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Title of the ATAL Programme:	IOT Integration with Embedded System
Application Number:	1730809413
Organized by:	Department of Electronics & Telecommunication Engineering, Atharva College of Engineering, Mumbai-400095
Program Type:	ATAL Six Days Online Faculty Development Programme
Academic Year:	2024-2025
Duration of the FDP:	06-01-2025 to 11-01-2025 (6 Days)
Time of the FDP:	Day-1: 06:00 pm to 09:30 pm Day-2 to Day-5: 06:00 pm to 09:00 pm Day-6: 02:00 pm to 08:00 pm
Mode:	Online
Key Outcome Objective:	• Understand the fundamentals of IoT, embedded systems, and their integration. • Learn to design and develop IoT-based embedded systems using various platforms.

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	● Acquire hands-on experience with IoT protocols and sensors and actuators. ● Develop skills in programming languages used in IoT and embedded systems. ● Explore applications of IoT in various domains. ● Develop curriculum and teaching materials for IoT and embedded systems courses. ● Enhanced faculty expertise in IoT and embedded systems. ● Identify research gaps and opportunities in IoT and embedded systems. ● Improved industry-academia collaboration and collaboration with industry partners for joint research and development.
Benefits in terms of learning/skills/knowledge:	● Improved Understanding of IoT and Embedded Systems: Faculty members would gain a deep understanding of both IoT technologies (such as sensors, actuators, communication protocols, cloud integration) and embedded systems (microcontrollers, hardware design, real-time systems). ● Faculty members will get updated on the latest trends in IoT and embedded systems, such as edge computing, machine learning in embedded systems, and security concerns in IoT. ● Faculty members will be better equipped to design interdisciplinary courses that combine software engineering, hardware design, communication protocols, and data analytics, providing students with a holistic view of IoT systems. ● The FDP on IoT Integration with Embedded Systems would have a far-reaching impact on participants, institutions, and even industries. Faculty members will emerge from the program with improved technical skills, teaching methods, and research ideas. They will be well-positioned to influence the curriculum and research directions at their institutions, contributing to a stronger, more future-ready workforce in the areas of IoT and embedded systems.
About the Event:	A FDP on “IoT Integration with Embedded System” was organized to enhance the knowledge and skills in integrating IoT with embedded systems. The program was tailored for educators, researchers, and industry professionals seeking to explore the dynamic field of IoT and its applications

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	in embedded systems. The FDP was aimed to empower participants with the knowledge and practical skills necessary to navigate the exciting field of IoT and embedded systems and to tackle real-world challenges and contribute to advancements in this rapidly growing area of technology.
About the Speakers:	Session-1 (Day-1): Dr. Chiranjeevi, Senior Member Technical, Maven Silicon, Bengaluru Topic: Introduction to Embedded system Design Session-2 (Day-1): Putta Satish, Principal Engineer, Maven Silicon, Bengaluru Topic: Microprocessors - ARM & RISC-V Session-3 (Day-2): Raghavendra, Senior Member Technical, Maven Silicon, Bengaluru Topic: Microcontrollers & Embedded system components Session-4 (Day-2): Dr. Chiranjeevi, Senior Member Technical, Maven Silicon, Bengaluru Topic: Peripheral Interfaces Session-5 (Day-3): Shanthi V A, Principal Engineer, Maven Silicon, Bengaluru Topic: Peripheral Protocols Session-6 (Day-3): Raghavendra, Senior Member Technical, Maven Silicon, Bengaluru Topic: C Programming for Embedded system Session-7 (Day-4): Susmita Nayak, Principal Engineer, Maven Silicon, Bengaluru Topic: Embedded Linux Session-8 (Day-4): Dr. Mehul Raval, Deputy CTO, RCT Solutions GmbH, Germany

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	Topic: Application of IOT device for PV plant monitoring and PV manufacturing optimization Session-9 (Day-5): Dr. Yerramreddy S. Rao, Academic Dean, Vice Principal, Professor, SPIT, Andheri Topic: Hands on IOT product development Session-9 (Day-5): Dr. Yerramreddy S. Rao, Academic Dean, Vice Principal, Professor, SPIT, Andheri Topic: Hands on IOT product development Session-11 (Day-6): Hemachandra Bhat, Chief Technical Officer, Maven Silicon, Bengaluru Topic: IOT - Protocol Session-12 (Day-6): Hemachandra Bhat, Chief Technical Officer, Maven Silicon, Bengaluru Topic: IOT - Introduction and Application Session-13 (Day-6): Dr. Deepak Waikar, Edu Energy, Singapore Topic: Innovation and technological challenges for green energy future
Co-ordinator:	Dr. Bhavin Shah, H.O.D. - Department of Electronics & Telecommunication Engineering, ARIIA Coordinator-iCell & Innovation Ambassador of IIC (Ministry of Education's Innovation Cell), Atharva College of Engineering, Malad (West), Mumbai
Co-coordinator:	Prof. Mahalaxmi Palinje, Assistant Professor - EXTC Dept., Atharva College of Engineering, Malad (West), Mumbai
No. of Participants:	268

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Platform:	Google Meet
Video URL:	6.42 Mins _ATAL OFDP Highlights Video: https://drive.google.com/file/d/1Y0qENJePQjkl7ffKcWu7xWqtfyKe6KeZ/view?usp=sharing 23.45 Mins _ATAL OFDP Video with Feedback: https://drive.google.com/file/d/1JbSdNuzVOCBwiVRpfILUfOFx0y3ZiksM/view?usp=sharing
Facebook Link:	https://www.facebook.com/share/p/1564HS9iNq/ https://www.facebook.com/share/p/18YpK4tM4Y/
Instagram Link:	https://www.instagram.com/p/DE9gpS2uwf1/?igsh=MWoydHl0c3A1b3B5Yw== https://www.instagram.com/p/DE95pGOAzAp/?igsh=eDFzaGZxcW1lcWgz
Linked Link:	https://www.linkedin.com/posts/atharva-college-of-engineering-acoe_a-tharvacollegeofengineering-iotintegration-activity-7286306537600389120-zWqO?utm_source=social_share_send&utm_medium=android_app&utm_campaign=copy_link https://www.linkedin.com/posts/atharva-college-of-engineering-acoe_a-tharvacollegeofengineering-iotintegration-activity-7286361457284288512-4YYt?utm_source=social_share_send&utm_medium=android_app&utm_campaign=copy_link

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Report on ATAL Six Days Online Faculty Development Program on “IoT Integration with Embedded System” organized by the Department of Electronics & Telecommunication Engineering (EXTC), Atharva College of Engineering, Malad-Marve Road, Charkop Naka, Malad (West), Mumbai-400095, held from 6th January, 2025 to 11th January, 2025

The ATAL Six Days Online Faculty Development Program, organized by the Department of Electronics & Telecommunication Engineering (EXTC), Atharva College of Engineering, Mumbai, commenced on 6th January, 2025. The program aimed to provide in-depth knowledge on IoT integration with embedded systems, featuring sessions by esteemed experts from academia and industry.

Day 1: Inauguration and Introduction

The program began with an inauguration hosted by Prof. Ruchi Chauhan, featuring inspiring speeches by Dr. Ramesh Kulkarni (Principal, Atharva College of Engineering) and Dr. Bhavin Shah (HOD-EXTC Dept., Atharva College of Engineering).

- **Session 1: Introduction to Embedded System Design** – Delivered by Dr. Chiranjeevi, Senior Technical Member at Maven Silicon, this session delved into the architecture, components, and role of embedded systems in IoT. The session highlighted the layered architecture of embedded systems, their hardware-software interaction, and their scalability in IoT applications.

Key Takeaways:

1. Fundamentals of embedded systems and their applications in IoT-driven solutions.
 2. Understanding system components and their roles in modern IoT designs.
- **Session 2: Microprocessors – ARM & RISC-V** – Presented by Mr. Putta Satish, Principal Engineer at Maven Silicon, the session highlighted the architecture, features, and real-world applications of ARM and RISC-V processors. Attendees explored the power efficiency, processing capabilities, and open-source advantages of these architectures.

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Key Takeaways:

1. Comparative advantages of ARM and RISC-V architectures and their role in efficient system design.
2. Insights into choosing appropriate processors for IoT devices.

