



## Report

# Industry Sponsored National Workshop on Opportunities in Radio Frequency Development of Next Generation Defence Systems for the Nation 2<sup>nd</sup> – 4<sup>th</sup> March, 2023

**Coordinator:** Prof. G. D. Makwana  
**Co-coordinator:** Prof. Rutika Ghariya

GTU-Graduate School of Engineering and Technology organized three days Industry supported national workshop on “**Implementation of Internet of Things Application using Machine Learning and Deep Learning**” during 2<sup>nd</sup> – 4<sup>th</sup> March, 2023. This workshop has been jointly sponsored by GTU- Graduate School of Engineering and Technology and INFITRON Advanced System Pvt. Ltd., Ahmedabad.

The objectives of the workshop are: (1) to explore requirement of defence system in India, (2) to help the participants to understand the key concepts and advanced understanding on development of defence system, (3) to motivate the participants to involve in design and development of various RF technologies used in defence systems, (4) to explore various research opportunities and challenges in the field RF and defence resources required in India.

58 participants across India participated in the workshop. The participants were the industrialists, faculty members, research scholars, and PG/UG students form the reputed firms/organisations.

In this workshop, various renowned experts from Paras Defence and Space Technologies, Bengaluru, INFITRON Advance System Pvt. Ltd., Ahmedabad, Institute of Plasma Research, Gandhinagar, Electronics and Mechanical Engineering (EME) School, under Ministry of Defence, Govt. of India, Vadodara, Terna Engineering College, Navi Mumbai, Satellite Communication Technology Division, SAC, Ahmedabad, Entuple Technologies Pvt. Ltd., Ahmedabad, Green IP Core, Ahmedabad are invited to discuss and explore various Next Generation Defence Systems developed for the Nation. The participants were able to identify various challenges, opportunities, research problems, and indigenous solutions in theme of Workshop.

The invited renowned and well-experience resource persons are as follows:

1. Mr. Amit Mahajan, Director, Paras Defence & Space Technologies, Bengaluru,
2. Mr. Viran Narayane, RF Manager, Paras Anti-Drone System, Bengaluru,

3. Mr. Himanshu Dave, Founder & CEO, INFITRON Advance System Pvt. Ltd., Ahmedabad,
4. Dr. Braj Kishore Shukla, Head, High Power ECRH systems, Division, Institute of Plasma Research, Gandhinagar,
5. Dr. Rajesh Kumar, Head, RF Plasma Application Division, Institute for Plasma Research, Gandhinagar
6. Dr. Deepak Kumar, Asst. Professor, Electronics and Mechanical Engineering (EME) School, under Ministry of Defence, Govt. of India, Vadodara,
7. Prof. Shilpa Kharche, Professor, Terna Engineering College, Navi Mumbai,
8. Dr. Chandra Prakash, Scientist – G & Head, Satellite Communication Technology Division, SAC, Ahmedabad,
9. Mr. Kush Parikh, Technology Socialist, Entuple Technologies Pvt. Ltd., Ahmedabad
10. Mr. Avi Patel, Co-Founder, Green IP Core, Ahmedabad
11. Prof. Gautam D. Makwana, Associate Professor, GTU-Graduate School of Engineering and Technology, Ahmedabad

The function is inaugurated on 2<sup>nd</sup> March, 202 by Hon'ble (I/C) Vice Chancellor, Gujarat Technological University and President of the inaugural function, Prof (Dr.).Pankajray Patel, in presence of Chief Guest of the Function, Dr. Nilesh Desai, Director, Space Application Centre (SAC), Ahmedabad, Guest of Honour, Dr. Subroto mukherji, Dean, Administration & Senior Professor-H, Institute of Plasma Research, Gandhinagar, Mr. Amit Mahajan, Director, R & D Division, Paras Defence and Space Technologies Pvt. Ltd, Banagluru and Mr. Himanshu Dave, Founder, INFITRON Advanced System Pvt. Ltd., Ahmedabad, Dr. K. N. Kher, Registrar, GTU, Prof. S. D. Panchal, Director, GTU-Graduate School of Engineering and Technology, Prof. G. D. Makwana, Coordinator and Prof. Rutika Ghariya, Co-Coordinator of the workshop, faculty members of the institute and participants.

