

A Seminar on Role of AI in 5G

Dr N.M. Kazi

E&TC

Activity Report

Academic Year	2024-25
Program Driven by	
Quarter	III
Program / Activity Name	Capacity Building Program
Program Type	
Program Theme	Innovation and startups
Start Date	15-03-2025
End Date	15-03-2025
Duration of the Activity (in Mins)	60
Number of Student Participant	0
Number of Faculty Participant	70
Number of external Participant	--
Expenditure Amount in Rs.	
Any Remark	--
Mode of Session Delivery	Offline
Objective	
Benefit in terms of Learning / Skills / Knowledge obtained	
Feedback	
Video url (mp4)	
Photograph 1 (jpg)	Attached
Photograph 2 (jpg)	Attached
Overall report of the Activity (pdf)	As given below



Dr. P. H. Zope
Convener IIC



1. Introduction

The rapid evolution of wireless communication technologies has brought us to the threshold of **5G networks**, which promise to revolutionize mobile communications by offering faster speeds, lower latency, and higher network capacity. However, the true potential of 5G cannot be fully realized without the integration of **Artificial Intelligence (AI)**, which is poised to play a critical role in shaping the future of wireless networks.

In this report, we explore how AI is influencing and enhancing various aspects of 5G networks and how it can address the challenges that come with the deployment of such advanced technology.

2. The Need for AI in 5G

2.1 Enhanced Network Efficiency

5G aims to provide higher speeds, massive device connectivity, and ultra-low latency. However, these goals introduce significant complexity in network management. **AI-powered algorithms** help automate tasks such as traffic routing, predictive maintenance, and self-healing mechanisms, enabling operators to optimize network performance with minimal human intervention.

2.2 Predictive Analytics for Better Resource Allocation

AI enables predictive analytics, allowing operators to forecast demand and allocate resources accordingly. This is essential for ensuring that the network can handle the vast number of devices, applications, and services that will rely on 5G.

2.3 Network Slicing

One of the groundbreaking features of 5G is **network slicing**, which allows the creation of virtual, isolated networks within a single physical infrastructure. AI facilitates the management of these slices by ensuring that each slice operates efficiently according to its specific needs—whether it's for IoT devices, autonomous vehicles, or augmented reality (AR) applications.

3. AI in the Key Components of 5G

3.1 AI in Radio Access Networks (RAN)

AI and machine learning (ML) are heavily utilized in the **Radio Access Network (RAN)** to optimize network resource usage and improve coverage. Algorithms that use real-time data can dynamically adjust the power levels and frequency bands for base stations, improving the overall capacity and user experience.

3.2 AI in Core Networks

The **core network** in 5G is designed to provide high-speed data transfer and low-latency connections for millions of devices. AI aids in traffic management, load balancing, and anomaly detection, ensuring the network can scale efficiently while minimizing congestion.

3.3 AI in Edge Computing

Edge computing is integral to 5G for low-latency applications. AI is applied in edge devices to process data locally, reducing the need for long-distance data transmission and improving responsiveness for applications like autonomous vehicles and real-time video streaming.

4. Challenges and Opportunities in AI-Driven 5G

4.1 Security Concerns

While AI enhances network performance, it also introduces potential vulnerabilities. Malicious actors could exploit AI algorithms, leading to attacks on the network's infrastructure. Ensuring robust security measures while leveraging AI for optimization is a crucial challenge for the industry.

4.2 Data Privacy

The AI systems in 5G networks rely on vast amounts of data, including user behavior, device activity, and network traffic. Safeguarding this data and maintaining user privacy is a major concern. Ensuring compliance with global privacy regulations (such as GDPR) while using AI to manage data is essential for the widespread adoption of 5G.

4.3 Deployment Costs

The implementation of AI solutions, especially in legacy systems, can be costly. Network operators must balance the investment in AI technology with the need to build scalable, cost-efficient networks.

5. Applications of AI in 5G Networks

5.1 Autonomous Vehicles

AI enables the ultra-low latency required for **autonomous vehicles** to operate effectively over 5G networks. Real-time data processing and decision-making are necessary for these vehicles to communicate with other vehicles, traffic systems, and infrastructure.

