mechatronics and Hydraulics Module 6-Agricultural Sensors and Module 7- Agricultural Cameras Module 8- Image processing and Python Programming Module 9- Rapid Prototyping and Reverse Engineering Module 10- Food Processing and Nursery Automation
Course commencement	21 January to 21 May, 2022
Frequency/ Periodicity of the course	once
Registration Link	
Batch photograph of the beneficiaries attending course	

Proforma: Details of the pilot courses developed under NAHEP

Particulars	Response
Component of NAHEP	CAAST-1B
Name of AU/ ICAR Institute	Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani
Type of the course	Specialized taught course (One year Professional course)

Name of the course: Agricultural Robot

FIRST SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGBOT-101T	Fundamentals of Agribots
2	DFSRDA -AGBOT-102T	CAD/CAM/CAE in Agriculture
3	DFSRDA -AGBOT-103T	Mechatronics in Agricultural Robots
4	DFSRDA -AGBOT-104T	Computing for Agricultural Robots
5	DFSRDA -AGBOT-105T	Maintenance in Agricultural Robots
6	DFSRDA -AGBOT-106P	Mini Project
7	DFSRDA -AGBOT-107P	Practical on Hydraulic and Pneumatic
8	DFSRDA -AGBOT-108P	Practical on CAD/CAM/CAE
9	DFSRDA -AGBOT-109P	Practical on Mechatronics (Sensors, Actuators and Controllers)

SECOND SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGBOT-201T	CDKS in Agri-Bots
2	DFSRDA -AGBOT-202T	SSPN in Agri-Bots
3	DFSRDA-AGBOT-203T	SPM in Agri-Bots
4	DFSRDA -AGBOT-204T	FPA in Agri-Bots
5	DFSRDA-AGBOT-205T	Elective I
6	DFSRDA-AGBOT-206T	Elective II
7	DFSRDA-AGBOT-207P	Major Project
8	DFSRDA-AGBOT-208P	Agri Bots Technology Lab
9	DFSRDA-AGBOT-209P	Practical on Image Processing

Particulars	Response
Core Subject of the course	DFSRDA AGRIBOT
Purpose of this development/ upgradation	Aim of course to impart knowledge about Agri Robot,Agri drones,Agri AGV and IOT,AI ,ML in field of agriculture to the students
Course credit (L+P=Total)	I sem- (10+4=14) II sem- (10+4= 14)
Developed for	PG/Ph.D Students of Agril.Engineering/Technology and Agriculture science Deciplines

Number of beneficiaries so far	Nil

Course Content (List down the number of modules/ contents)

FIRST SEMESTER

1	Fundamentals of Agribots	• Robots definition • Robots classification • Coordinate Transformation • Trajectory interpolation • Autonomous mobile robots • Mobile robot kinematics
2	CAD/CAM/CAE in Agriculture	• Criteria for selection of CAD workstations • 2D & 3D Geometric Transformations • Surface entities, Surface Representation • Introduction of ANSYS • Study solver and types of solver methods • Introduction to CAM
3	Mechatronics in Agricultural Robots	• Sensors and Measurement of parameter • Fundamentals of Electric drives • Control Speed control and drive • Pneumatic Drives • PLC • Block diagram representation of systems
4	Computing for Agricultural Robots	• Image acquisition • Image analysis • 3D vision and Stereo vision • Motion estimation and tracking • Introduction to programming languages • Case studies/application
5	Maintenance in Agricultural Robots	• Industrial safety • Electrical safety • General safety consideration in material handling • Ergonomic consideration • Quality Control and Safety Standards • Maintenance
6	Mini Project	
7	Practical on Hydraulic and Pneumatic	• Study of Basic pneumatic circuit for the working of single and double acting cylinder. • Study of Basic hydraulic circuit for the working of double acting cylinder and a hydraulic motor. • Study of Speed control circuits. Different Metering Methods Inlet & outlet flow control (meter-in & meter-out circuit) • Study of Circuits for the Use of different direction control valves and valve actuation in single and double acting cylinder, and multi-actuation circuit. • Study Hydraulic or Pneumatic Sequencing circuit. • Study of Electro Pneumatics circuit, based on the industrial application. • Study of Electro hydraulics circuit, based on the industrial application. • Write a PLC program to latch and unlatch an output by sealing. • Write a PLC program to latch and unlatch an output with time delay. • Write/Draw a PLC program to operate 4 outputs simultaneously with time delay.

