



**Ministry of Electronics &
Information Technology**



Government of India Initiative for Employability Enhancement

Mentoring Academicians & Professionals for Future Generation



- **Faculty Training**
- **Training and Consultancy**
- **Services for Industry**
- **Technical Incubation and Entrepreneurship**
- **Continuing Education for Students & Professionals**



IIT Guwahati



IIITDM Jabalpur



MNIT Jaipur



IIT Kanpur



NIT Patna



IIT Roorkee



NIT Warangal



India is fast emerging as a world power in Information, Communications Technology and Electronics (ICTE) sectors. To complement its growth and further development, there is an ever-increasing need for trained professionals with specialization in this space. This includes training of professionals not only in existing and changing technologies but also in the fields of R&D and electronics manufacturing. This will specifically be aimed at the ICTE sector to create a substantial resource pool of talent and generate ample opportunities for entrepreneurs. Ministry of Electronics & Information Technology (MeitY) has approved a scheme and setup Electronics and ICT Academies at 07 (seven) premier and leading institutions viz. IIT Guwahati, IIT Kanpur, NIT Warangal, NIT Patna and IIITDM Jabalpur (all five under Category-A); and IIT Roorkee, MNIT Jaipur (both under Category B). The Ministry had earlier setup two ICT Academies at Tamil Nadu and Kerala respectively. Subsequent to internal reviews in Ministry, revised cost and targets for the Electronics and ICT Academies in both the Categories for a period of seven years 4 months are as follows.

Category	Total Outlay	Internal Revenue	Grants-in-Aid from	Training Target Total
Category-A & B: 7- Academies	Rs. 87.7 crore	Rs. 10.4 crore	Rs. 77.3 crore	92,800

These Academies are aimed at faculty/mentor development and upgradation to improve the employability of the graduates, diploma holders in various streams, through collaboration of States/Union Territories. Each Academy would be provided funding support upto financial year 2021-22, and is expected to generate revenue by charging fee and taking up other activities to meet the recurring cost in a gradual manner and become self-sustainable by March 2022. All these Academies will cater to the requirements of identified neighboring States and UTs also. Brief information about all the Academies is available at:

<https://meit.gov.in/esdm/scheme-financial-assistance-setting-electronics-and-ict-academies>

Activities of the Academies

- Faculty development for
 - Specialized training with hands-on on basic and advanced level topics for Engineering streams and
 - Domain based training on use of ICT tools and techniques for non-engineering streams
- Training and consultancy services for industry
- Curriculum development for industry
- Continuing Education programme for students / working professionals
- Design, Develop and Deliver specialized modules for specific research areas
- Providing advice and support for technical incubation and entrepreneurial activities

About Spring/Summer Courses

Online Training Programmes in core areas of Electronics and Information & Communication Technology (ICT) streams have been planned by academies for delivery during Spring & Summers (i.e., Feb – Aug 2021). All these Spring & Summer- courses will be offered through **online live web-conferencing**, with instructor led talks delivered by eminent experts from IITs, NITs, IIITs and other premier institutes/industries, even from abroad. In addition, online proctoring coordinators designated by respective academies centres will take care of sessions on design orientation/activity linked problems/ assignments/ case studies and quiz test(s). Participants would be able to join online to web-conferencing platform using video/audio. For registration participants need to **apply to any participating academy online through its website**, as mentioned in details of respective programme,

How to apply:

- * For a particular programme, a participant is encouraged to apply to Academy level coordinator ONLY, belonging to any participating academy in that programme.
- * Government of India norms will be followed for SC/ST/EWS category participants.
- * The application form is to be submitted in the online mode to the Academy level coordinator of the respective academy.

Note: Refer, programme offering Academies websites for complete contact address and other details of Summer courses.

Following programmes are being offered online, these Spring & Summer, Feb - Aug 2021, each of 10/12 days duration.

Names of courses in Spring 2021	Starting date	Completion date	Names of courses in Summers 2021	Starting date	Completion date
Machine Learning for Computer Vision	01 Feb 2021	12 Feb 2021	Deep Learning & Applications (Parallel Architectures)	10 May 2021	21 May 2021
Advanced Communication & Antennae	15 Feb 2021	26 Feb 2021	Digital Tools for Writing, Authoring and reviewing manuscripts	24 May 2021	4 Jun 2021
5G Design: Journey from Devices to Circuits	01 Mar 2021	12 Mar 2021	SuperX- Operating Systems- Linux	7 Jun 2021	18 Jun 2021
ICT Tools for Teaching, Learning process & Institutes	15 Mar 2021	26 Mar 2021	Social Robotics & AI	7 Jun 2021	18 Jun 2021
RISC-V VLSI Implementation Flow: RTL2GDS	27 Mar 2021	10 Apr 2021	Numerical Analysis & optimization for Scientists & Engineers (SCILAB)	21 Jun 2021	2 Jul 2021
Data Science for All	12 Apr 2021	23 Apr 2021	Programming in Python	5 Jul 2021	16 Jul 2021
Designing With FPGAs (Intel)	19 Apr 2021	30 Apr 2021	Blockchain Technology & Applications	19 Jul 2021	30 Jul 2021
			Advanced Optimization Techniques and Hands-on with MATLAB/SCILAB	2 Aug 2021	13 Aug 2021
			Quantum Computing	16 Aug 2021	27 Aug 2021

Following are the programmes being offered as Self-Paced in this Spring/Summer, Feb - Aug 2021, by IIT Kanpur Academy.