## Inauguration function



**(L-R): Dr. Subroto Mukherji, Mr. Amit Mahajan, Dr. K. N. Kher, Prof. Mr. Himanshu Dave, Prof (Dr.).Pankajray Patel, Dr. Nilesh Desai, Prof. S. D. Panchal**



**Presidential Speech by Prof. Pankajrai Patel  
Vice Chancellor (I/c), GTU**



**Speech by Chief Guest Dr. Nilesh Desai  
Director, SAC-ISRO, Ahmedabad**



**Speech by Guest of Honour  
Dr. Subroto Mukherji,  
Dean, IPR, Gandhinagar**



**Speech by Dr. K. N. Kher  
Registrar, GTU**



**Welcome Speech by Prof. S. D. Panchal  
Director, GTU-GSET**



**Speech by Mr. Amit Mahajan  
Paras Defence & Space Technologies**





**Speech by Mr. Himanshu Dave  
INFITRON Advance System Pvt. Ltd**



**Vote of Thanks by Prof. G. D. Makwana  
Coordinator, National Workshop**





## Session Details



**Key Note Address by Mr. Amit Mahajan**

## Topics Covered

- Business verticals in Paras Defense Pvt. Ltd.
- Next upcoming technologies will be developed by Paras Defense.
- Working sectors of Paras Defense
- Current running projects in the company
- Career opportunities in the company
- Challenges in defense sector



**Session by Mr. Vinay Narayane**

- Basics of RF Technology
- RF MEMS components
- Electronic warfare (EW) suites
- RF Filters used in defence
- RF in military
- Anti-Drone System
- Various RF methodologies
- Role of RF methodologies in defence system





**Session by Mr. Himanshu Dave**

- Introduction of software defined radio system
- Demonstration of SDR Systems
- Applications of SDR system
- Details about Jammer Market and GNSS
- How cyberwarfare attacks can be prevented using algorithms.
- Advanced Algorithms in SDR.



**Session on Mr. Braj Kishore Shukla**

- TokMak and plasma heating
- ECRH system in sst-1, aditya-U
- Gyrotron (agriculture, space, defense)
- Alternate to conventional energy
- RF heating of plasma, RF & Microwave sources, RF sources for ITER ICRH
- ECRH assisted plasma start-up
- Applications of RF sources in ADITYA-U
- Klystron, tetron overview
- Experimental findings of IPR
- Active denial system (working with DRDO)
- Use of High Power Sources in Defence Systems, Agriculture, Food Industries

### Session by Dr. Rajesh Kumar



- Basics of Plasma, how is plasma produced?, Plasma parameters, plasma in different system for communication
- Different types of discharge
- Why plasma antenna system required?
- International scenario on plasma based antenna (STARLET :Italy), markland technologies plasma antenna USA, Haleakala R& D, USA
- Simulation and experimental demonstration of plasma antenna technology
- How RF can be used for defence application
- Demonstration of Plasma Antenna
- Use of Plasma Antenna in Anti-Drone System
- Designing of alternate storage systems for defence applications
- Limitations of Lithium-Ion batteries
- Limitations of Solid/Liquid Electrolytes
- Polymer electrolytes, Properties of it
- Polymer Gel Electrolytes
- Why magnesium based batteries?
- Carbonate based PGE
- Total ion transference number measurement



### Session by Dr. Deepak Kumar



**Prof. Shilpa Kharche**

- MIMO Antenna Technology and Its Applications in Defence Communication
- Introduction about defence communication, key requirement in defence communication,
- MIMO technology, how does MIMO antennas achieve better?
- Phase Array Antenna for beam steering applications



**Dr. Chandra Prakash**

- Distress alert transmitter second generation
- National network for emergency messaging by fisherman
- NAVCOM application
- (Indian railways, personnel tracker, NAVIC based air craft tracking)
- Real time train tracking information system example (improving public safety)
- Mobile satellite service gadget - Satsleeve
- Satellite based IoT service
- SATCOM as non-terrestrial network
- Type of Antennas in Aircrafts and Ships
- Use of Randonme in Aircrafts and Ships
- Demonstration of their findings for various defence applications
- Phase Array Antennas and its applications
- Use and significance of RF materials
- Airborne and Shipborne Defence Application



**Mr. Kush Parikh**





**Mr. Avi Patel**

- Significance of Integrated Chips in the failure of the System.
- Use of the technologies in the development of ICs for the defence system.
- Various issues is ICs (chips) at higher temperature, worst environment conditions, high pressures, high altitudes
- Challenges and Opportunities for the developments of the chips in the defence systems.