5.2 Smart Cities

5G, powered by AI, supports the concept of **smart cities** where devices, vehicles, and systems are interconnected to improve urban management and citizen services. AI can optimize traffic flow, energy usage, waste management, and even emergency response.

5.3 Industrial IoT (IIoT)

The integration of **AI** with **Industrial IoT (IIoT)** in 5G allows for real-time monitoring of industrial equipment, predictive maintenance, and autonomous production lines. This revolutionizes sectors such as manufacturing, energy, and logistics.

5.4 Enhanced AR/VR Experiences

With the higher data speeds and lower latency of 5G, augmented reality (AR) and virtual reality (VR) applications are expected to flourish. AI helps in improving the quality of AR/VR experiences by adjusting rendering processes and enhancing interactive features.

6. Future Trends and Impact of AI in 5G

As 5G continues to expand and evolve, the role of AI will become increasingly vital. Key trends include:

- **AI-driven Network Automation:** Self-configuring networks will become commonplace, enabling operators to respond to changes in network conditions and traffic patterns with minimal human intervention.
- **AI in 6G:** Research is already underway on the potential of 6G, and AI will play an even more significant role in the next generation of wireless networks. AI-driven technologies like **quantum computing** and **terahertz waves** are expected to be integrated into 6G.
- **AI-enhanced Security:** AI will help identify network vulnerabilities and protect 5G infrastructure from cyber-attacks, ensuring secure and reliable communications.

7. Conclusion

The integration of AI into 5G networks is a game-changer, unlocking new capabilities that were previously thought impossible. From enhancing network efficiency and enabling smart applications to ensuring scalable deployment and resource management, AI is indispensable to the success of 5G. While challenges such as security and privacy concerns remain, the continued development of AI technologies will play a critical role in overcoming these hurdles, shaping a smarter, more connected world.




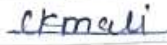

















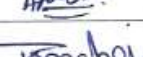
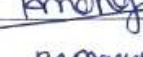
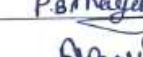

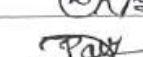

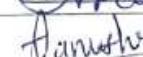
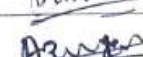
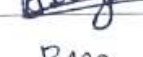


Cell Type	Frequency	Power	Coverage
Macro	700 MHz - 2.6 GHz	46 dBm	35 km
Micro	700 MHz - 2.6 GHz	30 dBm	1-3 km
Pico	700 MHz - 2.6 GHz	23 dBm	100-200 m
Femto	700 MHz - 2.6 GHz	10-20 dBm	10-100 m



	Decimal	DMS
Latitude	21.014066	21°0'50" N
Longitude	75.502675	75°30'9" E

2025-03-15(Sat) 04:42(pm)



Roll no.	Name	Sign
54	Kalyani Bapu pati	
17	Chaitali K. Mali	
60	Megha Manoj Patil	
45	Devayani Samadhan Patil	
74	Shruti Kiran Patil	
73	Shrushti Rakesh Patil	
80	Teena Hemraj Patil	
28	Nizgala Natendra Narkhede	
33	Vishakha Pramod Nikam	
46	Devyani Pravin Patil	
38	Ankita Sanjay Patil	
41	Rutuja Ravindra Patil	
32	Lavanya Santosh Nikam	
83	Pranjal Mukunda Patil	
02	Bhagyashree Anant Khewalkar	
79	Tanvi Vinesh Singh Patil	
70	Ranjana Dnyaneshwar Patil	
19	Prapti Shrawan Mali	
53	Jayshree G. Patil	
08	Bhumiika Dilip Mahajan	
10	Khushi Rajendra Mahajan	
06	Priyanka Bhagwan Magare	
39	Ankita Vilas Patil	
37	Keerti Kaduba Pordeshi	
36	Trupti Dyaneshwar Palve	
55	Khushi Vinayak Patil	
78	Tanushree Pandharinath Patil	
07	Aniket Balwant Mahajan	
05	Prajwal Vinod Machankar	
59	Mayur Surish Patil	