Python Programming – A Practical Approach	https://ict.iitk.ac.in	Smart Grid Technology	https://ict.iitk.ac.in
Computer System Security	https://ict.iitk.ac.in		

Target Beneficiaries:

Interested Faculty/students of engineering/other institutions & professionals from our country as well as from outside India, are eligible to attend these Spring/Summer courses. Additionally, faculty of non-engineering background are also invited to attend FDP on ICT Tools and techniques for Teaching Learning Process & Institutes. Industry persons and student participants are also invited to attend the aforesaid programmes to upgrade their skills.

Availability of seats at each offering Academy:

Participants will be selected based on first-cum-first-serve basis by organizing academy. Selected participants will be communicated through e-mail / notified in E&ICT Academy websites. There is no limit on number of participants, however, only first 1000 participants would enjoy duplex both way video/audio. Rest of the participants would enjoy receiving video/audio but may not raise queries in real-time.

Course duration:

Each course is designed as 3 credit equivalent for 35-40 hours (Theory Lectures, Hands-on/Design orientation/Activity linked problems/Assignments Problem Solving/Case Studies sessions/Quiz Tests). The contact hours are to be spread over 10 days, implying NOT more than 3½ hours per day.

Accommodation & Travel

There is no provision as well as scope for Boarding and Lodging, as all the programmes are being offered ONLINE.

Registration Fee for each Summer Course:

No Registration fee is charged for attending these programme. However, candidates from India/SAARC/African countries are required to pay a mandatory examination fee of Rs. 500/- (faculty/PhD-scholars/students) OR Rs. 1000/- (others), and US\$ 60 from other countries, if they desire a certificate of completion of programme. This Certificate for participation as well as for Satisfactory performance will be given to the participants subject to fulfillment of attending all sessions, submission of assignments and clearing the test(s) by all the paying participants.

Mode of Payment: Preferred mode is ONLINE payment at respective Academy site.

Academy Name	Link for payment
IIT Guwahati	Online registration at web site of Academy, IIT Guwahati- http://www.iitg.ernet.in/eictacad/
IIITDM Jabalpur	Online registration at web site of Academy, IIITDM Jabalpur- http://ict.iiitdmj.ac.in/
MNIT Jaipur	Online registration at web site of Academy, MNIT Jaipur- http://www.mnit.ac.in/eict
NIT Patna	Online registration at web site of Academy of NIT Patna- http://www.nitp.ac.in/ict
IIT Roorkee	Online registration at web site of Academy of IIT Roorkee- http://eict.iitr.ac.in/
NIT Warangal	Online registration at web site of Academy NIT Warangal- http://nitw.ac.in/eict/

- Last Date for Submission of Applications is Monday of earlier week from the start date of respective programme.
- The intimation of Selection for participation will be posted on website on Wednesday of previous week.

The details of Online-Spring courses being offered during Feb - Apr 2021 is as follows.