Day 2: Microcontrollers and Interfaces

- **Session 3: *Microcontrollers and Embedded System Components*** – Conducted by Mr. Raghvendra, this session explored microcontroller architecture, internal components, and their importance in embedded IoT systems. The session included a detailed explanation of memory management, timers, and interrupt handling.

Key Takeaways:

1. Microcontrollers as the core of IoT devices, enabling efficient control and functionality.
 2. Understanding the hardware-software synergy in embedded systems.
- **Session 4: *Peripheral Interfaces*** – Presented by Dr. Chiranjeevi, the session introduced various peripheral interfaces, such as GPIO, ADC, DAC, and I/O ports, essential for hardware integration in IoT systems. Real-world examples of sensor and actuator interfacing were also discussed.

Key Takeaways:

1. Understanding interface configurations for seamless integration in embedded systems.
2. Practical knowledge of connecting IoT peripherals to microcontrollers.

Day 3: Protocols and Programming

- **Session 5: *Peripheral Protocols*** – Delivered by Shanthi V. A., the session covered SPI, I2C, and UART protocols for device-to-device communication. Attendees learned about their working mechanisms, electrical specifications, and use cases in real-time IoT systems.

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Key Takeaways:

1. Communication standards enabling data transfer between components in embedded systems.
 2. Practical examples of integrating peripheral protocols into IoT devices.
- **Session 6: C Programming for Embedded Systems** – Led by Mr. Raghvendra, this session introduced practical C programming concepts, with demonstrations of real-world applications for IoT devices. Concepts like bitwise operations, memory pointers, and interrupt service routines were emphasized.

Key Takeaways:

1. Efficient coding techniques for embedded systems using C programming.
2. Enhanced understanding of debugging and optimization in embedded software.

Day 4: Advanced IoT Systems and Applications

- **Session 7: Embedded Linux** – Sumita Nayak's session detailed the benefits and use of Linux in IoT devices, focusing on its lightweight architecture, multitasking capabilities, and open-source ecosystem. Techniques for integrating device drivers and kernel modules were also explained.

Key Takeaways:

1. Embedded Linux as a robust solution for managing IoT devices.
 2. Understanding kernel customization for embedded applications.
- **Session 8: IoT for PV Plant Monitoring and Optimization** – Dr. Mehul Raval demonstrated how IoT technologies enable real-time monitoring and data analysis in photovoltaic systems. Topics included IoT sensor deployment, data acquisition, and predictive maintenance techniques for PV systems.

Key Takeaways:

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1. IoT's role in enhancing efficiency and decision-making for renewable energy systems.
2. Improved understanding of data-driven optimizations in PV plants.

Day 5: Practical Product Development

- **Sessions 9 & 10: Hands-on IoT Product Development** – Dr. Y. S. Rao introduced practical IoT product design using tools like Eagle Soft, AutoCAD, and Tinkercad, emphasizing the entire development lifecycle. Participants worked on virtual prototypes, schematic diagrams, and PCB designs, gaining insights into product testing and validation.

Key Takeaways:

1. Comprehensive knowledge of IoT hardware and software integration through real-world prototyping tools.
2. Hands-on experience in using design tools for IoT project development.

Day 6: IoT Protocols and Green Energy Innovation

- **Session 11: IoT - Introduction and Application** – Mr. Hemachandra Bhat explained core IoT principles, emphasizing applications in healthcare, smart cities, and industrial automation. Attendees explored IoT architecture, cloud integration, and data analytics techniques.

Key Takeaways:

1. Broad applications of IoT and its transformative potential.
2. Key concepts for integrating IoT solutions into diverse industries.

- **Session 12: IoT Protocols** – This session explored communication protocols like MQTT, CoAP, and HTTP, critical for IoT device connectivity. Attendees learned to choose protocols based on factors such as latency, security, and scalability.

Key Takeaways:

1. Efficient device-to-cloud communication through robust IoT protocols.

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2. Practical understanding of selecting protocols for specific IoT use cases.

- **Session 13: Green Energy Innovations** – Dr. Deepak Waikar discussed IoT's contribution to renewable energy, addressing challenges and solutions for sustainable technology. Topics included smart grid implementation, energy optimization, and the integration of IoT with renewable energy sources.

Key Takeaways:

1. Leveraging IoT for optimizing renewable energy usage and fostering sustainability.
2. Addressing challenges in implementing green technologies using IoT.

In the valedictory session, Prof. Mahalaxmi Palinje expressed her sincere thanks to all the participants, resource persons, and organizers of the ATAL Six-Day Online Faculty Development Program on IoT Integration with Embedded Systems. She acknowledged the valuable contributions of the speakers, whose expertise and insights significantly enriched the learning experience. Prof. Palinje also extended her appreciation to the management of Atharva College of Engineering for their support in organizing the program and to all the participants for their active engagement throughout the sessions. She emphasized the importance of applying the knowledge gained during the program to enhance teaching, research, and innovation in the field of IoT and embedded systems. Prof. Palinje concluded her speech by wishing the participants success in their future endeavors and encouraging them to continue exploring new technologies and ideas to contribute to the development of the academic community.

The AICTE Training and Learning Academy (ATAL) Academy's initiative was magnificent. We are grateful to AICTE Training and Learning Academy (ATAL) for providing us with an opportunity to offer a free Online Faculty Development Programme to faculty members at Indian technical institutes. A lot of participants registered, and we received a lot of praise for setting up the hands-on, material, and online training. Many thanks to AICTE Training and Learning Academy (ATAL) for this great initiative.

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243	Mr. Sandeep Yeshwant Pawar	Vidyavardhini's College of Engineering & Technology Vasai(W)	7350757075	sandeep.pawar@v cet.edu.in
244	Mrs. Shahjahan Shaikh	Rizvi College of Engineering	9892840192	shahjahanshaikh3 @gmail.com
245	Mr. Nikhil Bhujbal	K K Wagh Institute of engineering Education and Research	9970750684	nmb.eltx@gmail. com
246	Mrs. Joslyn Gracias E Vaz	Atharva College of Engineering	9158875875	joslynbgracias@g mail.com
247	Mrs. Garima Gurjar Unhale	Atharva College of Engineering	9769688302	garimagurjar@ath arvaco. ac. in
248	Dr. Srinivas Samala	SR University	8019772036	srinu486@gmail. com
249	Mrs. Manila Gupta	Rizvi College of Engineering	9810916126	manilagupta@eng .rizvi. edu. in
250	Dr. Arun Sekar Rajasekaran	SR University	9994650100	rarunsekar007@g mail.com
251	Miss Priyanka Latesh Ikhar	Shreeyash College of Engineering and Technology	7709049272	priyanka.bicorp@ gmail.com
252	Dr. Ch. Rajendra Prasad	SR University	8008796636	rajendrprasad.ch @sru. edu. in
253	Mrs. Natasha Naik	Atharva College of Engineering	8087137315	natashanaik@atha rvaco. ac. in
254	Dr. Suchitra M	Vidyavardhaka College of Engineering	9880545049	suchitra@vvce. ac. in
255	Dr. J. Anita Lett	Sathyabama Institute of	8939221882	anitalett2018@gm