Sr.No	Name of Student	Sign.	Roll No.
1)	Utkarsha S. Patil	<u>Utkarsha</u>	2
2)	Tanvi Vinod kulkarni	<u>Kulkarni</u>	62
3)	Utkarsha S. Suryawanshi	<u>US</u>	38
4)	Gayatri Tushar Shingate	<u>Shingate</u>	26
5)	Simran Shawata Tadari	<u>Tadari</u>	41
6)	Mansi suresh shirade	<u>Shirade</u>	27
7)	Snigdha Ratilal Patil	<u>Patil</u>	71
8)	Sejal Dipak Sandhanshi	<u>Sandhanshi</u>	21
9)	Pradnya Vijay Nikam	<u>Pradnya</u>	67
10)	Saniya Javed Shaikh	<u>Saniya</u>	74
11)	Gauri Vijay Sonar	<u>Gauri</u>	75
12)	Chhayashree Pralhad Patil	<u>Patil</u>	69
13)	Vaibhavi Vinayak patil	<u>Vaibhavi</u>	3
14)	Troiveni Ashok Solanki	<u>Troiveni</u>	29
15)	Abhijeet Girish Patil	<u>Patil</u>	68
16)	Shreyas Vijay Sangore	<u>Shreyas</u>	72
17)	Varad Anil Akkavadi	<u>Varad</u>	55
18)	Aryan Kamal Bajaj	<u>Aryan</u>	53
19)	Reham Akiloddin Shaikh	<u>Reham</u>	73
20)	Ganesh P. Sushir	<u>G.P. Sushir</u>	40
21)	Yogeshwar Sapan Wagh	<u>Yogeshwar</u>	51
22)	OM Rajendra Talele	<u>Talele</u>	43
23)	chandheersant Devidas Ahire	<u>Ahire</u>	54
24)	Faigan Lukman Tadvi	<u>Tadvi</u>	79
25)	Kalpesh Ananda Sonawane	<u>Kalpesh</u>	31
26)	Chiranjy Digambar Rajput	<u>Chiranjy</u>	16

Roll No	Name	Sign
23	Aditya Arun more	<u>Aditya</u>
65	Pratik Rajesh Patil	<u>Pratik</u>
66	Prathmesh Avinash Patil	<u>Prathesh</u>
26	Kunal Vasant Nannaware	<u>Kunal</u>
03	Amol Govinda Kumbhar	<u>Amol</u>
04	Ramchandra Bhatu Lohar	<u>Ramchandra</u>
50	Harshal Bharat Patil	<u>Harshal</u>
12	Pranav Bhaskar Mahajan	<u>Pranav</u>
13	Sumit Vinod Mahajan	<u>Sumit</u>

Attendance Sheet

Date and Sign		15/03/25	29/03/25	
SN	Name of faculty Member	Dept.		
1	Dr. P.A. Shirule	Civil		02
2	Dr. F.I. Chavan	Civil		04
3	Dr. Sonali B. Patil	Civil		03
4	Mr. J.N. Kale	Civil		03
5	Ms. Jyoti R. Mali	Civil		05
6	Pankaj Ramdas Punase	Civil		03
7	Ms. Dipika Purushottam Mali	Civil		01
8	Kalyani Ganesh Bendale	Civil		00
9	Dr. K.P. Adhiya	Computer		04
10	Dr. Manoj E Patil	Computer		04
11	Mr. Ashish T. Bhole	Computer		04
12	Dr. Akash D. Waghmare	Computer		06
13	Dr. Dnyaneshwar K. Kirange	Computer		06
14	Dr. Pankaj H. Zope	Computer		03
15	Dr. Surendra P. Ramteke	Computer		06
16	Ms. Shital A. Patil	Computer		03
17	Mr. Sarkarsinha Harshinha Rajput	Computer		05
18	Mr. Mohan Pramod Patil	Computer		05
19	Mr. Ramkrishna Hari Patil	Computer		05
20	Mr. Pramodgiri B. Gosavi	Computer		02
21	Ms. Priyanka Vinod Medhe	Computer		06
22	Mr. Krunal Chadrashekhwar Pawar	Computer		03
23	Ms. Pooja Mukundrao Khandar	Computer		03
24	Ms. Ashwini Arun Kakde	Computer		03
25	Ms. Mayuri Rajesh Chandratre	Computer		04
26	Ms. Shama S Pawar	Computer		03
27	Mr. Mohammed Shafique Shaikh	Computer		05
28	Ms. Tejashri Anil Patil	Computer		—
29	Ms. Prachi Pushkaraj Chaudhari	Computer		—
30	Ms. Utkarsha Prmod Narkhede	Computer		—
31	Ms. Soniya Premraj Chaudhari	Computer		—
32	Ms. Dipali Daulatrao Phadat	Computer		—
33	Mr. V. S. Pawar	Electrical		03
Pranesh S. Sarda		02/12		02