1. Machine Learning for Computer Vision			1 Feb – 12 Feb 2021
EXPERTS/SPEAKERS- Prof. Shantanu Chaudhury, Director IIT Jodhpur; Dr. Suresh Sundaram, IITG; Prof. H. Fujiyoshi, Chubu Univ. Japan; Prof. Barbara Zitova, Acad Sci. Czech Republic; Dr. Amit Sethi, IITB; Prof. Sumantra Dutta Roy, IITD; Prof. P. Guha, , Prof. Aparajita Ojha, IIITDM Jabalpur, Dr. Santosh Viparthi, MNIT Jaipur			
Principal Coordinator		Joint- Principal Coordinators	
Prof. Aparajita Ojha, IIITDM Jabalpur aojha@iiitdmj.ac.in M:94258 00334		Dr. Santosh Viparthi, MNIT Jaipur skviparthi@mnit.ac.in M: 954 9658 135	Prof. Amey Karkare, IIT Kanpur, karkare@iitk.ac.in M: 953 268 9131
Joint- Principal Coordinators			
Dr Prthwjit Guha IIT Guwahati, pguha@iitg.ac.in		Dr. Mukesh Kumar NIT Patna mukesh.kumar@nitp.ac.in M:8984142557	Dr Somraju NIT Patna somaraju@nitp.ac.in M:9676430356
MODULES TOPICS-			
<ul style="list-style-type: none"> Introduction to Image Processing and Computer Vision (CV) Digital Image and Computer Vision, Main Goals and challenges of the CV, Structure of Human Eye and Vision, Color Models, Image Processing Goals and Tasks. Traditional approaches in CV Feature Extraction using local patterns and their applications to Image Processing and CV: SIFT, HOG, LBP, Natural Image Classification, Image Enhancement, edge Detection, Segmentation. Image denoising Introduction to Artificial Intelligence (AI) and Machine Learning (ML) AI and ML, Supervised and Unsupervised Learning, Traditional ML approaches, 		<ul style="list-style-type: none"> Neural Network as a learning machine, Machine learning. applications in computer vision. Image classification, Image segmentation etc Applications of ML in Medical Images Challenges in Medical image processing, ML for Medical Image processing, Medical image segmentation, classification and survival prediction, Medical image denoising, Medical image retrieval Introduction to Deep Learning (DL) Basic differences between Conventional ML and DL approaches, Feed forward Neural Networks (NN), Back propagation, Stochastics gradient method and variants, regularization, 	
		<ul style="list-style-type: none"> and optimization, Vanishing /exploding gradient problem. Introduction to Convolutional Neural Network The Convolution Operation, Basic architecture of a Convolution Neural Network, Pooling and Batch Normalization layers, CNNs as feature extractors, Image classification using CNN, Image Enhancement and Segmentation. CNN architectures for CV State of the Art CNN Architectures, CNN for Image Enhancement and Segmentation. Applications of CNN in face recognition Face Detection and Recognition using CNN, Siamese Network and Triplet Loss. 	

2 Advanced Communication and Antennas

15 Feb – 26 Feb 2021

EXPERTS/SPEAKERS- Prof. P. K. Jain, NITP; Prof. Ratnajit Bhattacharjee, IITG; Dr. Ravi Gangwar, IIT(ISM) Dhanbad; Dr. Veer Singh Gangwar, LRDE Bangalore; Dr. Ribhu, IITG; Dr. Kalpana Dhaka, IITG; Dr. Mahima Arrawatia, IITG; Dr. Sudarshan Mukherjee, IITG; Dr. Salil Kashyap, IITG; Dr. Gaurav Varshney, NIT Patna; Dr. Rakesh Ranjan, NITP

Principal Coordinator	Joint- Principal Coordinators	
Prof. Ratnajit Bhattacharjee IIT Guwahati ratnajit@iitg.ac.in M: 954 965 8131	Dr. Rakesh Ranjan, NIT Patna rr@nitp.ac.in M: 9334385016	Dr. Sarthak Singhal sarthak.ece@mnit.ac.in 7376157421(M) Dr. R. Mitharwal, rajendra.ece@mnit.ac.in 8239633089(M)

Academy Level Coordinator

Dr. Richa Agrawal, NIT Patna richa.ec@nitp.ac.in M: 9559090527	Dr. Gaurav Varshney, NIT Patna, gaurav.ec@nitp.ac.in M:8076114006	
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MODULES TOPICS-

<ul style="list-style-type: none"> 1: Digital Communication System 2: Channel coding: block and convolutional codes 3: Multicarrier modulation and OFDM 4: Spread spectrum and DSSS 	<ul style="list-style-type: none"> 5: Diversity techniques for wireless communication 6: MIMO and Massive MIMO for wireless communication 7: 5G and Emerging millimetre wave communication systems 	<ul style="list-style-type: none"> 8: Optical communication 9: Antenna Basics 10. Antennas for WiFi, cellular communication, portable devices and 5G communication systems 11. Antenna Array
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3 5G Design: Journey from Devices to Circuits

1 Mar – 12 Mar 2021

EXPERTS/SPEAKERS- Shri Surinder Singh (Director, SCL Chandigarh); (ii) Other Speakers- Shri H. S Jatana (Senior Head, SCL Chandigarh), Prof. Anand Bulusu (IIT Roorkee), Dr. Salil Kashyap, Dr. Ribhu Dr. Sudarshan Mukherjee, Dr. Gaurav Trivedi, IITG (iii) Industry- Dr. Aditya Dalakoti, Mr. Ashish Jindal (DRDO), Puneet Mittal

Principal Coordinator

Dr. Gaurav Trivedi, IITGuwahati,
trivedi@iitg.ernet.in
M: 9435582802

Joint- Principal Coordinators

Dr. C. Periasamy, MNITJ
cpsamy.ece@mnit.ac.in
M: 954 9654 235

Dr Pankaj Sharma, IIITDMJ,
IIITDMJ
pankaj.sharma@iiitdmj.ac.in
M: 9893805618

Joint- Principal Coordinators

Dr. Sangeeta Singh, NIT Patna
sangeeta.singh@nitp.ac.in
M:9479646111
Mr. Pankaj Kumar, NIT Patna
pankajjha@nitp.ac.in
M:7004727085