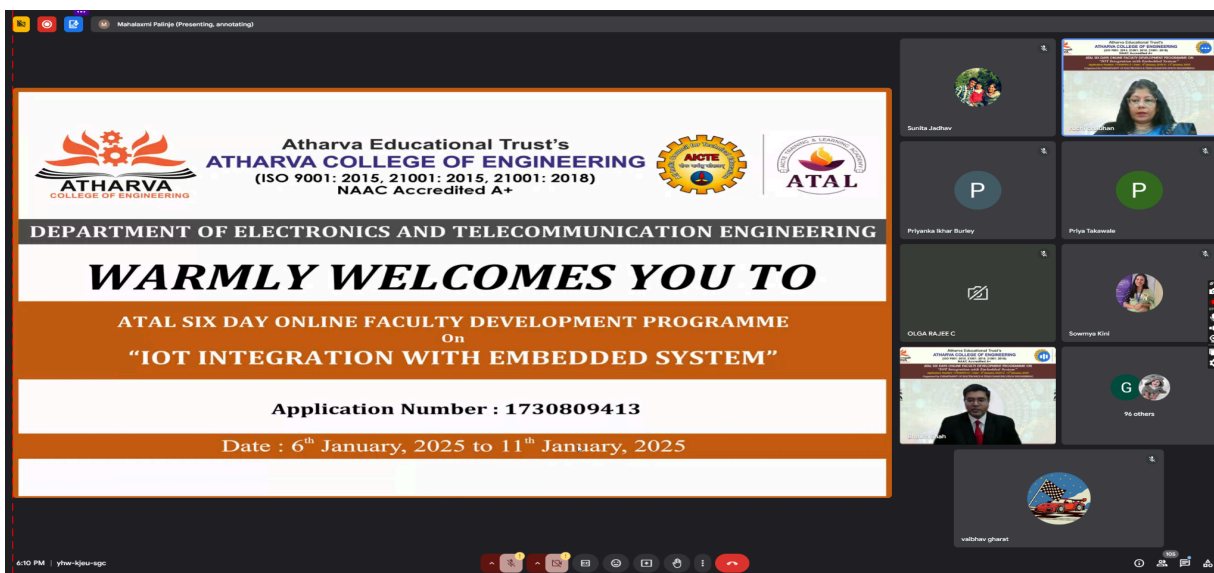
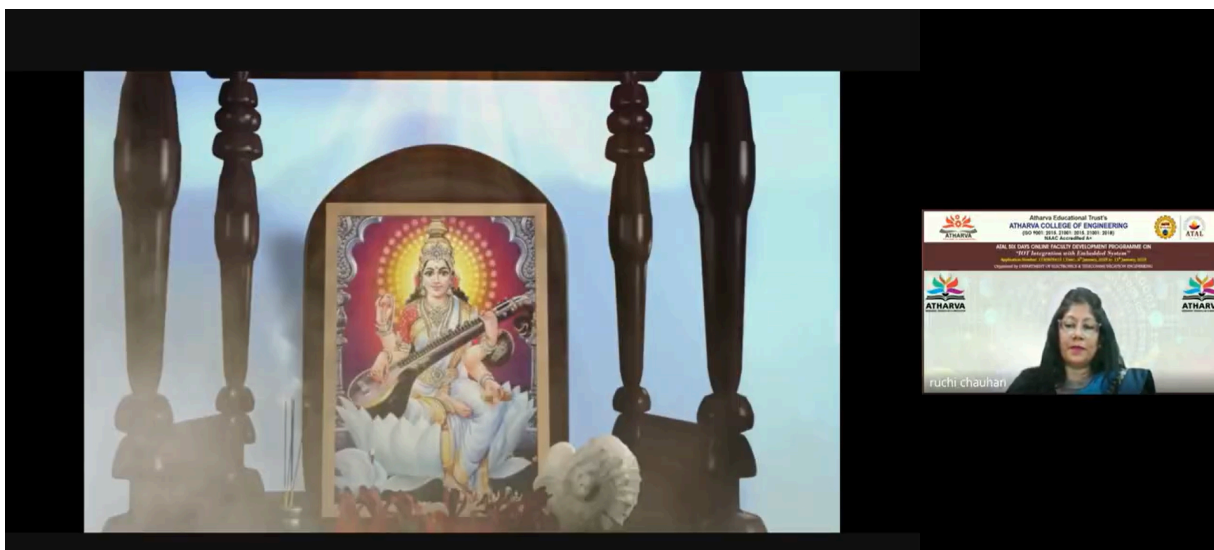
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		Science and Technology		ail.com
256	Mrs. Preeti Patil	terna engineering college	8512858648	patilpreeti@ternae ngg.ac.in
257	Mrs. Ramya Prabhakaran	Rizvi College of Engineering	9629230608	cimmy.kraj@gm il.com
258	Dr. Kiruthika B	Atharva College of Engineering	9739742401	drkiruthika@athar vacoe.ac.in
259	Miss Alanka Vidya Sree	Bharat institute of engineering and technology	6281338251	vidyaalanka1998 @gmail.com
260	Dr. S.Anandhi	Sathyabama Institute of Science and Technology	9487204425	anandhi.phy@gm ail.com
261	Dr. Kani Mozhi J K	K.S.R. College of Engineering	9994199827	drjkkanimozhi@g mail.com
262	Dr. Dhakshinamoorthy Thavamani	KPR Institute of Engineering and Technology	9150469885	damiai.mar.2020 @gmail.com
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264	Dr. Vivek Ramakrishnan	ATHARVA COLLEGE OF ENGINEERING	9895902492	vivekramakrishna n@atharvacoe.ac.i n
265	Mrs. Sujatha R	SRM Institute of Science and technology	8072530526	sujathar2@srmist. edu.in
266	Miss Ishrat Fatema	Shreeyash college of engineering and technology aurangabad	7249372715	izishratfatema@g mail.com
267	Miss Poonam Navnath Bhor	CCOE&M	8999562011	er.poonam1420@ gmail.com
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Glimpse of the ATAL Online Faculty Development Programme on “IoT Integration with Embedded System”

**Date: 06-01-2025, Day-1, Inauguration Ceremony, Time: 06:00 pm
to 06:30 pm**



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ATAL Online 6 Days Faculty Development Programmes 2024-25 Schedule

FDP Thrust Area: Semiconductor
FDP Title: IoT Integration with Embedded System
Start Date: 6th January, 2025
End Date: 11th January, 2025
"No Charge for Registration, Course and Certification"

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
6:00 PM to 6:30 PM Inaugural Session	6:00 PM to 7:30 PM Session 3 Topic: Microcontrollers & Embedded system components Name of the Expert: Raghavendra Designation & Organization: Senior Member Technical Staff, Marven Silicon Years of Experience: 10 years	6:00 PM to 7:30 PM Session 5 Topic: Peripheral Protocols Name of the Expert: Shashi V A Designation & Organization: Principal Engineer, Marven Silicon Years of Experience: 12 years	6:00 PM to 7:30 PM Session 7 Topic: IOT - Introduction and Application Name of the Expert: Hanuachandra Shet Designation & Organization: Chief Technical Officer, Marven Silicon Years of Experience: 35 years	6:00 PM to 7:30 PM Session 9 Topic: IOT - Protocol Name of the Expert: Hanuachandra Shet Designation & Organization: Chief Technical Officer, Marven Silicon Years of Experience: 35 years	2:00 PM to 3:30 PM Session 11 Topic: Embedded Linux Name of the Expert: Sumanta Nayak Designation & Organization: Principal Engineer, Marven Silicon Years of Experience: 15 years
6:30 PM to 8:00 PM Session 1 Topic: Introduction to Embedded system Design Name of the Expert: Dr Chiranjeevi Designation & Organization: Senior Member Technical, Marven Silicon Years of Experience: 12 Years	7:30 PM to 9:00 PM Session 4 Topic: Peripheral Interfaces Name of the Expert: Dr Chiranjeevi Designation & Organization: Senior Member Technical Staff, Marven Silicon Years of Experience: 12 Years	7:30 PM to 9:00 PM Session 6 Topic: C Programming for Embedded system Name of the Expert: Raghavendra Designation & Organization: Senior Member Technical Staff, Marven Silicon Years of Experience: 10 Years	7:30 PM to 9:00 PM Session 8 Topic: Application of IOT device for PV plant monitoring and PV manufacturing optimisation Name of the Expert: Dr Mahesh Raval Designation & Organization: Deputy CTO, RCT Solutions GmbH, Germany Years of Experience: 17 years	7:30 PM to 9:00 PM Session 10 Topic: Hands on IOT Product Development Name of the Expert: Dr Y.S. Rao Designation & Organization: Academic Dean, Vice Principal, Professor, IITD, Australia Years of Experience: 25 Years	3:30 PM to 5:00 PM Session 12 Topic: Hands on IOT Product Development Name of the Expert: Dr Y.S. Rao Designation & Organization: Academic Dean, Vice Principal, Professor, IITD, Australia Years of Experience: 25 Years
8:00 PM to 9:30 PM Session 2 Topic: Microprocessors - ARM & RISC-V Name of the Expert: Parashakti Designation & Organization: Principal Engineer, Marven Silicon Years of Experience: 10 Years					5:00 PM to 7:30 PM Session 13 Topic: Innovation and technological challenges for green energy future Name of the Expert: Dr Durgesh Walker Designation & Organization: Edu Energy, Singapore Years of Experience: 25 Years
					6:30 PM to 7:30 PM Online test & feedback
					7:30 PM to 8:00 PM Valedictory Session