Attendance Sheet

SN	Date and Sign	Name of faculty Member	Dept.	15/03/25	29/03/25	
34		Mr. M. Mujtahid Ansari	Electrical			05
35		Dr. Suhas M. Shembekar	Electrical		—	04
36		Dr. Rajesh R. Karhe	Electrical			04
37		Mr. Muqem Khan	Electrical	—		04
38		Mr. Tanveer Khatik	Electrical		—	04
39		Mr. Vijay Abaji Shinde	Electrical			02
40		Dr. M.P. Deshmukh	E&TC	—		04
41		Dr. V.M. Deshmukh	E&TC			04
42		Dr. N.M. Kazi	E&TC			04
43		Dr. Atul H. Karode	E&TC		—	04
44		Mr. Sunil K. Khode	E&TC		—	03
45		Ms. Rajashri B. Patil	E&TC			05
46		Dr. P.G. Damle	Mechanical		—	04
47		Mr. N. K. Patil	Mechanical	—		04
48		Dr. K. Shrivastav	Mechanical		—	02
49		Dr. Devendra B. Sadaphale	Mechanical			04
50		Dr. P. M. Solanki	Mechanical		—	04
51		Dr. Ajay R. Bhardwaj	Mechanical			03
52		Dr. Dipak C. Talele	Mechanical			05
53		Dr. Vijay R. Diware	Chemical	—		04
54		Dr. S. A. Thakur	Chemical	—	—	03
55		Mr. V. P. Sangore	Chemical	—		04
56		Mrs. Sarika S. Pawar	Chemical		—	03
57		Mrs. Ruchita S. Naik	Chemical		—	04
58		Dr. Sandip S. Patil	First Year			05
59		Dr. K. S. Patil	First Year	—	—	02
60		Dr. Sunita S. Patil	First Year	—		04
61		Dr. Prashant N. Ulhe	First Year			05
62		Mr. Amol Chandrakan Wani	First Year	—	—	03
63		Ms. Priti Ramesh Sharma	First Year		—	02
64		C.U. Nikam	First Year		—	01

Attendance Sheet

Date and Sign		Dept		Signs 29/01/21	
Sl. No.	Name of Faculty Member	Dept			
61	Mr. Pratik D. Patel	First Year	P	P	04
62	Mr. Dhanendra J. Doshi	First Year			04
63	Mr. Mahendra S. Patel	First Year			01
64	Mr. Manoj Prasad Kulkarni	First Year			04
65	Mr. Dharmendra Chandrakant Vagade	First Year			03
66	Dr. Anand T. Patel	First Year			03
67	Mrs. Nitesh Sawhney	First Year			01
68	Mr. Tarun S. Chaudhari	First Year			07
69	Mrs. Anand Dhanraj Patel	First Year			00
70	Mr. Dhanendra S. Vagade	First Year			03
71	Mrs. Poo Manoj Mali	First Year			14
72	Mr. Dhanendra S. Chaudhari	First Year			12
73	Mr. Sachin Tejendra Bhalekar	First Year			13
74	Dr. Mahesh S. Rawlani	MBA			03
75	Dr. Rishi A. Modhwar	MBA			04
76	Mr. Farooq A. Khan	MBA			04
77	Mrs. Bharti F. Joshi	MBA			05
78	Mrs. Sakshi Manoj Modhwar	MBA			04
79	Mr. Rishabh Sunil Patel	MBA			12
80	Mr. Anand Dhanraj Sawhney	MBA			12
81	Dr. Poo Dhanraj Vagade	MBA			
82	Mr. Tejendra Dhanraj Vagade	MBA			
83	Mr. Anand Dhanraj	MBA			
84	Mr. Dhanendra Bhalekar	MBA			
85	Mr. Dhanendra Bhalekar	MBA			
86	Mr. Dhanendra Bhalekar	MBA			
87	Mr. Dhanendra Bhalekar	MBA			
88	Mr. Dhanendra Bhalekar	MBA			
89	Mr. Dhanendra Bhalekar	MBA			
90	Mr. Dhanendra Bhalekar	MBA			
91	Mr. Dhanendra Bhalekar	MBA			
92	Mr. Dhanendra Bhalekar	MBA			
93	Mr. Dhanendra Bhalekar	MBA			
94	Mr. Dhanendra Bhalekar	MBA			
95	Mr. Dhanendra Bhalekar	MBA			
96	Mr. Dhanendra Bhalekar	MBA			
97	Mr. Dhanendra Bhalekar	MBA			
98	Mr. Dhanendra Bhalekar	MBA			
99	Mr. Dhanendra Bhalekar	MBA			
100	Mr. Dhanendra Bhalekar	MBA			

