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

Programme brochure for 2021

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://meity.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 Repulic; 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 Vipparthi, MNIT Jaipur skvipparthi@mnit.ac.in M: 954 9658 135	Prof. Amey Karkare, IIT Kanpur, karkare@iitk.ac.in M: 953 268 9131
Joint- Principal Coordinators		
Dr Prthwijit 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-

- 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,

- 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,

- 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	

MODULES TOPICS-

- 1: Digital Communication System
- 2: Channel coding: block and convolutional codes
- 3: Multicarrier modulation and OFDM
- 4: Spread spectrum and DSSS

- 5: Diversity techniques for wireless communication
- 6: MIMO and Massive MIMO for wireless communication
- 7: 5G and Emerging millimetre wave communication systems

- 8: Optical communication
- 9: Antenna Basics
- 10. Antennas for WiFi, cellular communication, portable devices and 5G
- communication systems
- 11. Antenna Array

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	Joint- Principal Coordinators	
Dr. Gaurav Trivedi, IITGuwahati, trivedi@iitg.ernet.in M: 9435582802	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 Awaiated (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-

- **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,

assessment; MooC's deployment and use; Building Course Website and Google Suite

- **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,

Version Control; ICT tool for English language teaching and learning; Illustration tools and author aids- Visio

- **Computer Based Training (CBT)** =- CBT for letters generation, certificate preparation, report writing, Presentation and posters preparation, Spreadsheets & evaluation, Research Resources & Bibliography Management etc.

5	RISC-V VLSI Implementation Flow: RTL2GDS	27 Mar – 10 Apr 2021

EXPERTS/SPEAKERS-

Principal Coordinator	Joint- Principal Coordinators	
Dr. Gaurav Trivedi, IIT Guwahati ratnajit@iitg.ernet.in M: 99544 98116	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)

• Simulations and Characterization for Libraries • Design Basics: Circuit, Architecture and System Level • Constraints and Synthesis : Input Output Constraints, Complex SoC Constraints	• 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	• Placement Basics and Settings • DRC LVS and Extraction • Low Power Flow Basics • Sign Off

• 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 Subramnayam NIT-W, Dr Atul Gupta IIITDMJ, Dr T Ramakrishnudu NIT-W, Dr Nagesh Bhattu – NIT AP, Dr Anand Kumar- NIT K Surathkal, Industry speakers.

Principal Coordinator	Joint- Principal Coordinators	
Prof. R. B. V. Subramanyam, NIT Warangal rbvs66@gmail.com M: 9491346969	Dr. Atul Gupta, IIITDM 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-

• **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	• **Data Processing**: Dimensionality Reduction, Principal Component Analysis. • **Machine Learning basics**: Regression, Classification – Decision Trees, Naïve Bayesian Classifier, Clustering, Handling Large Datasets: MapReduce	• **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	Joint- Principal Coordinators	
Dr. Gaurav Trivedi, IIT Guwahati trivedi@iitg.ernet.in M: 9435582802	Dr Satish Maheswaram, NIT Warangal satishm@nitw.ac.in Mobile: 97600 18986	Prof. P N Kondekar, IIITDM Jabalpur, pnkondekar@iiitdmj.ac.in M:9425805445
Joint- Principal Coordinators		**Academy Level Coordinator**
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	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)

-
-
-

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
- The Programming Cycle for Python
- Interacting with Python Programs
- Elements of Python
- Type Conversion
- Expressions
- Assignment Statement
- Arithmetic Operators
- Operator Precedence
- Boolean Expression
- Conditionals
- Expression Evaluation
- Float Representation
- Loops
- For Loop
- Nested Loops
- Break and Continue
- Function

- Parts of A Function
- Execution of A Function
- Keyword and Default Arguments
- Scope Rules
- Strings
- Indexing and Slicing of Strings
- More Slicing
- Tuples
- Unpacking Sequences
- Lists
- Mutable Sequences
- List Comprehension
- Sets
- Dictionaries
- Higher Order Functions
- Sieve of Eratosthenes
- File I/O
- Exceptions
- Assertions
- Modules

- Abstract Data Types
- Classes
- Special Methods
- Class Example
- Inheritance
- Inheritance and OOP
- Iterators
- Recursion
- Simple Search
- Estimating Search Time
- Binary Search
- Estimating Binary Search Time
- Recursive Fibonacci
- Tower Of Hanoi
- Sorting
- Selection Sort
- Merge List
- Merge Sort
- Higher Order Sort