MODULES TOPICS-

- **Introduction and Tools Overview:** Introduction: Basics of RF Communication; Setup of Scikit-RF,
- **RF ASIC Concepts 1:** Two port Networks, Stability, Equivalent Device Models, Impedance Matching, Biasing
- **Device:** Semiconductor general basics and requirements, Exploration in Si MOSFET, GaN HEMT

- **Modelling:** Basic of Device Modelling, Passive and Active Model, Hands on Modelling of passive component using Scikit-RF
- **RF Simulations:** Hands of tutorial for Doing Impedance Matching using Scikit-RF
- **RF ASIC Concepts 2:** PDK Development, Layout Issues, Packaging Issues and package selection, Testing

- **Power Amplifier Design:** Basics of PA, different classes, performance matrix, design of one topology for 5G , Flow of MMIC design using ADS
- **Measurement:** Loadpull measurement, DC-IV, S parameter and power measurement



4 ICT Tools for Teaching, Learning process & Institutes

15 Mar – 26 Mar 2021

EXPERTS/SPEAKERS- CONSENT Awaited (i) Prof. D. B. Phatak, IITB (ii) Prof. Prabhakar, IITK, (iii) Prof. K. Mangala Sundar, IITM (iv) Prof. Binod Kumar, IITR (v) Prof. S. Sancheti, VC, SRMIST (consent awaited) & speakers from IIT Kharagpur (consent awaited); Dr. Reema Sahni, FiTT, IITD; Active Learning Group
Experts from host institutes- (i) Prof. Aparajita Ojha, IIITDMJ (ii) Prof. L. Bhargava, MNITJ (iii) Dr. Pilli Emmanuel Shubhakar, MNITJ, (iv) Dr. Arka Prokash Mazumdar, MNITJ (v) Dr. A. M. Joshi, (vi) Dr. R. K. Maddila, MNITJ, (vii) Dr. Santosh Vipparthi, MNITJ & Prof. V. Sahula, MNITJ (viii) Dr. Prabhat Kumar & Dr. Bharat Gupta, NIT Patna

Principal Coordinator		Joint- Principal Coordinators	
Dr. Bharat Gupta, NIT Patna, bharat@nitp.ac.in M:93314 06964		Prof. Lava Bhargava, MNIT Jaipur lavab@mnit.ac.in M: 954 9654 231	Dr. Gaurav Trivedi, IIT Guwahati trivedi@iitg.ac.in M: 94355 82802
Joint- Principal Coordinators			Academy Level Coordinator
Prof. Amey Karkare, IIT Kanpur karkare@iitk.ac.in M: 953 268 9131	Dr Prashant K. Jain, IIITDM Jabalpur pkjain@iiitdmj.ac.in M:9425800310	Dr. Sandeep Kumar Garg, IIT Roorkee sandeep.garg@cs.iitr.ac.in eict@iitr.ac.in 7579024426	Dr. Rakesh Ranjan, NIT Patna rr@nitp.ac.in M: 9334385016 Dr. Jitendra Bahadur Maurya jbm.ec@nitp.ac.in M:9198042481

MODULES TOPICS-

<ul style="list-style-type: none"> Use of ICT- Effective use of ICT for transforming pedagogy and empowering students; Empowerment through Communication skills Online/blended Learning- Adopting online/blended-learning in teaching learning process MooC- Use of MooC for contents management, class organization, 	<p>assessment; MooC's deployment and use; Building Course Website and Google Suite</p> <ul style="list-style-type: none"> Teaching Learning Tools & e-content generation- Using tools for teaching learning-interactive whiteboards/smart-screens, video-conferencing, digital content creation, design of instructional material & presentation; Content Dissemination- Management, 	<p>Version Control; ICT tool for English language teaching and learning; Illustration tools and author aids- Visio</p> <ul style="list-style-type: none"> Computer Based Training (CBT) =- CBT for letters generation, certificate preparation, report writing, Presentation and posters preparation, Spreadsheets & evaluation, Research Resources & Bibliography Management etc.
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5 RISC-V VLSI Implementation Flow: RTL2GDS

27 Mar – 10 Apr 2021

EXPERTS/SPEAKERS-

Principal Coordinator

Dr. Gaurav Trivedi, IIT Guwahati
ratnajit@iitg.ernet.in
 M: 99544 98116

Joint- Principal Coordinators

Dr. Bal Chand Nagar, NITP
balchandnagar@nitp.ac.in
 M:9993102487
 Dr. Meena Pachori, NITP
meenap.ec@nitp.ac.in
 M:8989186900