		• Write a PLC program for A motor is connected to PLC. Run this motor in the forward and reverse direction using ladder diagram programming language. • Experimental study of pneumatically sorting station, conveyer belt and diversion mechanism.
8	Practical on CAD/CAM/CAE	• Introduction to CAD software's • Performance on CAD software for 3D design modeling of agricultural equipment's • Introduction to CAM Software • Introduction to CAE software • Experiment of Structural Analysis • Experiment of Thermal Analysis • Experiment of Modal Analysis • Experiment of CFD Analysis • Experiment of Electromagnetic Analysis
9	Practical on Mechatronics (Sensors, Actuators and Controllers)	• Study of Agricultural sensors and actuators • Study of Industrial sensors and actuators • Study and Experiment on Solar Kit to test the solar panel efficiency. • Study of Industry 4.0 trainer Kit-1 • Study of Industry 4.0 trainer Kit-2 • Interpretation of Agricultural sensors, PLC and actuators hardware and programming • Automatic irrigation system based on soil moisture level • Testing of soil temperature and humidity • Experimentation on water level measurement • PLC based water pump operation for irrigation
SECOND SEMESTER		
1	CDKS in Agri-BOT	• Introduction to CDKS • Introduction to Precision Agriculture Technologies • Introduction to Protected Cultivation • Agricultural Robot Applications • Robotics application in Field Crops • Robotics application in Protected Cultivation
2	SSPN in Agri-BOT	• Seed, Seedling, Nursery • Seed Processing • Hightech Polyhouse • Agricultural robotics in SSPN • Robotics and automation in Hitech Polyhouse management • Robotic Grafting
3	SPM in Agri-BOT	• Introduction to farm production system and operations • Robotics in land development and soil related activities • Robotics in sowing and planting • Robotics in intercultural, plant protection and allied activities • Robotics in harvesting • Economics of Agribots
4	FPA in Agri-BOT	• Food Processing • Agricultural robotics in FPA • Robotics and automation in the fresh produce • Robotics and automation in Unit Operations Food Processing • Robotics and automation for packaging

		• Automation for a sustainable food industry
5	Major Project	• Detailed design of some Agricultural system • Detailed experimental / practical verification of some Agricultural Robotic systems • Detailed study of some agricultural equipment/implement integrated • with digital technology and AI • Software development for particular application / design / analysis etc. • Any other relevant area to agriculture.
6	Agri Bots Technology Lab	• Experiment on Grafting Robot • Experiment on Cotton Picking Robot • Experiment on 3D Printer • Experiment on 3D Scanner • Experiment on Jackal J 100 • Experiment on Husky A200 • Experiment on Mobile Platform (Scissor lift) • Experimental study of Refrigerated Van • Experimental Study of Cold Storage Unit • Experimental Study of Gator type vehicle for agricultural implements
7	Practical on Image Processing	• Experiment on Stereo Vision Camera • Experiment on Real Sense Cameras • Experiment on Zed 2 Camera • Experiment on CCD Camera • Experiment on Multi Spectral Camera • Experiment on Spectro-radiometer • Experimental Analysis on PIX 4D software • Experimental Analysis MAT Lab Software • Experimental Analysis on QGIS software.
Course commencement		Course will be offered every year
Frequency/ Periodicity of the course		1 Year
Registration Link		www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course		Nil

Proforma: Details of the pilot courses developed under NAHEP

Particulars	Response
Component of NAHEP	CAAST-1B
Name of AU/ ICAR Institute	Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani
Type of the course	Specialized taught course (One year Professional course)