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Date: 06-01-2025, Day-1, Session-1, Time: 06:30 pm to 08:30 pm



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ATAL SIX DAYS ONLINE FACULTY DEVELOPMENT PROGRAMME ON
"IoT Integration with Embedded System"

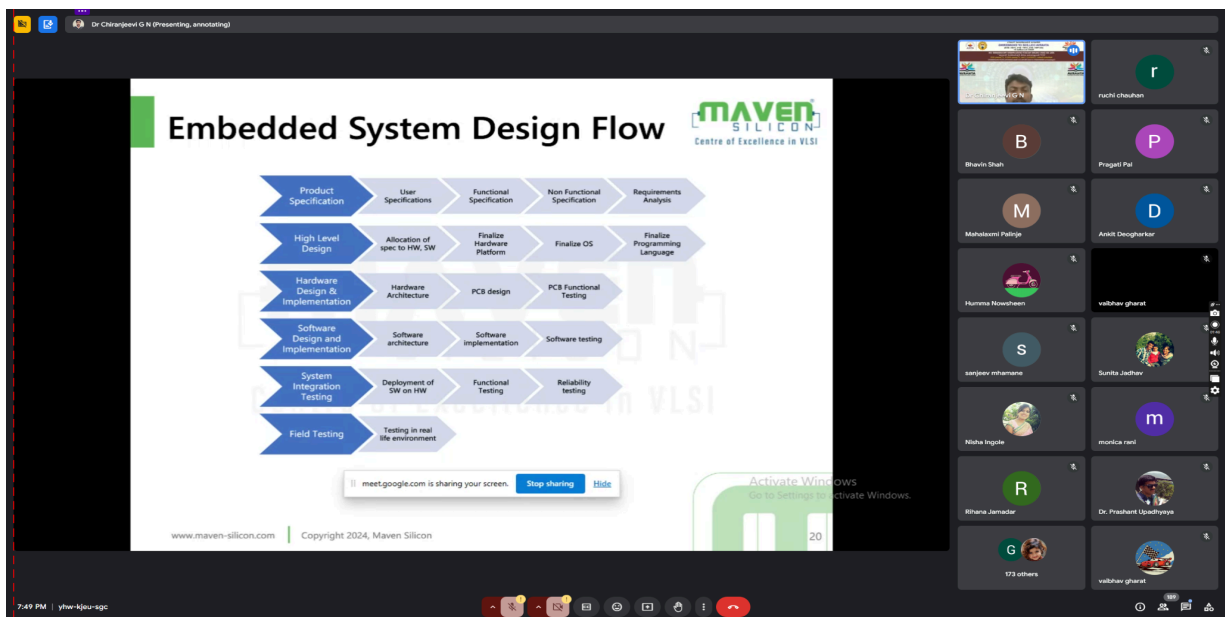
Application Number:
1730809413

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Day- 1 | Date:- 06/01/2025 | Time:- 6.30 pm to 8.00 pm
SESSION- 1

DR. CHIRANJEEVI
Senior Member Technical, Maven Silicon
Topic:
Introduction to Embedded System Design

