



*ATAL FDP*

*ON*

*Wireless Sensor Network and Internet of Things: Theoretical  
and Practical Approach*

**19<sup>th</sup> December 2022 -24<sup>th</sup> December 2022 (Online)**

**30<sup>th</sup> December 2022 to 3<sup>rd</sup> January, 2023 (Offline)**

*Under the Aegis of*

**All India Council for Technical Education (AICTE), New Delhi**

Organized by

School of Computer and Systems Sciences

Jawaharlal Nehru University, New Delhi-110067

[www.jnu.ac.in](http://www.jnu.ac.in)



### **About University**

Jawaharlal Nehru University is the foremost university in India, and a world-renowned center for teaching and research. Ranked number one in India by the National Assessment and Accreditation Council (NAAC) with a Grade Point of 3.91 (on a scale of 4), JNU was ranked no 3 among all universities in India by the National Institutional Ranking Framework, Government of India, in 2016 and no 2 in 2017. JNU also received the Best University Award from the President of India in 2017. Still a young university, established by an act of Parliament in 1966, the strength, energy, and reputation of Jawaharlal Nehru University result from the vision that ideas are a field for adventure, experimentation and unceasing quest, and that diversity of opinions are the basis for intellectual exploration. JNU is the place for the intellectually restless, the insatiably curious, and the mentally rigorous, giving them the space to grow amidst the calmness of an oasis, a green lung within the hustle and bustle and the crowds of the capital city of India. Coming into being in 1969, three years after its establishment by Parliament, JNU brought frontier disciplines and newer perspectives for old disciplines to the Indian university system.

### **About School**

Ever since its inception in 1974, this School has been trying to meet the computing needs of different Schools in JNU and offering specially designed courses for their students.

The teaching is specially designed to integrate inputs from Statistics, Operations Research, Algebra and Combinatorics, Digital Electronics, Systems Software, Artificial Intelligence, Computer Architecture, Programming Languages. A training and placement cell have been set up at the School to maintain liaison with various government and industrial organizations to facilitate employment for the students.

After the completion of the course, the students are fully competent to enter the Global IT- world as well as the fields of Research & Development at prestigious institutions in India and abroad. The various programmes offered in the School of Computer and System Sciences are M.C.A. (6 Semesters), M.Tech (4 Semesters) and Ph.D. These courses are designed to provide the necessary theoretical background and practical experience in Computer Science and Applications, to meet the growing manpower requirements of the Global Software & hardware Industry.

### **FDP Overview**

#### **1. Introduction**

Wide spread applications of wireless sensor network and IoT have created a demand for researchers and manpower to work in the industry and academia. Currently a reasonable number of students, faculty and researchers are working in the area of wireless sensor network and IoT. However, most of them lack proper training on carrying out research in these area due to unavailability of proper guidance, infrastructure, simulation techniques and hands-on practice on running of simulators. Further, with the vision to have smart cities, smart home and other smart activities will result in demand for sensors and sensor networks. Therefore, this will generate requirement for huge manpower in the industry.

## 2. Objectives

The primary objectives of this proposed FDP are as follows:

- To provide basic knowledge about WSN and IoT to the students and faculty
- To give hands-on training on Network Simulator (NS-2) to carry out research
- To provide hands-on training on sensor network on real platform
- To motivate towards future research and development in the area of WSN and IoT

### **FDP: Basic ATAL FDPs (refer to Annexure I, II & III): -**

- Emerging/Core subject area domain knowledge/content: Need to refer the Schedule plan.
- Applied knowledge/Lab practical related to the content: Need to refer the Schedule plan.
- Research Avenues/Industrial emerging trend: Cyber Security
- Analysis & reflection of 2 quality research journal articles on the topic: Attached with **annexure II**.
- Related Pedagogical approaches including technology integration: Collaborative, Lab, Experiential, and Outcome Based Teaching and Learning based live Sessions, Presentation, Research journals/article review discussions.
- Comprehensive assessment/evaluation designing (theory & practical): Quiz, Interactive session and Feedback of Research articles.
- Four mandatory sessions, one each on: Yes, Agree, we will conduct one session on each National Education Policy (NEP) 2020 Implementation, Indian values & ethos, Classroom conduct & behavior (teaching learning psychology), Life Skills such as time and stress management (more may be added), and Research Methodology as per schedule.