Prof. D. Boolchandani, MNITJ
dboolchandani.ece@mnit.ac.in
 Mobile:93314 06964
 Dr. Deepak Bharti, MNITJ
dbharti.ece@mnit.ac.in
 M:

Joint- Principal Coordinators

Prof. P. N. Kondekar, IIITDMJ
pnkondekar@iiitdmj.ac.in
 M:9425805445

MODULES TOPICS- TO be Announced (IIT Guwahati)

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|--|---|--|
| <ul style="list-style-type: none"> Simulations and Characterization for Libraries Design Basics: Circuit, Architecture and System Level Constraints and Synthesis : Input Output Constraints, Complex SoC Constraints | <ul style="list-style-type: none"> Input Output Files : Lib Files, General files needed in complete flow Layer and Power Planning Floorplanning Delay Calculations and System Implications Setup and Hold Discussion | <ul style="list-style-type: none"> Placement Basics and Settings DRC LVS and Extraction Low Power Flow Basics Sign Off |
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- All Modules will be covered using hands on tutorials of RISC-V implementation in open source tool flow.



6 Data Science for All

12 Apr – 23 Apr 2021

EXPERTS/SPEAKERS- Prof Amey Karkare IITK, Prof DVLN Somayajulu-IIITDMK, Prof RBV Subramnyam NIT-W, Dr Atul Gupta IIITDMJ, Dr T Ramakrishnu NIT-W, Dr Nagesh Bhattu – NIT AP, Dr Anand Kumar- NIT K Surathkal, Industry speakers.

Principal Coordinator

Prof. R. B. V. Subramanyam,
 NIT Warangal
rbvs66@gmail.com
 M: 9491346969

Joint- Principal Coordinators

Dr. Atul Gupta, IIITDMJ
 Jabalpur
atul@iiitdmj.ac.in
 M: 9425152499

Prof. Amey Karkare, IIT
 Kanpur,
karkare@iitk.ac.in
 M: 953 268 9131

Joint- Principal Coordinators

Dr. Prabhat Kumar, NITP
prabhat@nitp.ac.in
 M:8406001700

Dr. Namita Mittal MNIT Jaipur
nmittal.cse@mnit.ac.in,
 M: 954 9654 394
 Dr. Meenakshi Tripathi,
mtripathi.cse@mnit.ac.in

Dr. Raksha Sharma, IIT Roorkee
raksha.sharma@cs.iitr.ac.in
eict@iitr.ac.in
 8879261844

MODULES TOPICS-

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|--|---|---|
| <ul style="list-style-type: none"> Mathematical Foundations of Data Sciences: Matrices, Vectors, Vector Spaces, Matrix Decomposition, Singular Value Decomposition, Statistical Measures, Probability basics, density function, variance, conditional probability, Markov Chains | <ul style="list-style-type: none"> Data Processing: Dimensionality Reduction, Principal Component Analysis. Machine Learning basics: Regression, Classification – Decision Trees, Naive Bayesian Classifier, Clustering, Handling Large Datasets: MapReduce | <ul style="list-style-type: none"> R for Data Science: Data Wrangling, Data Visualization, Programming Python for Data Science: Normal Python, NumPy, Pandas, Matplotlib Deep Learning Scikit, Keras and TensorFlow: Practice on ML topics |
|--|---|---|

7 System Design Methodologies for Embedded, IoT, AI, & HPC using Intel FPGA

(Industry supported- Intel India)

19 Apr – 30 Apr 2021

EXPERTS/SPEAKERS-

Principal Coordinator

Dr. Gaurav Trivedi, IIT Guwahati
trivedi@iitg.ernet.in
 M: 9435582802

Joint- Principal Coordinators

Dr Satish Maheswaram, NIT Warangal
satishm@nitw.ac.in
 Mobile: 97600 18986

Prof. P N Kondekar, IITDM Jabalpur,
pnkondekar@iitdmj.ac.in
 M:9425805445

Joint- Principal Coordinators

Dr. Amit M. Joshi, MNIT Jaipur
amjoshi.ece@mnit.ac.in
 M: 954 9654 239
 Dr. C. Sahu, MNIT Jaipur
chitrakant.ece@mnit.ac.in
 M: 954 965 5371

Dr. Bharat Gupta, NIT Patna
bharat@nitp.ac.in
 Mobile:93314 06964

Academy Level Coordinator

Dr. Sangeeta Singh, NIT Patna
sangeeta.singh@nitp.ac.in
 M:9479646111
 Dr. Pushpa Giri, NIT Patna
pushpa.ec@nitp.ac.in
 M:8076304396

MODULES TOPICS- To be Announced (IIT Guwahati)

IIT Guwahati IITDM Jabalpur MNIT Jaipur IIT Kanpur IIT Patna IIT Roorkee NIT Warangal

Various courses from IIT Kanpur in Intelligent Self Paced Education (iSPED) mode are being offered in this pandemic period till September 2021. The courses are made available to faculty for free for a limited duration under FDP. Participants may please ignore the price mentioned on the URL for the courses, and join the courses of their choice.