**Prof. Gautam D. Makwana**

- Scenarios of Defence System in India
- Opportunities, Type of Antennas used in Defence System.
- C4ISR: - Defence System
- Findings and demonstration of Various Multiband Antennas for 2G, 3G, 4G, 5G, GPS, IRNISS, Wi-Fi, WLAN, WiMAX, and Satellite technologies
- Use of small and multiband antennas for various defence systems.

### **Feedback by the Participant**



**Certificate Distribution to the Participants**



**Participants of the workshop**

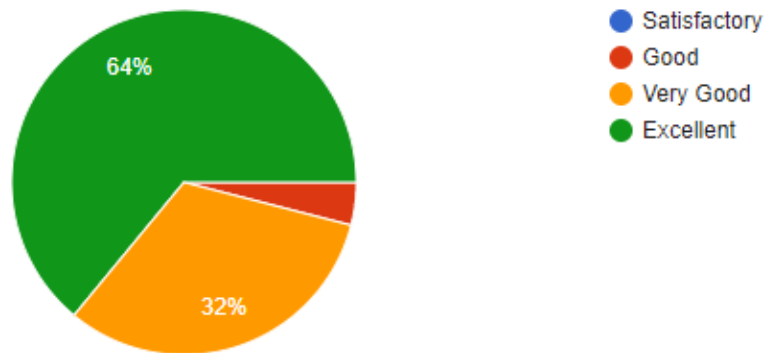
**Vote of thanks**  
**By Prof. Rutika Ghariya**  
**Coordinator, National Workshop**



## Feedback of the workshop

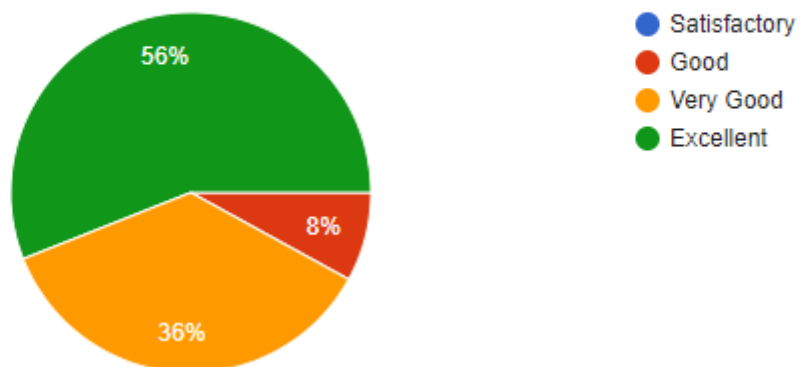
Relevance of workshop content with industry requirement.

25 responses



Relevance of workshop content with Outcome based Education.

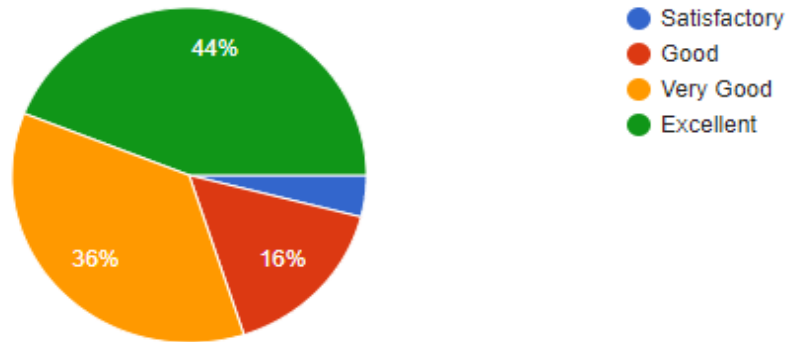
25 responses





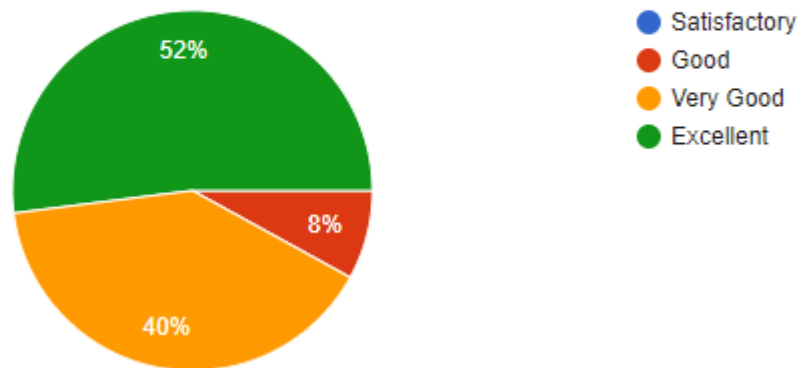
Quality of lab infrastructure/equipment available to conduct the workshop in the institute.