**Mode: - Blended/Hybrid.** Online for theory and offline for practical/labs/experiential learning

Visiting Lab/industry: JNU and DRDO

### **Duration- 2 weeks**

**1st week**, Monday to Saturday 7:00 to 9:30 pm daily (Online concepts/theory /research avenues/emerging trends, etc.): **Schedule A** is attached.

### **Session planning:**

**Session-I** 7:00-7:50 pm, **Session-II** 8:00-8:50 pm

**Session-III** 9:00-9:30 pm (Interactive session/Question Answers)

**2nd week**, Monday to Friday– Offline (**33 hours**) (practical/labs/ experiential learning/ Visit/Post FDP assessment/Demo teaching sessions): **Schedule B** is attached

**Pedagogy** - Collaborative, Lab, Experiential, and Outcome Based Teaching and Learning based live Sessions, Presentation, Research journals/article review discussions.

Require 2 **relevant state-of-the-art articles/case studies** identified by the FDP Coordinator when they submit their proposal.: Attached with annexure II

**Coordinator should form Teams** (5-6 members per team) from the registered attendees by Session 1: We will do after acceptance of proposal and during FDP. All teams read, discuss, and summarize their findings from the article. Individually, complete Reflection Journal with a focus on implementation of learnings.

**Target Group:** -

Assistant Professors/Associate Professors/Ph.D. scholars/PG students

Min/Max Limit- 30/50 participants from the HEIs from the same city/within 100 km of host institute

**Requirement for Participants:** Maximum 50 attendees per FDP. Nomination by a college principal/director for better accountability to attend the registered FDPs.

**Continuous Comprehensive Assessment of Attendees - Overall 70% to receive a certificate, 90% and above distinction (refer to Annexure IV & V)**

1. Attendance – 10% (Individual) - *minimum required 80% attendance*
2. Two assessments, one after each week- 20% (Individual) - combination of MCQs/short answer type/reasoning based, etc.
3. 2 Page Article Summary/per Team - 30% (Team & Individual)
4. Teaching Practice -15% (Individual)
5. Report/outcome of Industrial visit- 10% (Team) at the last session
6. Reflection Journal - 15% (Individual) - at the last session

**Resource Persons**

Tentative Resource Persons are from IIT, NIT, Center University, DRDO, ISSER and Repute State University.

Sl. No.	Name	Organization	Topic
1.	Prof. G.S. Tomer	Director, THDEC	Hands-on on Sensors
2.	Mr. Pranav Tyagi	Eigen Private Limited	Sensor Emulator
3.	Prof. D.K. Lobiyal	JNU	Introduction to WSN
4.	Dr. Sushil Kumar	JNU	IoT
5.	Dr. Karan Singh	JNU	Network Simulator
6.	Prof. Satish Chand	JNU	Wireless Protocols
7.	Dr. Buddha Singh	JNU	LEACH
8.	Dr. R.S Rao	AIACTR	IEEE802.11
9.	Prof. Zaheeruddin	Jamia Millia Islamia	Modeling of Sensor Network
10.	Dr. Satish Pidduji	IIT Roorkee	ZigBee
11.	Prof. R.S. yadav	MNNIT Allahabad	IoT Architecture
12.	Prof. H.M. Gupta	IIT Delhi	Research in WSN & IoT
13.	Prof. Milap Punia	JNU	Application of Sensors in Disaster Management
14.	Dr. Rajesh Ku. Yadav	DTU	Aggregation in WSN
15.	Dr. Adwitiya Sinha	JP University Noida	Clustering in WSN
16.	Dr. Sanjay Das	IGNTU, Amarkantak	NS-2 Hands-on
17.	Prof. Rishipal Singh	GJU Hisar	Hands-on IoT
18.	Prof. K.L. Bansal	Himanchal Pradesh University, Shimla	Mobility in WSN
19.	Dr. Shrawan Kumar	IGNTU, Amarka	Localization in WSN
20.	Dr. H.L Mandoria	GB Pant University Pantnagar, Uttarakhand	Mobilty Models in WSN
21.	Dr. Anil Kumar Sagar	RKGIT Gaziabad	MAC protocols in WSN
22.	Prof. R.K. Saket	IIT BHU	Reliability in WSN
23.	Dr. Vivek Shrivastav	NIT Delhi	Performance Evaluation of WSN & IoT
24.	Prof. Hazoor Saran	IIT Delhi	Wireless Networks
25.	Prof. Shiv Prakash	MMMUT, Gorakhpur	Wireless Communication