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)
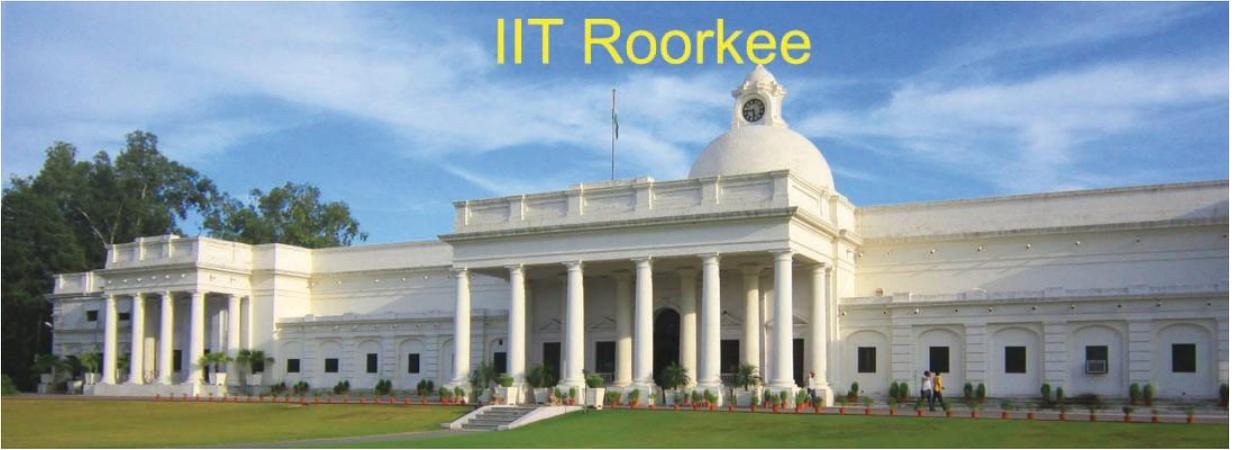- Machine to Machine Communication

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
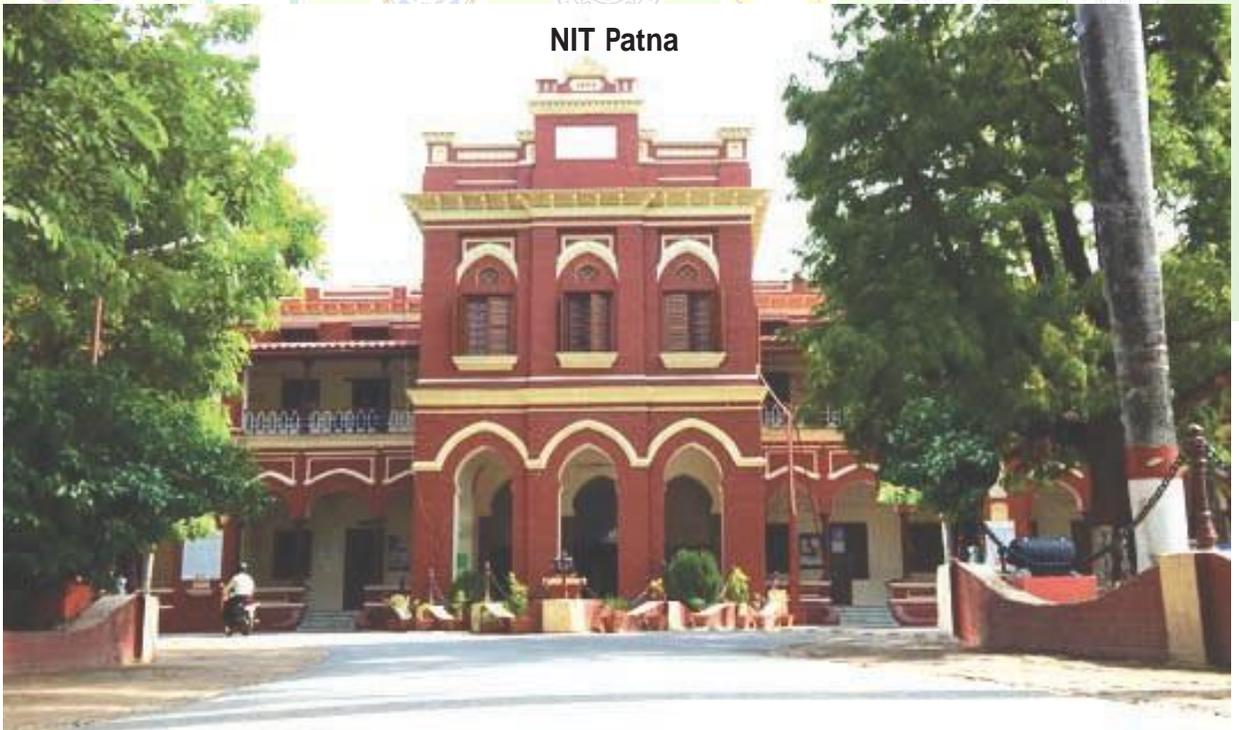- SunSpec
- SEP 2.0