25 responses



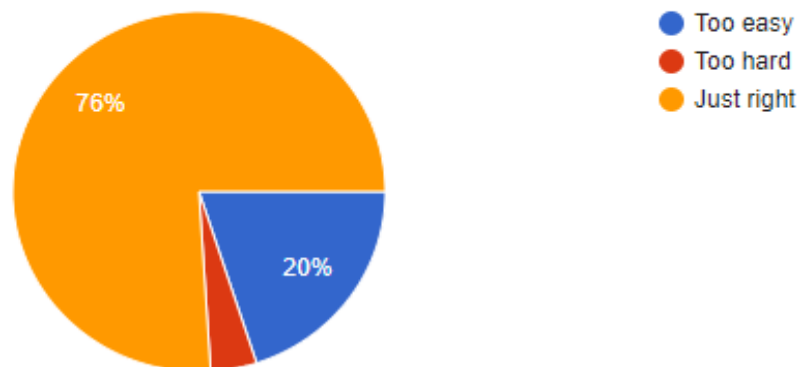
How satisfied are you all with the teaching style of experts?

25 responses



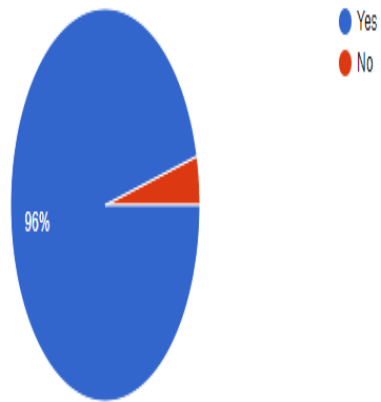
Were the resources/materials provided by the expert helpful?

25 responses



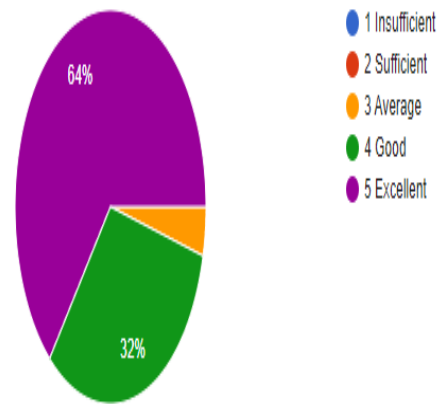
Did the workshop achieve the program objectives?

25 responses



What is your overall assessment of the event?

25 responses



### Team of GTU-GSET with Invited Guests



**Details of the Participants**

No.	Full Name	Designation	Name of Organization
1	Gautam Durlabhji Makwana	Associate Professor	GTU - Graduate School of Engineering and Technology
2	PRAJAPATI OM VIJAYBHAI	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
3	Ritisha Bhatt	Ph.D. Scholar	Sankalchand Patel University, Visnagar
4	VIJAY MANSUKHBHAI HOTHI	Faculty Member	DR JIVRAJ N MEHTA GOVERNMENT POLYTECHNIC AMRELI
5	SHAH HIMIL RAJANIKANT	Ph.D. Scholar	GUJARAT TECHNOLOGICAL UNIVERSITY
6	Amal S.	PG Scholars	Ahmedabad Institute of Technology(AIT), Ahmedabad
7	JOSHI DEDEEPYAMAN RAKESHKUMAR	UG Scholars	Gujarat Power Engineering & Research Institute
8	Vinayak Shivram Mahadik	PG Scholars	<a href="#">Mumbai University/Terna Engineering College</a>
9	Ramya R	Ph.D. Scholar	Sardar Vallabhbhai National Institute of Technology
10	Devendrakumar H Patel	Faculty Member	Government Engineering College, Sector-28, Gandhinagar
11	Sanjaykumar D. Joshi	Faculty Member	Government Engineering College, Patan
12	Madhusmita C. Sahoo	Faculty Member	LDCE,Ahmedabad
13	UJJVAL RAMESHCHANDRA DAVE	Ph.D. Scholar	GOVERNMENT ENGINEERING COLLEGE, SECTOR 28, GANDHINAGAR
14	NEETIRAJ SINH JAYDEEPSINH CHHASATIA	Faculty Member	GOVERNMENT ENGINEERING COLLEGE, GANDHINAGAR
15	PANDEY RAJAT GIRJASHANKAR	Faculty Member	GOVERNMENT ENGINEERING COLLEGE GANDHINAGAR
16	Jayesh Upadhyay	UG Scholars	GEC Gandhinagar, Sector 28 GIDC, Sector 28, Gandhinagar, Gujarat 382028
17	Tigunait Anchal Avdhesh	UG Scholars	Sector 28 GIDC, Sector 28, Gandhinagar, Gujarat 382028
18	Puja Yogendra pal Singh	Ph.D. Scholar	GTU-GSET, Chandkheda, Ahmedabad.
19	RAO PRITESH YOGESH	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
20	Sheth Prisha Y.	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
21	Tanisha khanduri	UG Scholars	Vishwakarma Government Engineering College, Chandkheda