Name of the course: Agricultural Drones

FIRST SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGDRO-101	Fundamentals of Agri-DRONE
2	DFSRDA-AGDRO-102	CAD/CAM in Agri-DRONE
3	DFSRDA-AGDRO-103	Agri-DRONE Mechatronics
4	DFSRDA-AGDRO-104	Agri-DRONE Computing
5	DFSRDA-AGDRO-105	Agri-DRONE Maintenance
6	DFSRDA-AGDRO-107P	Mini Project
7	DFSRDA-AGDRO-108P	Mechatronics Lab
8	DFSRDA-AGDRO-109P	Image Processing Lab
9	DFSRDA-AGDRO-110P	Sensors, Actuators and PLC Lab

SECOND SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGDRO-201	Agri-DRONE in CDKS
2	DFSRDA-AGDRO-202	Agri-DRONE in SSPN
3	DFSRDA-AGDRO-203	Agri-DRONE in SPM
4	DFSRDA-AGDRO-204	Agri-DRONE in FPA
5	DFSRDA-AGDRO-205	Elective-I
6	DFSRDA-AGDRO-206	Elective-II
7	DFSRDA-AGDRO-207P	Major Project
8	DFSRDA-AGDRO-208P	Agri-DRONE Hardware Lab
9	DFSRDA-AGDRO-209P	Agri-DRONE Software Lab
10	DFSRDA-AGDRO-210P	CAD/CAM/CAE Lab

Core Subject of the course	DFSRDA AGRIDRONES
Purpose of this development/ upgradation	Aim of course to impart knowledge about Agri Robot,Agri drones,Agri AGV and IOT,AI ,ML in field of agriculture to the students
Course credit (L+P=Total)	I sem- (10+4=14) II sem- (10+4= 14)

Developed for	PG/Ph.D Students of Agril.Engineering/Technology and Agriculture science Deciplines
Number of beneficiaries so far	Nil

Course Content (List down the number of modules/ contents)

FIRST SEMESTER

1	Fundamentals of Agri-DRONE	• Introduction to Drone • Components of Drone • Working principles of Drone • Stability and Control of Drone • Sensors used in drones • Regulation and Maintenance of Drone
2	CAD/CAM in Agri-DRONE	• Criteria for selection of CAD workstations • 2D & 3D Geometric Transformations • Surface entities, Surface Representation • Feature Based Modeling, Assembling Modeling
3	Agri-DRONE Mechatronics	• Fundamentals of UAV Mechatronics • Sensors and Measurement Systems • Electronics Control Systems of UAV • Electrical Involvement in UAV • Hardware System of UAV • UAV Communications And Softwares
4	Agri-DRONE Computing	• Introduction to Drone Programming • Computing Methods • Image Processing Techniques • Drone Parameter for computing • Flight Planning, Mission and Control Software's • Drone Mapping Software
5	Agri-DRONE Maintenance	• New Drone Set Up • Drone Pre & Post Flight • Drone Troubleshooting • Drone repair Maintenance report • Routine Drone Maintenance • Drone Testing & Compliance
6	Mini Project	
7	Mechatronics Lab	• Study of sensors and actuators • Study and Experiment on Solar Kit to test the solar panel efficiency. • Study of Industry 4.0 trainer Kit-1 • Study of Industry 4.0 trainer Kit-2 • Interpretation of Agricultural sensors, PLC and actuators hardware and programming • Automatic irrigation system based on soil moisture level • Testing of soil temperature and humidity • Experimentation on water level measurement • PLC based water pump operation for irrigation • Experimental study of pneumatically sorting station, conveyer belt and diversion mechanism.
8	Image Processing Lab	• Experiment on Stereo Vision Camera • Experiment on Real Sense Cameras • Experiment on Zed 2 Camera • Experiment on CCD Camera • Experiment on Multi Spectral Camera