Attendance Sheet

SN	Name of faculty Member	Dept.	08/02/25	15/2/25	08/03/25	
1	Dr. P.A. Shirule	Civil				2
2	Dr. F.I. Chavan	Civil				2
3	Dr. Sonali B. Patil	Civil				1
4	Mr. J.N. Kale	Civil				1
5	Ms. Jyoti R. Mali	Civil				3
6	Pankaj Ramdas Punase	Civil				2
7	Ms. Dipika Purushottam Mali	Civil				0
8	Kalyani Ganesh Bendale	Civil				0
9	Dr. K.P. Adhiya	Computer				2
10	Dr. Manoj E. Patil	Computer				2
11	Mr. Ashish T. Bhole	Computer				3
12	Dr. Akash D. Waghmare	Computer				3
13	Dr. Dnyaneshwar K. Kirange	Computer				2
14	Dr. Pankaj H. Zope	Computer				2
15	Dr. Surendra P. Ramteke	Computer				3
16	Ms. Shital A. Patil	Computer				1
17	Mr. Sarkarsinha Harshinha Rajput	Computer				2
18	Mr. Mohan Pramod Patil	Computer				0
19	Mr. Ramkrishna Hari Patil	Computer				3
20	Mr. Pramodgiri B. Gosavi	Computer				
21	Ms. Priyanka Vinod Medhe	Computer				2
22	Mr. Krunal Chadrashankar Pawar	Computer				2
23	Ms. Pooja Mukundrao Khandar	Computer				2
24	Ms. Ashwini Arun Kakde	Computer				2
25	Ms. Mayuri Rajesh Chandratre	Computer				2
26	Ms. Shama S. Pawar	Computer				2
27	Mr. Mohammed Shafique Shaikh	Computer				2
28	Ms. Tejashri Anil Patil	Computer				
29	Ms. Prachi Pushkaraj Chaudhari	Computer				
30	Ms. Utkarsha Prmod Narkhede	Computer				
31	Ms. Soniya Premraj Chaudhari	Computer				
32	Ms. Dipali Daulatrao Phadat	Computer				
33	Mr. V. S. Pawar	Electrical				2