**Schedule A: Week 1 – Online (7:00 pm – 9:30 pm)**

<b>Day 1 19.12.22</b>	<b>Day 2 20.12.22</b>	<b>Day 3 21.12.22</b>	<b>Day 4 22.12.22</b>	<b>Day 5 23.12.22</b>	<b>Day 6 24.12.22</b>
7:00 – 7:50 Session 1 (Wireless Sensor Network)	7:00 – 7:50 Session 2 (Modeling of Sensor Network)	7:00 – 7:50 Session 3 (Wireless Communication)	7:00 – 7:50 Session 4 (Wireless Network Security)	7:00 – 7:50 Session 5 (Mobility in WSN)	7:00 – 7:50 Session 6 (Clustering in WSN)
8:00 – 8:50 Session 1 (Internet of Things)	8:00 – 8:50 Session 2 (IoT Components)	8:00 – 8:50 Session 3 (Wireless Protocols)	8:00 – 8:50 Session 4 (Routing Protocols)	8:00 – 8:50 Session 5 (Research in WSN & IoT)	8:00 – 8:50 Session 6 (Reliability in WSN)
9:00 – 9:30 Session 1 Interactions	9:00 – 9:30 Session 2 Interactions	9:00 – 9:30 Session 3 Interactions	9:00 – 9:30 Session 4 Interactions	9:00 – 9:30 Session 5 Interactions	9:00 – 9:30 Week 1 MCQs

**Schedule B: Week 2 – Offline (9:30 am – 4:30 pm)**

(Adjust timing to suit your local needs and ensure minimum 33 hours actual coverage)

<b>Day 1 30.12.2022</b>	<b>Day 2 31.12.2022</b>	<b>Day 3 1.1.2023</b>	<b>Day 4 2.1.2023</b>	<b>Day 5 3.1.2023</b>
9:00 – 9:30 Inauguration	9:30 – 12:00 Session 8 Network Simulator-2	9:30 – 12:00 IoT implementation using NS-3	9:30 – 12:00 Session 12 Hands on Training With Arduino	9:30 – 12:00 Session 14 IoT Application Development
9:30 – 12:00 Session 7 (Internet of Things, its Design Principles, and Elements of IoT)	12:00 – 1:00 Article 1: Published by Prof. D K Lobiyal	12:00 – 1:00 Article 2: Published by Prof. D K Lobiyal	12:00 – 1:00 MCQs	12:00 – 1:00 Visit Report (Team)
12:00 – 1:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch	1:00 – 2:00 Lunch
1:00 – 2:00 Travel for Visit	2:00 – 4:00 Hands on Training with Raspberry Pi	2:00 – 4:00 Session 11 Cloud connectivity with IoT	2:00 – 4:00 Session 13 Research Methodology	2:00 – 3:00 Reflection Journal
2:00 – 4:00 Visit	4:00 – 5:15 NEP 2020	4:00 – 5:15 Indian Values and Ethos	4:00 – 5:15 Stress management	3:00 – 4:00 Feedback
4:00 – 5:00 Travel back				4:00 – 5:00 Valedictory

**Coordinators**  
**FDP Coordinators**

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