8 Computer System Security (<https://ict.iitk.ac.in/product/computer-system-security/>)

EXPERTS/SPEAKERS-

Prof. Sandeep Shukla (<https://www.cse.iitk.ac.in/users/sandeeps/>)

Principal Coordinator

Prof. Amey Karkare, IIT Kanpur,
karkare@iitk.ac.in
 M: 953 268 9131

MODULES TOPICS-

- Introduction, Interview with Prof. Sandeep Shukla; Learning objectives, Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1 chase
- Control Hijacking, More Control Hijacking attacks integer overflow, More Control Hijacking attacks format string vulnerabilities, Defense against Control Hijacking
- Confidentiality Policies, Confinement Principle, Detour Unix user IDs process IDs and privileges

- VM based isolation, Confinement principle, Software fault isolation, Rootkits, Intrusion Detection Systems
- Secure architecture principles isolation and leas, Access Control Concepts
- Web security landscape, Web security definitions goals and threat models, HTTP content rendering, Browser isolation, Security interface, Cookies frames and frame busting

- Major web server threats, Cross site request forgery & scripting, Finding vulnerabilities, Secure development
- Basic cryptography, Public key cryptography, RSA public key crypto, Digital signature Hash functions; Email security certificates, Transport Layer security TLS, IP security, DNS security
- Internet infrastructure, Summary of weaknesses of internet security, Link layer connectivity and TCP IP connectivity

9 Python Programming – A Practical Approach

(<https://ict.iitk.ac.in/product/python-programming-a-practical-approach/>)

EXPERTS/SPEAKERS-

Prof. Amey Karkare, IIT Kanpur,
karkare@iitk.ac.in
M: 953 268 9131

Principal Coordinator

Prof. Amey Karkare, IIT Kanpur,
karkare@iitk.ac.in
M: 953 268 9131

MODULES TOPICS-

• Introduction	• Parts of A Function	• Abstract Data Types
• The Programming Cycle for Python	• Execution of A Function	• Classes
• Interacting with Python Programs	• Keyword and Default Arguments	• Special Methods
• Elements of Python	• Scope Rules	• Class Example
• Type Conversion	• Strings	• Inheritance
• Expressions	• Indexing and Slicing of Strings	• Inheritance and OOP
• Assignment Statement	• More Slicing	• Iterators
• Arithmetic Operators	• Tuples	• Recursion
• Operator Precedence	• Unpacking Sequences	• Simple Search
• Boolean Expression	• Lists	• Estimating Search Time
• Conditionals	• Mutable Sequences	• Binary Search
• Expression Evaluation	• List Comprehension	• Estimating Binary Search Time
• Float Representation	• Sets	• Recursive Fibonacci
• Loops	• Dictionaries	• Tower Of Hanoi
• For Loop	• Higher Order Functions	• Sorting
• Nested Loops	• Sieve of Eratosthenes	• Selection Sort
• Break and Continue	• File I/O	• Merge List
• Function	• Exceptions	• Merge Sort
	• Assertions	• Higher Order Sort
	• Modules	

10 Smart Grid Technology (<https://ict.iitk.ac.in/product/smart-grid-technology/>)

EXPERTS/SPEAKERS-

Prof. Ankush Sharma, IIT Kanpur

ansharma@iitk.ac.in

Principal Coordinator

Prof. Amey Karkare, IIT Kanpur,

karkare@iitk.ac.in

M: 953 268 9131

MODULES TOPICS-

Smart Grid Overview

- History of Smart Grid
- Conventional Grid Vs. Smart Grid
- Features of Smart Grid
- Key Characteristics of Smart Grid
- Smart Grid Elements
- Forces behind Smart Grid Evolution
- Smart Grid Stake Holders
- Smart Grid Building Blocks
- Smart Grid Resources

Smart Grid Architecture & Design

- Conventional Power System Architecture
- IT Layer
- Communication Layer
- Distributed Architecture Design

Smart Grid Measurement

- Synchrophasor Technology
- Smart Meters and Advanced Metering Infrastructure
- Wireless Sensor Network (WSN)
- GIS/Google mapping
-

Smart Grid Communication

- Wired Communication (e.g. PLCC, Ethernet, Optical Fibre)
- Wireless Communication (e.g. WiFi, Zigbee, GSM/GPRS, WAN)
- Machine to Machine Communication