DATE
6th January, 2025 to
11th January, 2025



Embedded System Design Flow

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```

graph TD
    subgraph Row1 [ ]
        direction LR
        P1[Product Specification] --> P2[User Specifications]
        P2 --> P3[Functional Specification]
        P3 --> P4[Non Functional Specification]
        P4 --> P5[Requirements Analysis]
    end
    subgraph Row2 [ ]
        direction LR
        H1[High Level Design] --> H2[Allocation of spec to HW, SW]
        H2 --> H3[Finalize Hardware Platform]
        H3 --> H4[Finalize OS]
        H4 --> H5[Finalize Programming Language]
    end
    subgraph Row3 [ ]
        direction LR
        HW[Hardware Design & Implementation] --> HW2[Hardware Architecture]
        HW2 --> HW3[PCB design]
        HW3 --> HW4[PCB Functional Testing]
    end
    subgraph Row4 [ ]
        direction LR
        SW[Software Design and Implementation] --> SW2[Software architecture]
        SW2 --> SW3[Software implementation]
        SW3 --> SW4[Software testing]
    end
    subgraph Row5 [ ]
        direction LR
        ST1[System Integration Testing] --> ST2[Deployment of SW on HW]
        ST2 --> ST3[Functional Testing]
        ST3 --> ST4[Reliability testing]
    end
    subgraph Row6 [ ]
        direction LR
        FT1[Field Testing] --> FT2[Testing in real life environment]
    end
  
```

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Date: 06-01-2025, Day-1, Session-2, Time: 08:00 pm to 09:00 pm

SoC with RISC-V ISA

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9:02 PM | yfner-kjeur-sgc

170 others

9:20 PM | yfner-kjeur-sgc



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Date: 07-01-2025, Day-2, Session-3, Time: 06:00 pm to 07:30 pm

Types of Embedded Systems

- The basic embedded system types based on functional requirements:
 - Mobile embedded systems are small-sized systems that are designed to be portable.
 - Example: Digital cameras.
 - Networked embedded systems are connected to a network to provide output to other systems.
 - Example: home security systems.
 - Standalone embedded systems they perform a specialized task, they do not necessarily belong to a host system.
 - Example: MP3 player, calculator.
 - Real-time embedded systems give the required output in a defined time interval they are responsible for time-critical tasks.
 - Example: medical equipment, military weapon

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8051 Architecture (Cont)

Diagram illustrating the 8051 Architecture components:

- System Timing: E, ALE, PSEN, XTAL1, XTAL2, RESET, VCC, GND
- System Interrupt Timer
- Data Buffer
- Memory Controller
- General Purpose Area: IP, IE, PCON, SBUF, SCON, TCON, TMOD, TL0, TH0, TL1, TH1
- Bit Addressable Area: Register Bank 3, Register Bank 2, Register Bank 1, Register Bank 0
- SFR and General Purpose Register



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Date: 07-01-2025, Day-2, Session-4, Time: 07:30 pm to 09:00 pm

The screenshot shows a Google Meet interface. On the left, a presentation slide titled "Hardware Peripherals" is displayed. The slide content includes:

- Consider a home automation device, such as a smart thermostat.
- LCD Display:** Uses I2C to show the current temperature and settings to the user.
- Temperature Sensor:** connected via ADC to measure temperature.
- Wi-Fi Module:** Communication with the home network to receive remote commands.
- Relay:** Controlled via GPIO to turn the heating system on or off based on temperature readings.

The slide also features an image of a smart thermostat and a smartphone displaying temperature data. The bottom of the slide shows the URL "www.maven-silicon.com" and "Copyright 2024, Maven Silicon".

On the right side of the Meet window, a grid of participant avatars is visible. The bottom status bar shows the time as 7:45 PM and the user "yhan-kjau-9gc".