		• Experiment on Spectro-radiometer
		• Experimental Analysis on PIX 4D software
		• Experimental Analysis MAT Lab Software
		• Experimental Analysis on QGIS software.
9	Sensors, Actuators and PLC Lab	• Study of Agricultural sensors and actuators
		• Study of Industrial sensors and actuators
		• Study of Basic pneumatic circuit for the working of single and double acting cylinder.
		• Study of Basic hydraulic circuit for the working of double acting cylinder and a hydraulic motor.
		• Study of Speed control circuits. Different Metering Methods Inlet & outlet flow control (meter-in & meter-out circuit)
		• Study of Circuits for the Use of different direction control valves and valve actuation in single and double acting cylinder, and multi-actuation circuit.
		• Study Hydraulic or Pneumatic Sequencing circuit.
		• Study of Electro Pneumatics circuit, based on the industrial application.
		• Study of Electro hydraulics circuit, based on the industrial application
SECOND SEMESTER		
1	Agri-DRONE in CDKS	• Introduction to CDKS
		• Introduction to drones and its applications in agriculture
		• Drones in Agriculture
		• Remote Sensing, UAV's and Applications
		• Drone technology as a tool for improving agricultural productivity
		• Introduction to IoT, Drone and AI based Agriculture Monitoring System
2	Agri-DRONE in SSPN	• Seed, Seedling, Nursery
		• Seed Processing
		• Hightech polyhouse
		• Agridrones
		• Drones in Agricultural and Nursery Management
		• Drones in agricultural crop production practices
3	Agri-DRONE in SPM	• Introduction to farm production system and operations
		• Introduction to farm machinery
		• Agridrones
		• Drones in Agricultural soil management practices
		• Drones in agricultural crop production practices
		• Economics of Agri-drones
4	Agri-DRONE in FPA	• Food processing
		• Agricultural AGV in FPA
		• Agridrones
		• Drones for food industry
		• Future trends
		• Applications
5	Major project	•

6	Agri-DRONE Hardware Lab	• Study on Drone component identification and uses • Study on types of drones: Quadcopter, Hexa copter, Fixed Wing, Parachute drones • Study on types of drones: FPV Racer, DJI Phantom, • Study on types of drones: Spraying Drones • Study of drone applications: Spraying • Study of drone applications: Surveying and Mapping • Study on drone training software, simulation platform through remote control • Study of autonomous mission planning: remote control, mobile apps, calibration with GCP • Study on drone manufacturing process: 3 D Printer, CAE/CAM design
7	Agri-DRONE Software Lab	• Study on introduction to drone operating system • Study on communication between drones and RC • Study of Telemetry and telegraphy of drones • Study of drone sensors and Camera • Study of multispectral cameras: Mica sense and Parrot • Study of basics of data capturing using drones • Experimental Study of Crop health monitoring using drones • Calculation of Vegetation indices (NDVI, VCI etc.) using drones • Hands on practical on PiX 4D software introduction tools • Drone data processing using PiX 4D software • Advanced features for crop scouting and mapping using drones
8	CAD/CAM/CAE Lab	• Introduction to CAD software's • Performance on CAD software for 3D design modeling of agricultural equipment's • Introduction to CAM Software • Introduction to CAE software • Experiment of Structural Analysis • Experiment of Thermal Analysis • Experiment of Modal Analysis • Experiment of CFD Analysis • Experiment of Electromagnetic Analysis
Course commencement		Course will be offered every year
Frequency/ Periodicity of the course		1 Year
Registration Link		www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course		Nil

Proforma: Details of the pilot courses developed under NAHEP

Particulars	Response
Component of NAHEP	CAAST-1B
Name of AU/ ICAR Institute	Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani
Type of the course	Specialized taught course (One year Professional course)

Name of the course: Agricultural Automated guided Vehicle

FIRST SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGAGV-101	Fundamentals of Agri-AGV
2	DFSRDA-AGAGV-102	CAD/CAM in Agri-AGV
3	DFSRDA-AGAGV-103	Agri-AGV Mechatronics
4	DFSRDA-AGAGV-104	Agri-AGV Computing
5	DFSRDA-AGAGV-105	Agri-AGV Maintenance
6	DFSRDA-AGAGV-107P	Mini Project
7	DFSRDA-AGAGV-108P	Mechatronics Lab
8	DFSRDA-AGAGV-109P	Image Processing LabS
9	DFSRDA-AGAGV-110P	Sensors, Actuators and PLC Lab