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SN	Name of faculty Member	Dept.	08/02/25	15/02/25	08/03/25	
34	Mr. M. Mujtahid Ansari	Electrical				3
35	Dr. Suhas M. Shembekar	Electrical				3
36	Dr. Rajesh R Karhe	Electrical				3
37	Mr. Muqem Khan	Electrical				3
38	Mr. Tanveer Khatik	Electrical				3
39	Mr. Vijay Abaji Shinde	Electrical				3
40	Dr. M.P. Deshmukh	E&TC				3
41	Dr. V.M. Deshmukh	E&TC				2
42	Dr. N.M. Kazi	E&TC				2
43	Dr. Atul H. Karode	E&TC				3
44	Mr. Sunil K. Khode	E&TC				3
45	Ms. Rajashri B Patil	E&TC				3
46	Dr. P.G. Damle	Mechanical				3
47	Mr. N. K. Patil	Mechanical				3
48	Dr. K. Shrivastav	Mechanical				1
49	Dr. Devendra B. Sadaphale	Mechanical				2
50	Dr. P. M. Solanki	Mechanical				3
51	Dr. Ajay R. Bhardwaj	Mechanical				3
52	Dr. Dipak C. Talele	Mechanical				3
53	Dr. Vijay R. Diware	Chemical				3
54	Dr. S. A. Thakur	Chemical				3
55	Mr. V. P. Sangore	Chemical				3
56	Mrs. Sarika S. Pawar	Chemical				3
57	Mrs. Ruchita S. Naik	Chemical				3
58	Dr. Sandip S. Patil	First Year				1
59	Dr. K. S. Patil	First Year				3
60	Dr. Sunita S. Patil	First Year				3
61	Dr. Prashant N. Ulhe	First Year				3
62	Dr. Amol Chandrakan Wani	First Year				3
63	Ms. Priti Ramesh Sharma	First Year				3
64	C.U. Nikam	First Year				3

Attendance Sheet

SN	Date and Sign	Dept.	08/02/25	15/2/2025	08/03/25	
65	Mr. Pravin D. Patil	First Year	P	P	—	2
66	Ms. Deepmala I. Desai	First Year	Desai	Desai	Desai	6
67	Mr. Mahendra B. Patil	First Year	—	—	—	0
68	Ms. Meera Prassan Kulkarni	First Year	Yashwanth	—	Yashwanth	6
69	Ms. Dhanashree Shashikant Tayade	First Year	D.	—	D.	2
70	Ujawalsing T. Patil	First Year	Patil	Patil	—	2
71	Mrs. Nancy Sawhney	First Year	—	—	—	1
72	Ms. Tanuja Y. Chouhan	First Year	—	—	Tanuja	1
73	Mrs. Anjali Darshan Patil	First Year	—	—	—	0
74	Ms. Jayashree R. Tayade	First Year	R. Tayade	R. Tayade	R. Tayade	3
75	Mrs. Puja Mayur Malu	First Year	—	Malu	Malu	2
76	Mr. Dashrath U. Chaudhari	First Year	Dashrath	—	Dashrath	2
77	Mr. Sachin Topalu Bhalerao	First Year	Sachin	Sachin	Sachin	6
78	Dr. Mahesh V. Rawlani	MBA	—	—	—	1
79	Dr. Richa A. Modiyani	MBA	—	—	—	2
80	Ms. Farooza A. Kazi	MBA	—	—	—	2
81	Mrs. Bharti P. Joshi	MBA	B. Joshi	B. Joshi	B. Joshi	3
82	Mrs. Sakina Mujahid Husain	MBA	Sakina	Sakina	Sakina	3
83	Mr. Rohan Suresh Patil	MBA	—	R. Patil	R. Patil	2
84	Ms. Vrushali Dinkar Sonawane	MBA	V.S.	V.S.	—	2
85	Dr. Puri Dinesh Dagadu	MCA	Puri	Puri	Puri	2
86	Ms. Sapana Ananrao Fegade	MCA	Sapana	Sapana	—	2
87	Mr. Aslan Shaikh	MCA	Aslan	Aslan	—	2
88	Ms. Dhanshee Rajendra Shinde	MCA	—	—	—	0
89	Ms. Chetana Mohan Kawale	MCA	Chetana	Chetana	Chetana	2
90	Ms. Vishakha Yadonao Pande	MCA	V. Pande	V. Pande	V. Pande	2
91	Ms. Bhagyashri Suresh Patil	MCA	—	—	—	1
92	Ms. Reeta Vinod Patil	MCA	Reeta	Reeta	Reeta	2
93	Dr. Sudhir S. Patil	Library	Sudhir	Sudhir	—	2
94	Nikita Gokul Patil	civil	—	Nikita	Nikita	2
95	V. S. Pawan	steriod	Pawan	Pawan	Pawan	2
96	Aravesh Sonawane	civil	—	—	—	1