This screenshot shows a Google Meet interface with a grid of participant avatars. The grid is organized into rows and columns, with each cell containing a participant's profile picture and name. The participants are arranged in a grid that is approximately 10 columns wide and 10 rows high. The bottom status bar shows the time as 8:58 PM and the user "yhan-kjau-9gc".



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Date: 08-01-2025, Day-3, Session-5, Time: 06:00 pm to 07:30 pm

UART Communication

DLR = System clock speed / (16 * communication Baud rate)

One bit period

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4:37 PM | yhe-npu-egc

prafina babar

14

SPI Protocol

- SPI stands for Serial Peripheral Interface.
- Serial peripheral interface (SPI) is one of the most widely used interfaces between microcontrollers and peripheral ICs such as sensors, ADCs, DACs, shift registers, SRAM, and others.
- SPI is a synchronous protocol that allows a master device to initiate communication with a slave device.
- Data is exchanged simultaneously between these devices.

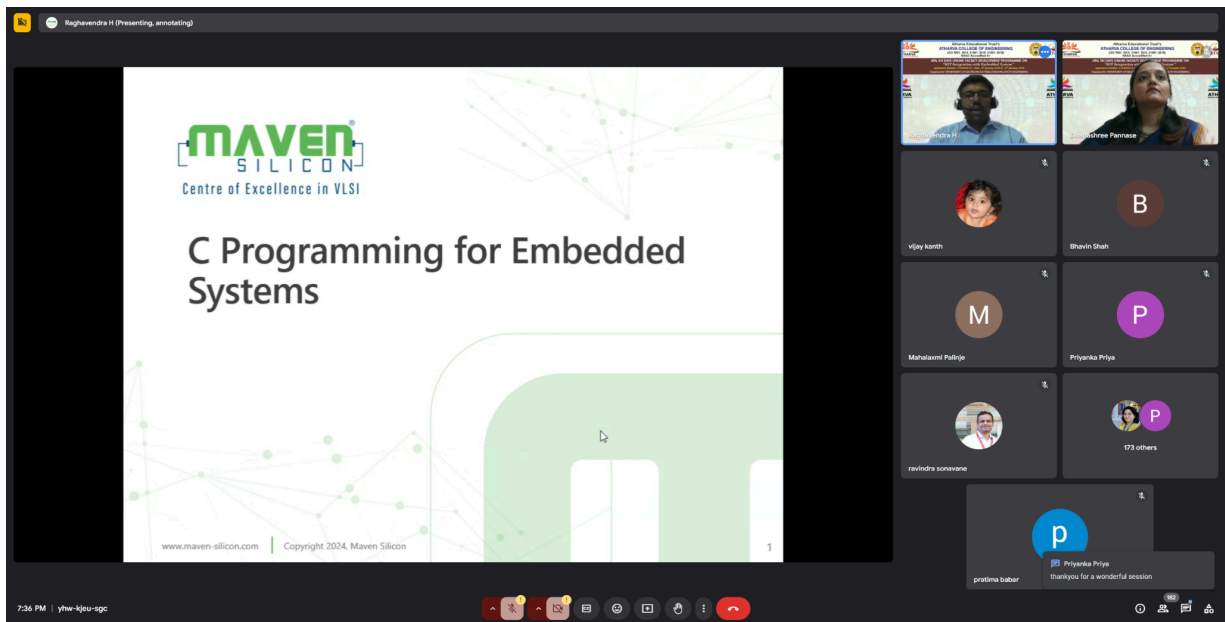
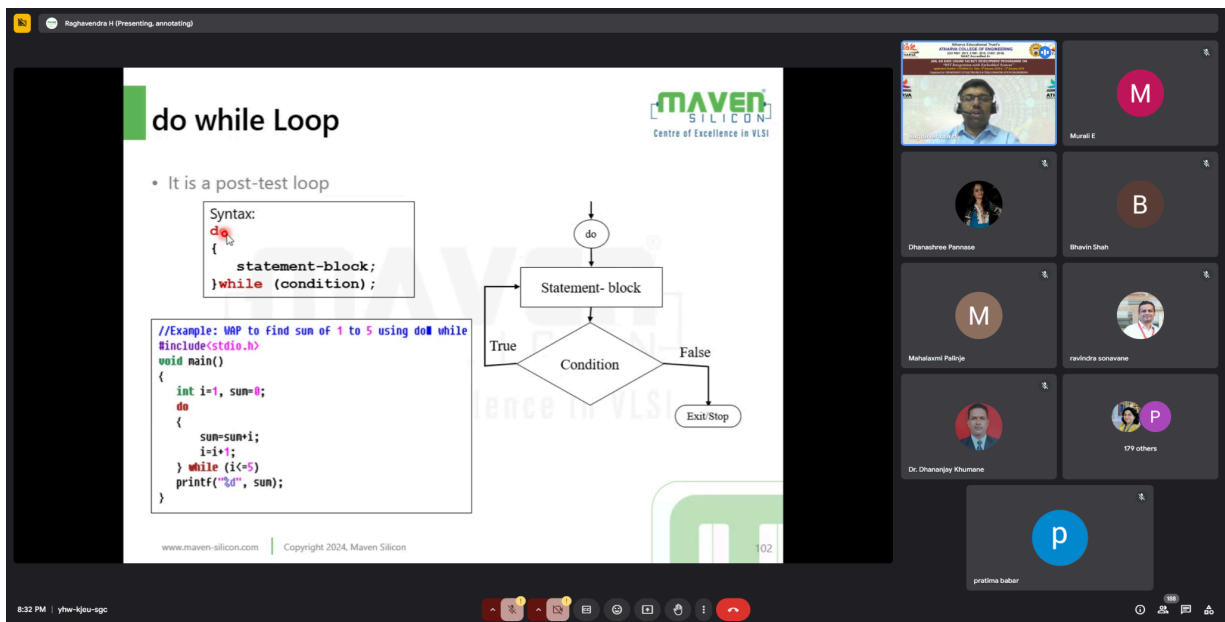
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4:41 PM | yhe-npu-egc

prafina babar

17

Date: 08-01-2025, Day-3, Session-6, Time: 07:30 pm to 09:00 pm



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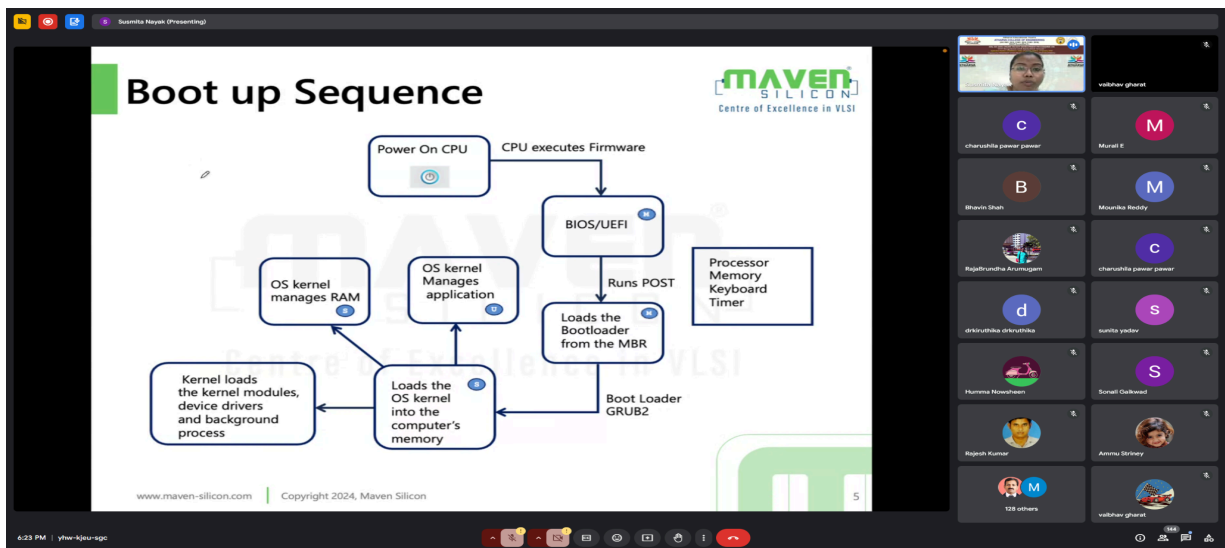
Date: 09-01-2025, Day-4, Session-7, Time: 06:00 pm to 07:30 pm

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Embedded Linux

Susmita Nayak

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Date: 09-01-2025, Day-4, Session-8, Time: 07:30 pm to 09:00 pm

Photovoltaic Services & Technology Solutions Partner

Application of IoT in PV Manufacturing & PV systems

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RCT solutions

Mehul Raval
9/01/2025

Digital Twin for smart warehouse

Assets considered in smart warehouse

Assets	Sensing Capability (From physical to digital asset)	Controlling Capability (From digital to asset)
AGV	1. Position from position sensor 2. Speed from speed sensor 3. Capacity from steering control system	1. Speed to speed controller 2. Capacity to steering control
Operator	1. Position from position sensor	-
Operator Conveyor	1. Position from position sensor 2. Speed from speed sensor	1. Speed from speed controller
Forklift	1. Position from position sensor	-
Rack	1. Cell based position	-



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Date: 10-01-2025, Day-5, Session-9, Time: 06:00 pm to 07:30 pm

Service-Oriented IoT

COMMON SERVICE PLATFORM

Service Sources

- Smart Transportation System
- Smart Grid System
- Smart Health System

Management Services

Proxy Service

Disco Service

Service Consumers

- eHealth Application
- Energy Applications
- Transportation Applications

Enabling Technologies:

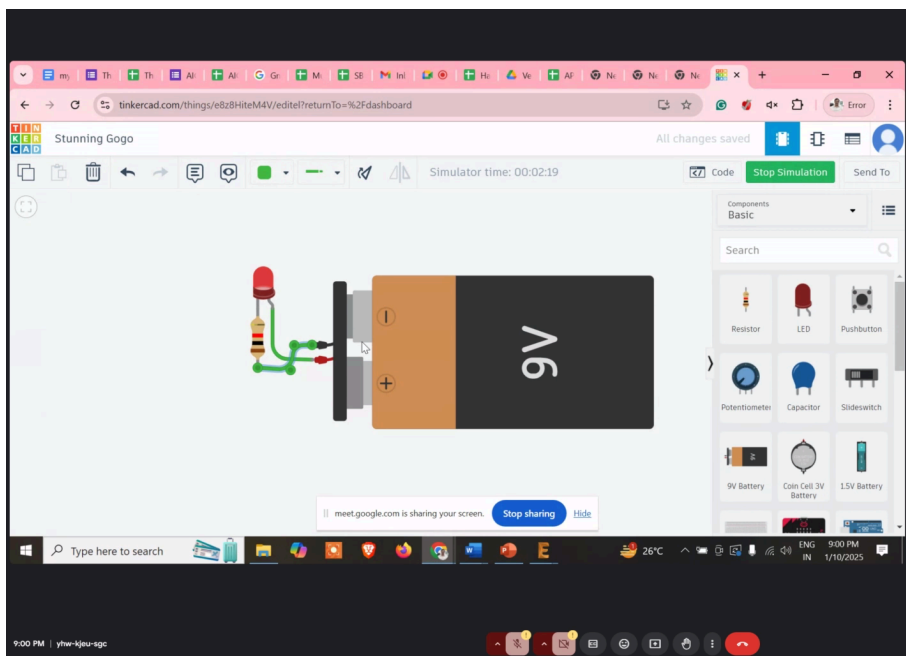
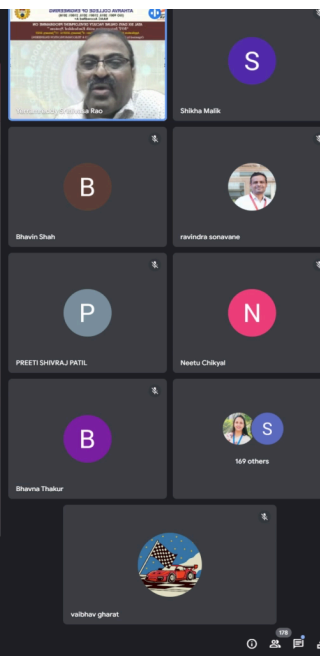
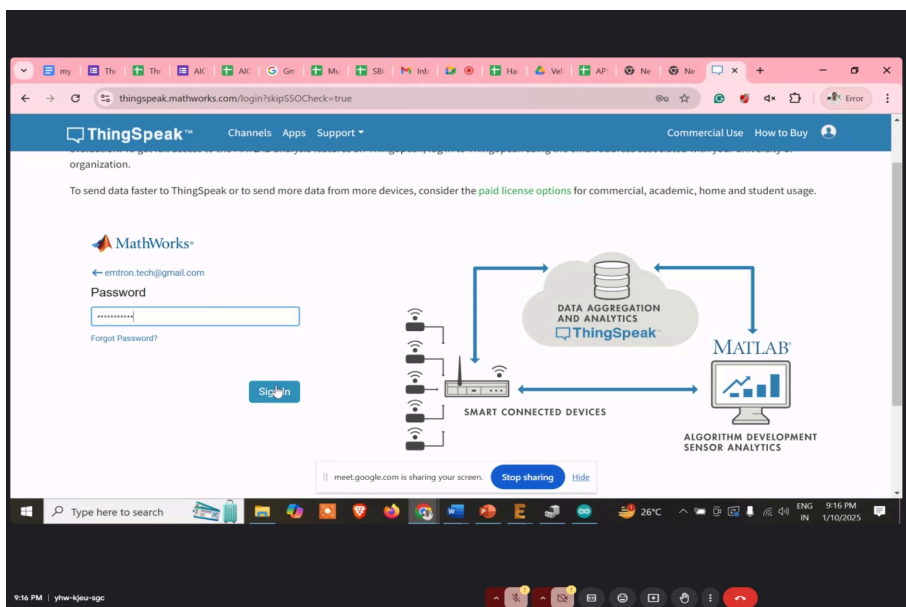
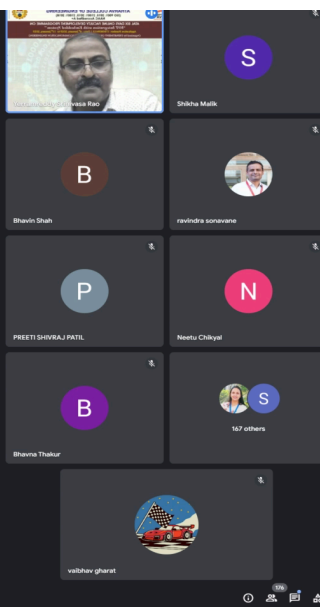
- WSDL: Web Service Description Language
- UDDI: Universal Description Discovery and Integration
- SOAP: Simple Object Access Protocol
- AMQP: Advanced Message Queuing Protocol
- MQTT: Message Queuing Telemetry Transport

7:29 PM | yfwr-kjnu-9gc

6:16 PM | yfwr-kjnu-9gc

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Date: 10-01-2025, Day-5, Session-10, Time: 07:30 pm to 09:00 pm



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Date: 11-01-2025, Day-6, Session-11, Time: 02:00 pm to 03:30 pm

The screenshot shows a Google Meet interface. The main window displays a presentation slide titled "IoT Gateway" from Maven Silicon. The slide lists the following points:

- Integrates heterogeneous protocols on sensor side to cloud for seamless access
- Sensor side connectivity is usually wireless
- This consists of hardware and software
- Provides security layer to the sensors