SECOND SEMESTER

Sr. No.	Subject code	Subject Name
1	DFSRDA-AGAGV-201	Agri-AGV in CDKS
2	DFSRDA-AGAGV-202	Agri-AGV in SSPN
3	DFSRDA-AGAGV-203	Agri-AGV in SPM
4	DFSRDA-AGAGV-204	Agri-AGV in FPA
5	DFSRDA-AGAGV-205	Elective-I
6	DFSRDA-AGAGV-206	Elective-II
7	DFSRDA-AGAGV-207P	Major Project
8	DFSRDA-AGAGV-208P	Agri-AGV Hardware Lab
9	DFSRDA-AGAGV-209P	Agri-AGV Software Lab
10	DFSRDA-AGAGV-210P	CAD/CAM

Core Subject of the course	DFSRDA AGRIAGV
Purpose of this development/ upgradation	Aim of course to impart knowledge about Agri Robot,Agri drones,Agri AGV and IOT,AI ,ML in field of agriculture to the students
Course credit (L+P=Total)	I sem- (10+4=14) II sem- (10+4= 14)

Developed for (Please mention expected beneficiaries)	
Number of beneficiaries so far (if finalised and implemented)	Nil

Course Content (List down the number of modules/ contents)

FIRST SEMESTER

1	Fundamentals of Agri-AGV	• Introduction • Material Handling Equipment • Automated Guided Vehicle System • Storage System Conveyor systems • Robotics in Material Handling • Application Methods of protecting materials for packages
2	CAD/CAM/CAE in Agri-AGV	• Introduction to CAD • 2D & 3D Feature Based Part Sketch, Modeling • Introduction of ANSYS, Basics of ANSYS workbench • Study solver and types of solver methods • Introductions to Fluid flow, Basics of CFD Analysis • Introduction to CAM
3	Agri-AGV Mechatronics	• Sensors • Measurement of parameter • Fundamentals of Electric drives • Control • Pneumatic Drives • PLC • Block diagram representation of systems
4	Agri-AGV Computing	• Image acquisition • Image analysis • 3D vision • Stereo vision • Motion estimation and tracking • Introduction to programming languages • Case studies/application
5	Agri-AGV Safety & Maintenance	• Introduction to Maintenance System • Electrical safety • maintenance policies – preventive maintenance • General safety consideration in material handling • Repair methods for material handling equipment • Quality Control and Safety Standards • Principles and practices of maintenance planning
6	Mini Project	
7	Practical on Hydraulic and Pneumatic application in AGV	• Study of Basic pneumatic circuit for the working of single and double acting cylinder in AGV. • Study of Basic hydraulic circuit design for the working of double acting cylinder in AGV. • Study of Circuits for the Use of different direction control valves and valve actuation in single and double acting cylinder, solenoid and multi-actuation circuit. • Study electro-mechanical circuit design based on the agriculture application. • Study of Electro Pneumatics circuit, based on the agriculture