22	Ratadia Kirti Keshubhai	UG Scholars	Gec Gandhinagar
23	Manoj Kanani	Industry Person	<a href="#">Ourosa Advanced Materials, Mumbai</a>
24	Bajania Prashant Kumar	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
25	Sapna Singh	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
26	AHIR SAVITA RAJBAHADUR	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
27	Rina S. Parikh	Faculty Member	Vishwakarma Government Engineering College, Chandkheda
28	Sangani Dharaben Jashvantlal	Faculty Member	Vishwakarma Government Engineering College, Chandkheda
29	Prajapati Banseeben Pravinbhai	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
30	Patel Loveme	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
31	Shruti Sivani Karn	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
32	JAIN SNEHKUMAR VIPULKUMAR	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
33	Ghanshyamkumar Sajjan Sah	Faculty Member	Vishwakarma Government Engineering College, Chandkheda
34	Agrawal Amit Rajendra	Faculty Member	Vishwakarma Government Engineering College, Chandkheda
35	JAY A SHINDE	PG Scholars	GTU- GRADUATE SCHOOL OF ENGINEERING AND TECHNOLOGY
36	VEDANG VIJAYKUMAR LIMBACHIA	UG Scholars	Vishwakarma Government Engineering College, Chandkheda
37	Pemmaraju Venkat Rajeshwari	Other	L.D.College of Engineering, Ahmedabad
38	Soniya R Jain	Faculty Member	GTU - GSET
39	Komal Prajapati	Faculty Member	GTU - GSET
40	Krutiks Paradkar	Phd scholar	SVIT Vasad
41	Sangramsinh Damor	Faculty Member	GEC Dahod
42	Rajrufananas singh	Industry Person	INFITRON Advanced System Ltd., Ahmedabad
43	Varsha Borkhatariya	Industry Person	INFITRON Advanced System Ltd., Ahmedabad
44	Trivedi Darshan	Industry Person	INFITRON Advanced System Ltd., Ahmedabad

45	Avi Patel	Industry Person	INFITRON Advanced System Ltd., Ahmedabad
46	Dr. Seema B. Joshi	Asst. Professor	GTU - GSET
47	Ms. Arpita Maheriya	Ph.D. Scholar	GTU - GSET
48	Ms. Aanal Raval	Ph.D. Scholar	GTU - GSET
49	Dr. S. K. Hadia	Associate Professor	GTU - GSET
50	Dr. S. D. Panchal	Professor	GTU - GSET
51	Prof. Mahesh Panchal	Asst. Professor	GTU - GSET
52	Prof. Deepak Upadhyay	Asst. Professor	GTU - GSET
53	Prof. K. R. Borisagar	Associate Professor	GTU - GSET
54	Prof. R. P. Ghariya	Asst. Professor	GTU - GSET
55	Prof. P. S. Mann	Associate Professor	GTU - GSET
56	Prof. Raj Hakani	Asst. Professor	GTU - GSET
57	Prof. Margam Suthar	Asst. Professor	GTU - GSET
58	Prof. Hemal Nayak	Asst. Professor	GTU - GSET
59			