IIT Roorkee
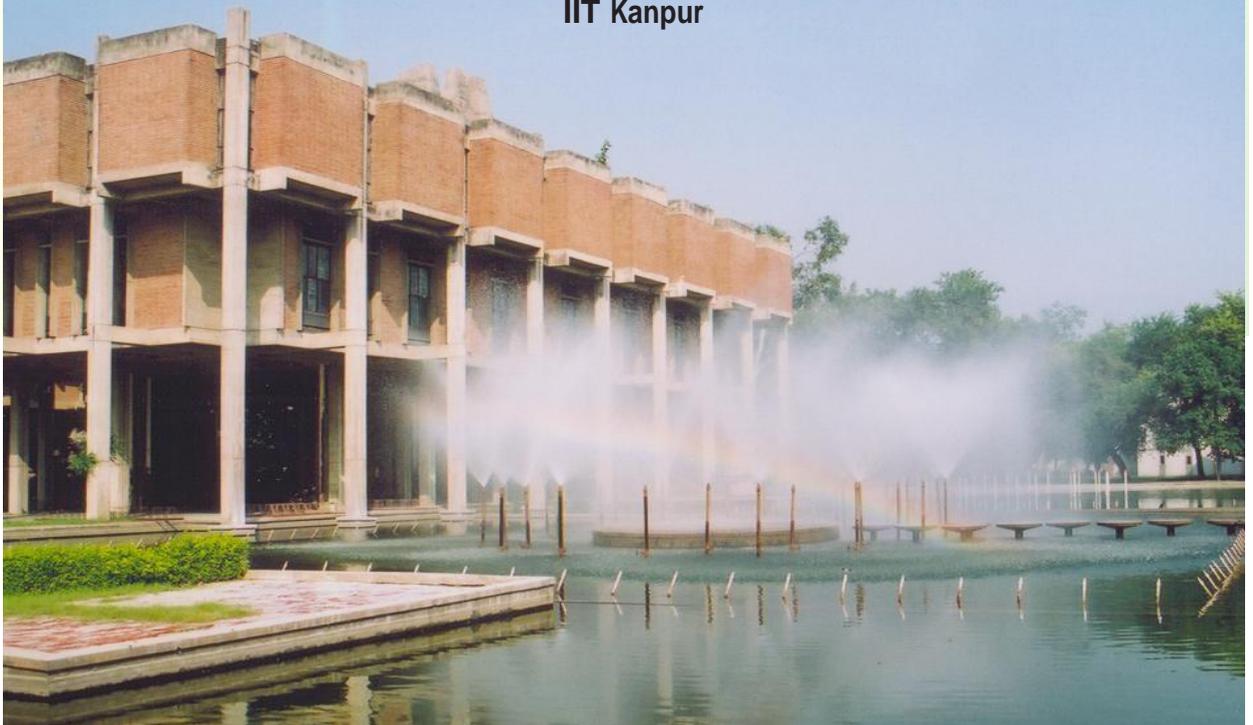

IIT Guwahati

NIT WARANGAL

MNIT Jaipur

NIT Patna

PDPM IIITDM Jabalpur

IIT Kanpur

FARMING DATA
Vast farm data is stored on cloud, fed to advanced analytics engine, and used by agro-input companies to customize serving and farmers to make timely operating decisions to enhance yield and profitability.

CONNECTED LIVESTOCK
Sensors monitor animal health and food intake; send alerts on health anomalies or reduction in food/water intake.

SMART DRONES
Survey fields, map weeds, yield and soil variations; enable application of inputs and map productivity. Drones are also used for applying pesticide and herbicide.

AUTONOMOUS TRACTOR
GPS-controlled autonomous tractor charts its route automatically, ploughs the land saving fuel, and reduces soil erosion and maintains soil quality.

CROWD SOURCING
Establish agribusiness communities of practice to share insights or videos/pictures; also share information with other farmers in rural areas.

FLEET OF AGRIBOTS
Agribots tend to crops, weeding, fertilization and harvesting; reduce fertilizer cost up to 90% and eliminate human labor.

SOIL SENSORS
Provides information for ground-truthing irrigation decisions and fine-tuning irrigation practices; avoids under and over-irrigation saving crops from yield loss, water-related diseases, nutrient losses and leach-outs.

WEATHER FORECAST
Enables decisions about when to plant, what area and crop variety to plant, when to apply fertilizers and when to harvest.

Academy & States/UTs catred	Advisory Board Chairman	Chief Investigator	Contact Details at Academy For all general queries
Electronics & ICT Academy at IIT Guwahati Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura,Sikkim	*Prof. T. G. Sitharam* director@iitg.ac.in	*Prof. Ratnajit Bhattacharjee* ratnajit@iitg.ac.in M: 9954498116	Ms Feroza Haque (PM) Email: feroza.haque@iitg.ac.in M: 789 6233 561 Website: www.iitg.ernet.in/eictacad/
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/