		application.
		• Study of Electro hydraulics circuit design, based on the agriculture application.
		• Write a PLC program to latch and unlatch an output by sealing.
		• Write a PLC program to latch and unlatch an output with time delay.
		• Write/Draw a PLC program to operate 4 outputs simultaneously with time delay.
		• Experimental study of pneumatically sorting station, conveyer belt and diversion mechanism.
8	Practical on integration & Image Processing	• Experiment on AGV Design assembly, testing and system integration analysis.
		• Experiment on Stereo Vision Camera & integration with AGV operations.
		• Experiment on Real Sense Cameras & integration with AGV operations.
		• Experiment on ZED 2 Camera & integration with AGV operations.
		• Experiment on Multi Spectral Camera & integration with AGV operations.
		• Experiment on Spectro-radiometer & integration with AGV operations.
		• Experimental Analysis on PIX 4D software & integration with AGV operations.1
		• Experimental Analysis python Programme Software & integration with AGV
		• operations.
9	Mechatronics (Sensors, Actuators and Controllers)	• Study of Agricultural sensors and actuators for AGV.
		• Study of Industrial sensors and actuators for AGV
		• Study and Experiment on Solar Kit to test the solar panel efficiency on AGV application.
		• Study of Industry 4.0 trainer Kit-1 on AGV application.
		• Study of Industry 4.0 trainer Kit-2 on AGV application.
		• Interpretation of Agricultural sensors, PLC and actuators hardware and Programming on AGV application.
		• Automatic irrigation system based on soil moisture level on AGV application.
		• Testing of soil temperature and humidity on AGV application.
SECOND SEMESTER		
1	Agri-AGV in CDKS	• Introduction to CDKS
		• Introduction to AGV's
		• Introduction to Precision Agriculture Technologies
		• Introduction to Protected Cultivation
		• AGV's in Land and soil management
		• AGV's application in Field Crops
		• AGV's application in Protected Cultivation
2	Agri-AGV in SSPN	• AGV
		• Agricultural AGV
		• Agriculture Robot Vehicles or AGV's
		• Next Generation of Autonomous Field AGV's
		• Sensor mounting on AGV's and their utility in SSPN

		• AGVs and automation in transportation and material handling
3	Agri-AGV in SPM	• Introduction to farm production system and operations • Introduction to farm machinery • Agricultural Vehicle Robot/ Agri-AGVs • Agri-AGVs in land development and soil related activities • Agri-AGVs in sowing and planting • Agri-AGVs in intercultural, plant protection and allied activities • Agri-AGVs in harvesting • Economics of Agri
4	Agri-AGV in FPA	• Food Processing • Agricultural AGV in FPA • AGVs and automation in the fresh produce • AGVs and automation in Unit Operations Food Processing • AGVs and automation for packaging • AGVs and automation in transportation and material handling • Automation for a sustainable food industry: computer aided • analysis and control engineering methods
5	Major Project	• Detailed design of Agricultural AGV system. This may integration of machines, hydraulics/ pneumatic system, design of some small industrial product developments.
6	Agri-AGV hardware Lab	• Experiment on primary raw material identification and preparation for AGV. • Experiment on fabrication and testing of AGV • Experiment on welding of AGV components • Experiment on AGV • Experiment on AGV Jackal J 100 • Experiment on AGV Husky A200 • Experimental study of innovative AGV applications • Experimental study of AGV application in Horticulture. • Experimental study of AGV application in nursery. • Experimental Study of AGV application for inter-culture operations.
7	Practical on Agri-AGV software lab	• Introduction to C language & python programming. • Prepare a python Programme for plant type recognition. • Prepare a python Programme for disease recognition. • Prepare a python Programme for fruits recognition. • Prepare a python Programme for weed recognition. • Prepare a python Programme for AGV operations. • Prepare a python Programme for colour based cotton boll picking operation. • Prepare a python Programme for selective spraying. • Prepare a python Programme for multipurpose AGV applications operations. • Prepare a python Programme for disease recognition auto selective spraying.
8	Practical on CAD/CAM/CAE	• Introduction to CAD software's • Application of CAD/CAE software tool for 3D design & development of agricultural AGV's • Introduction to Additive manufacturing Software (3D printer). • Introduction to CAE software • Experiment of Structural Analysis of AGV

	• Experiment of Thermal Analysis of AGV
	• Experiment of Modal Analysis of AGV
	• Experiment of CFD Analysis of AGV
	• Experiment of Electromagnetic Analysis of AGV
	• Experiment of 3D printing of AGV components.
Course commencement	Course will be offered every year
Frequency/ Periodicity of the course	1 Year
Registration Link	www.nahep.vnmkv.org.in
Batch photograph of the beneficiaries attending course	Nil