A diagram illustrates the IoT Gateway architecture, showing various sensors (factory, thermometer, camera, speedometer) connected to a central "IoT Gateway" device, which then connects to a cloud and various user devices (laptop, smartphone). The slide footer includes "www.maven-silicon.com" and "Copyright 2024, Maven Silicon".

On the right side of the screen, a grid of participant avatars is visible, including participants with initials B, P, M, S, A, and others. The bottom status bar shows the time as 2:38 PM and the user as yheer-kjnu-sgc.

The screenshot shows a Google Meet interface. The main window displays a presentation slide titled "IoT Applications- Healthcare Example" from Maven Silicon. The slide focuses on the "Management of medicines that require maintenance of specific temperature" and lists the following points:

- After manufacturing they are stored in a cold storage containers for transportation that can be tracked using IoT. This will have
 - Container ID (Vial or medicine strip IDs in side this container are made available to webapp)
 - Location tracker (GPS)
 - Temperature tracking with alert generation
 - Opening and closing of containers generates alert
- Web app connects to multiple containers to generate a dashboard on container status
- Webapp creates alerts to specific transport hubs to indicate if any action is needed
- Every medicine strip or vial can be tracked on the app for its life time temperature status
- Only the vials that meet storage specifications will be used, eliminating tapering

The slide footer includes "www.maven-silicon.com" and "Copyright 2024, Maven Silicon".

On the right side of the screen, a grid of participant avatars is visible, including participants with initials B, P, M, S, A, and others. The bottom status bar shows the time as 2:59 PM and the user as yheer-kjnu-sgc.



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Date: 11-01-2025, Day-6, Session-12, Time: 03:30 pm to 05:00 pm

CoAP Message Format

0 1 2 3 4 5 6 7

Option Delta *				Option Length			
Option Delta (Extended) 0-2 bytes							
Option Length (Extended) 0-2 bytes							
Option Value Number of bytes based on Option length							

Options Format:

- There could be multiple options in one packet. In an option, If the option delta or option length value is 13 then 1 extended byte exists, if it is 14 then 2 extended bytes exist
- Option number is = All previous option deltas + current option delta
- Option number determines the way Option value is structured. Example: option number 11 indicates that option is URI path. Refer to RFC 7252 for more information on option numbers

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MQTT – Message Format

Message Header Field	Description/ Values
Message Type (4 bits)	0 - RESERVED 1- CONNECT 2 - CONACK 3 - PUBLISH 4 - PUBACK 5 - PUBREC 6 - PUBREL 7 - PUBCOMP 8 - SUBSCRIBE 9 - SUBACK 10 - UNSUBSCRIBE 11 - UNSUBACK 12 - PINGREQ 13 - PINGRESP 14 - DISCONNECT 15 – Reserved
DUP (1 bit)	1 - Duplicate flag indicates that this message might have been already received
QoS Level (2 bits)	Indicates QoS level of PUBLISH message 0 – At most once delivery no guarantee 1 – At least-once-delivery, acknowledge delivery 2 – Exactly once delivery
Retain (1 bit)	1 – Retain the previously published data and deliver to new subscribers
Remaining Length (1-4 Bytes)	Indicates the remaining bytes in the message including optional header and payload

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Date: 11-01-2025, Day-6, Feedback, Time: 06:30 pm to 07:30 pm

ravitarika jadhav 8:25 PM

The Faculty Development Program was very helpful . The sessions covered important topics that are useful for teaching and professional growth. The speakers explained everything clearly and made the sessions engaging. I learned new ideas and strategies. It was a great experience, and I look forward to more programs like this. Thank You Team Dr. Bhavin Shah SIR , Prof. Mahalaxmi Palinje, Prof. Purvi Agarwal for arranging such an fantastic FDP.

Umarani Suryawanshi 9:01 PM

Thank you

EINDHUMATHY ECE 9:01 PM