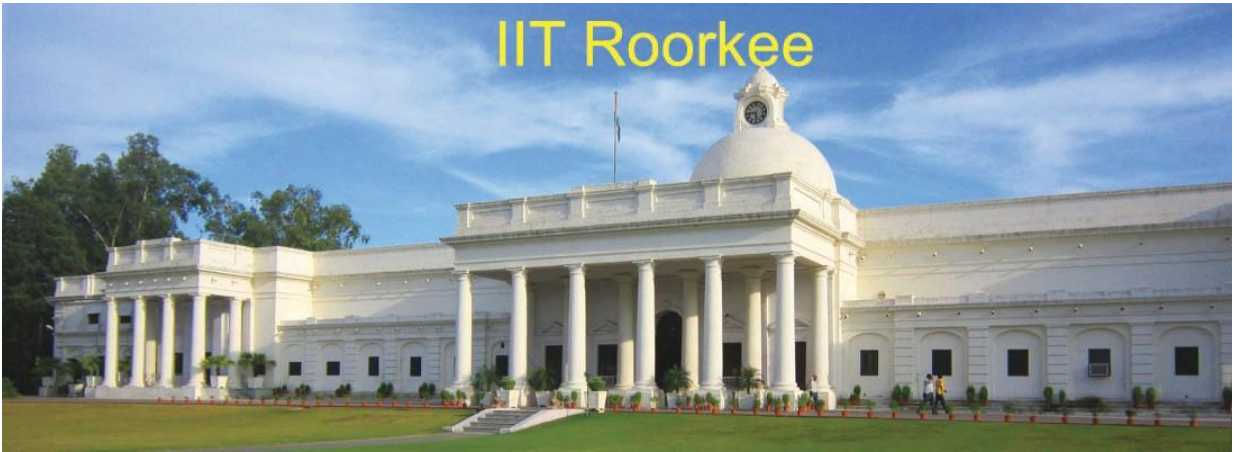
Smart Grid Standards and Protocols

- IEC 61850
- IEC 60870
- IEEE C37.118
- IEEE 1588
- IEC 62351; IEC 61970/ 61968
- IEC 62056; DNP 3.0

Interoperability & Associated Standard

- Interoperability issues in Smart Grid and its solutions
- Common Information Model
- Multispeak
- Green Button
- SunSpec
- SEP 2.0

IIT Roorkee



IIT Guwahati



NIT
WARANGAL



MNIT Jaipur



NIT Patna

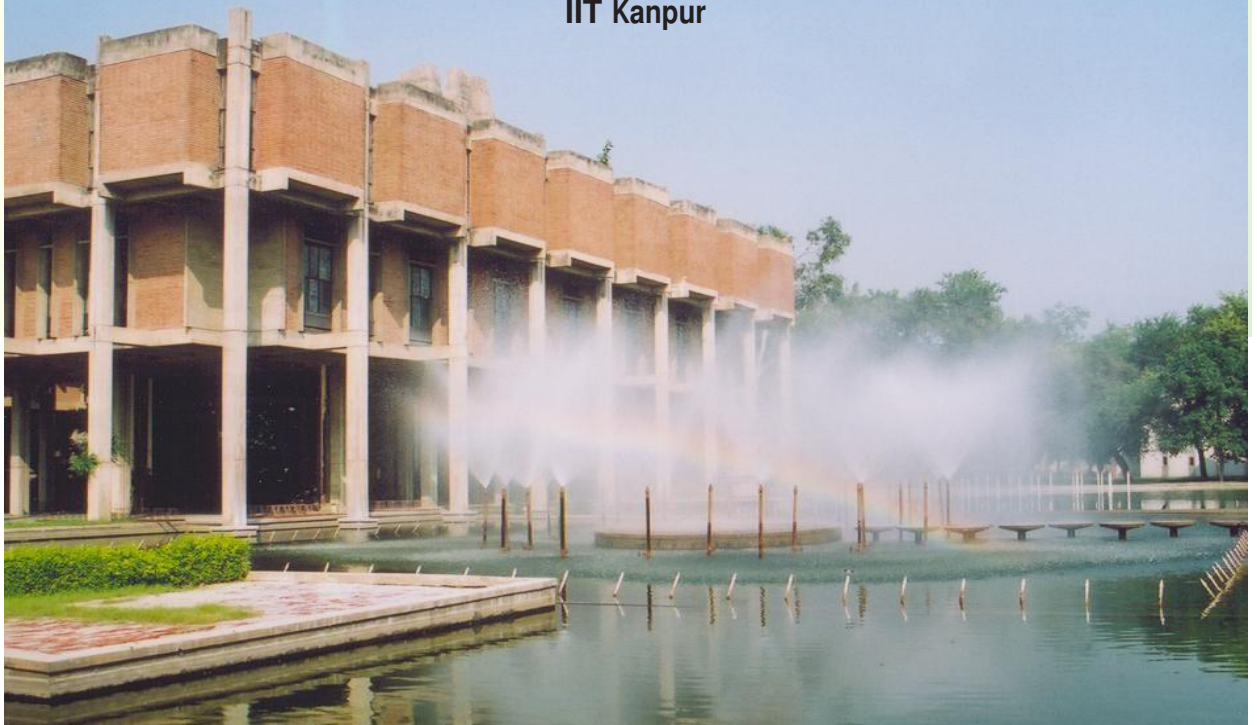


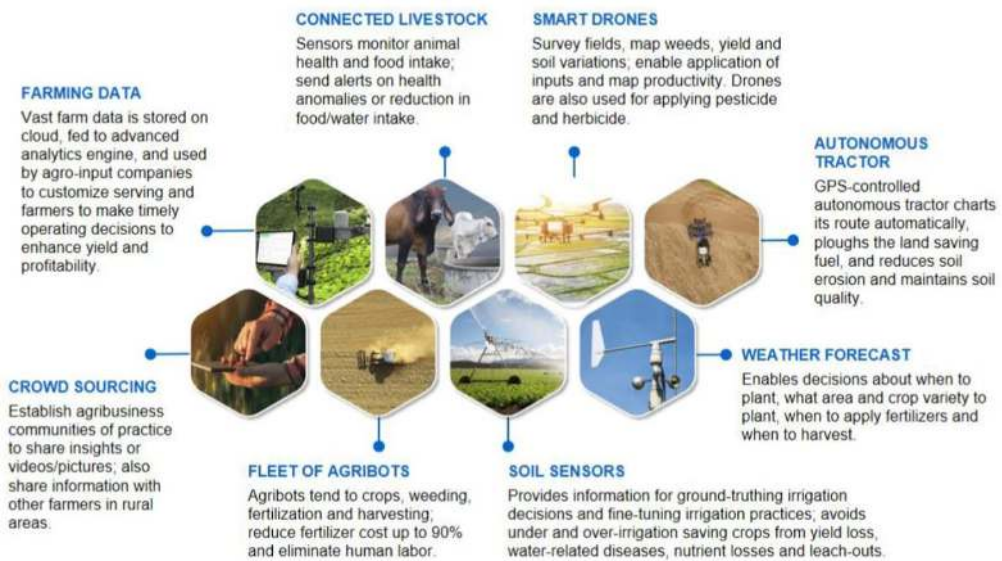


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IIT Kanpur





Academy & States/UTs catred	Advisory Board Chairman	Chief Investigator	Contact Details at Academy For all general queries
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Electronics & ICT Academy at IIITDM Jabalpur Madhya Pradesh, Chhattisgarh, Maharashtra	Prof. Sanjeev Jain director@iiitdmj.ac.in M:	Prof. Aparajita Ojha aojha@iiitdmj.ac.in M: +91 9425800334	Email: academyiiitdmj@gmail.com , M: +91 9893443284 Website: http://ict.iiitdmj.ac.in/
Electronics & ICT Academy at MNIT Jaipur Rajasthan, Gujarat, Dadra & Nagar Haveli, Daman & Diu	Prof. Udaykumar R. Y. director@mnit.ac.in	Prof. Vineet Sahula ci.academy@mnit.ac.in M: 954 9654 227	Dr. Shailesh Sharma (PM) Email: academy@mnit.ac.in L: 0141-2715084 M: +91 96724 72877 Website: http://www.mnit.ac.in/eict
Electronics & ICT Academy at IIT Kanpur UP, Punjab, Haryana, Delhi	Prof. Abhay Karandikar director@iitk.ac.in	Prof. B. V. Phani bvphani@iitk.ac.in M: +91 9451423721	Email: eict@iitk.ac.in M: 0512 679 7787 Website: https://ict.iitk.ac.in/
Electronics & ICT Academy at NIT Patna Bihar, Jharkhand, Odisha, West Bengal	Prof. Pradip Kumar Jain director@nitp.ac.in	Dr. Bharat Gupta bharat@nitp.ac.in M: 9331406964	Email: eictapatna@nitp.ac.in M: + 0612 - 237 1715 Website: http://www.nitp.ac.in/ict
Electronics & ICT Academy at IIT Roorkee Jammu and Kashmir, Himachal Pradesh and Uttarakhand	Prof. Ajit K. Chaturvedi director@iitr.ac.in	Dr. Sanjeev Manhas eict@iitr.ac.in M: +91 7078627392	Mr. Prateek Sharma (PM) Email: prateek2789@gmail.com , M: +91 7078627392 Website: http://eict.iitr.ac.in/
Electronics & ICT Academy at NIT Warangal Telangana, Andhra Pradesh, Karnataka, Puducherry, ndaman and Nicobar Islands, Goa	Prof. N.V. Ramana Rao director@nitw.ac.in	Prof. R. B. V. Subramanyam rbvs66@gmail.com M: +91 949 134 6969	Email: eict.nitw@gmail.com M: 0912 101 6547 Website: http://nitw.ac.in/eict/