very informative and worthful FDP. Thank you Organizing team.

Dr. R. Arun Sekar 8:38 PM

Very informative.. Thanks 🙏

Murali E 8:39 PM

Thank u so much sir

Neeta Moharkar 8:40 PM

Thank you organizing team.
It was very informative and amazing FDP.

Murali E 8:39 PM

Thank u so much sir

Neeta Moharkar 8:40 PM

Thank you organizing team.
It was very informative and amazing FDP.

Dipali Sarag 8:44 PM

Thank you so much all the authority for such a wonderful session. I really enjoyed the course. I learnt a lot of very useful information. This session gave me new tools and information that will help me. Very well organized program. thank you once again

Dipali Sarag 8:44 PM

Thank you so much all the authority for such a wonderful session. I really enjoyed the course. I learnt a lot of very useful information. This session gave me new tools and information that will help me. Very well organized program. thank you once again

Neha Nandurkar 8:44 PM

Thank you so much for arranging such an informative FDP.

Neha Nandurkar 8:44 PM

Thank you so much for arranging such an informative FDP.

Dhanashree Pannase 8:45 PM

Thank you Dr. Bhavin sir



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PATIL VAISHALI 8:48 PM

Thank you so much, all team for organizing a wonderful FDP.

Heena Kachhela 8:48 PM

Sir please kindly share attendance link

Mohan Kumar 8:48 PM

Thank you all

Sangita Bavkar 8:48 PM

Thank you organization team for organizing a such nice FDP.

Sandip Zade 8:49 PM

Very good session

Thanks Organiser

harshita baviskar 8:49 PM

Good evening mam Plz update my attendance due to which i was not able to give the test. Thank you

Dr. JAYANT NANDWALKAR 8:53 PM

Hats off to entire team, organising committee and Installation

Dr. Prashant Upadhyaya 7:52 PM

Thankyou to the Organizing team for such a wonderful session. It was really a wonderful session and especially you have covered the core of the Microprocessor and its programming which we found that in most of the FDP they don't focus on. Thankyou once again

Mohan Kumar 8:48 PM

Thank you all

Sangita Bavkar 8:48 PM

Thank you organization team for organizing a such nice FDP.

Sandip Zade 8:49 PM

Very good session

Thanks Organiser

harshita baviskar 8:49 PM

Good evening mam Plz update my attendance due to which i was not able to give the test. Thank you

Dr. JAYANT NANDWALKAR 8:53 PM

Hats off to entire team, organising committee and Installation

Giri Kulkarni 8:33 PM

Thank you very much.

Very well organised and very informative.

Prof. Archan Agrawal 8:34 PM

VERY INFORMATIVE FDP BY BRILLIANT FACULTIES.. THANK YOU..



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Date: 11-01-2025, Day-6, Valedictory, Time: 07:30 pm to 08:00 pm



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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

WARMLY WELCOMES YOU TO

ATAL SIX DAY ONLINE FACULTY DEVELOPMENT PROGRAMME
On
"IOT INTEGRATION WITH EMBEDDED SYSTEM"

Application Number : 1730809413

Date : 6th January, 2025 to 11th January, 2025

8:16 PM | yha-kjuu-9gc



100

RESOURCE PERSONS





100



Dr. Chiranjeevi
Senior Member
Technical



Putta Satish
Principal
Engineer, Maven
Silicon



Raghavendra
Senior Member
Technical, Maven
Silicon



Shanthi V A
Principal
Engineer, Maven
Silicon



Susmita Nayak
Principal
Engineer, Maven
Silicon



Hemachandra Bhat
Chief Technical
Officer, Maven
Silicon



Dr. MehulRaval
Deputy CTO,
RCT Solutions
GmbH, Germany



**Dr. Deepak
Waikar**
Edu Energy,
Singapore



Dr. Y. S. Rao
Academic, Dean,
Vice Principal,
Professor,
SPIT, Mumbai

8:51 PM | yha-kjuu-9gc



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Malad-Marve Road, Charkop Naka, Malad (West), Mumbai-400095

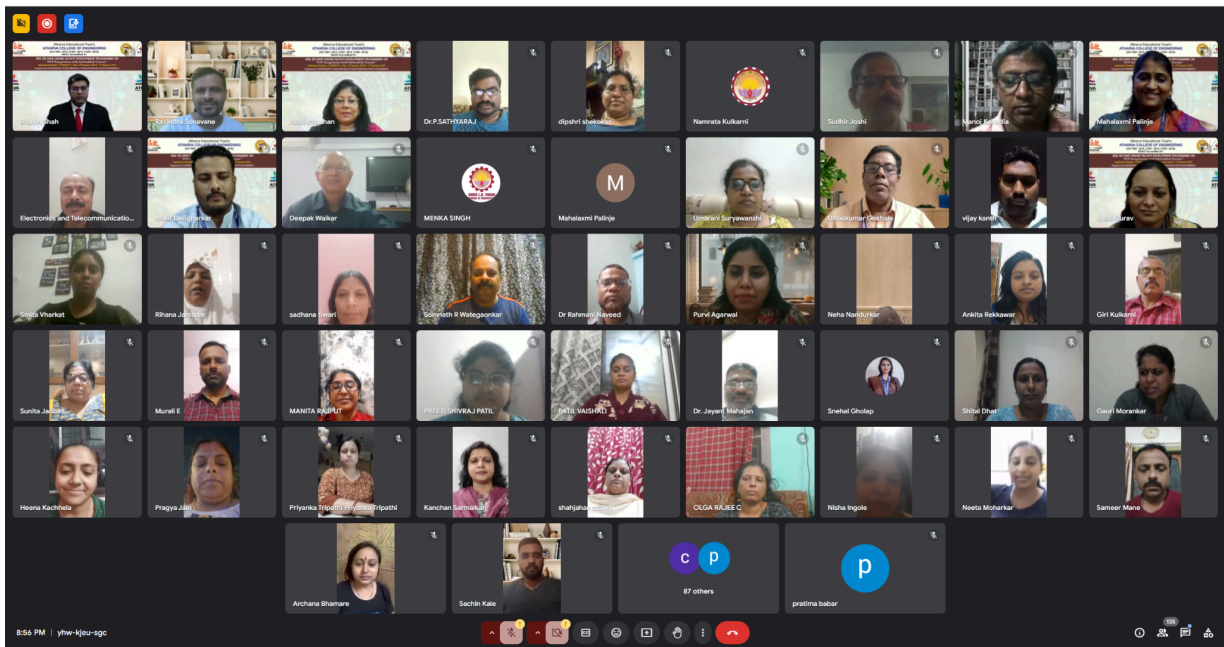
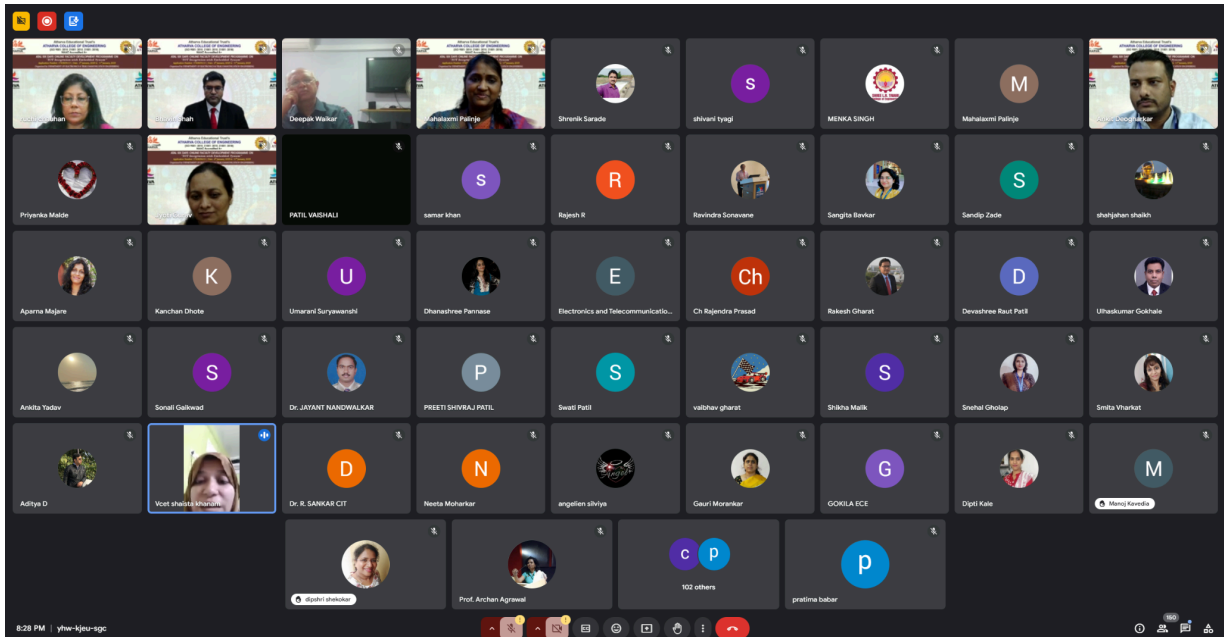


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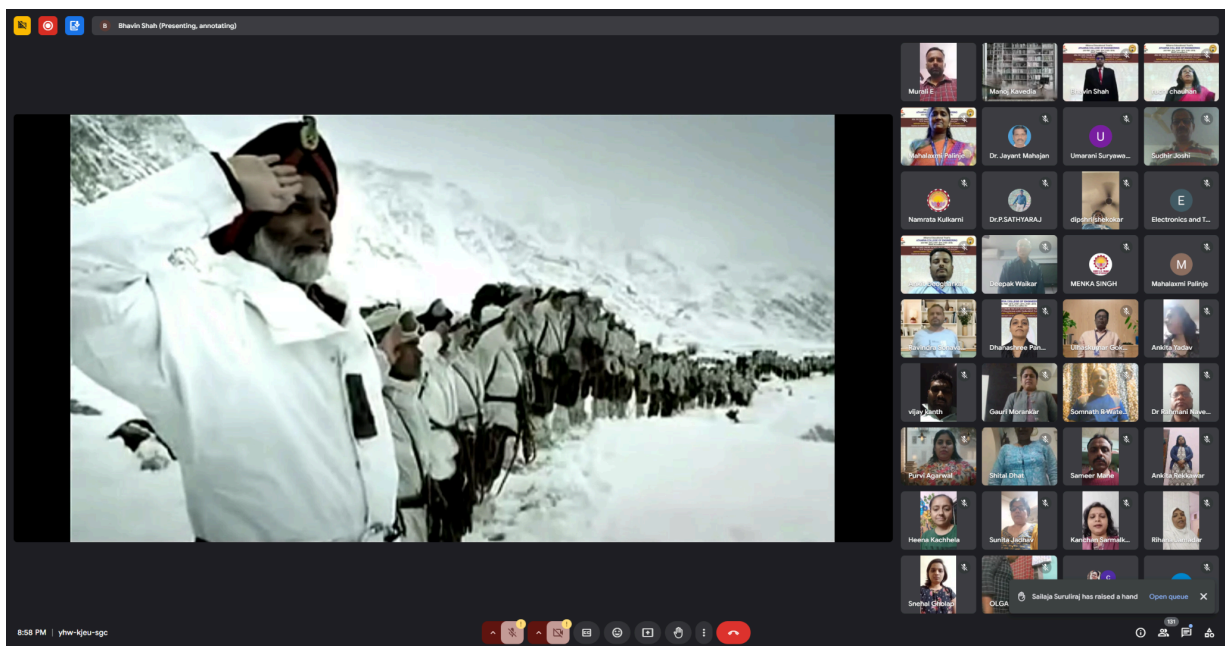
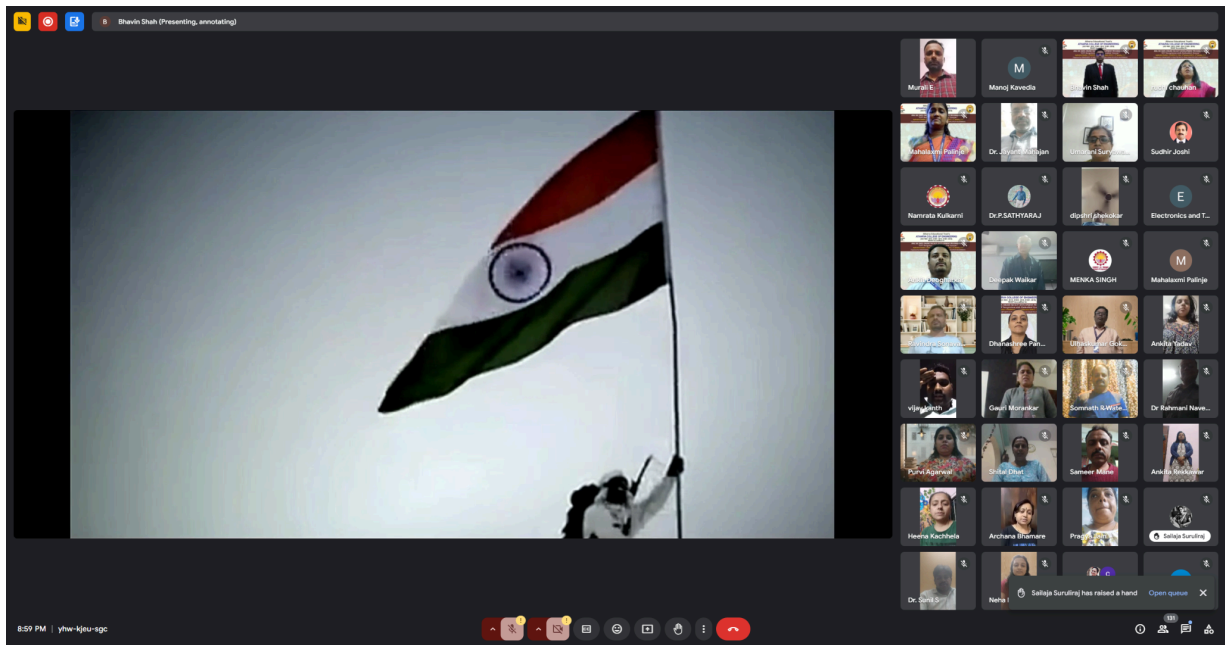




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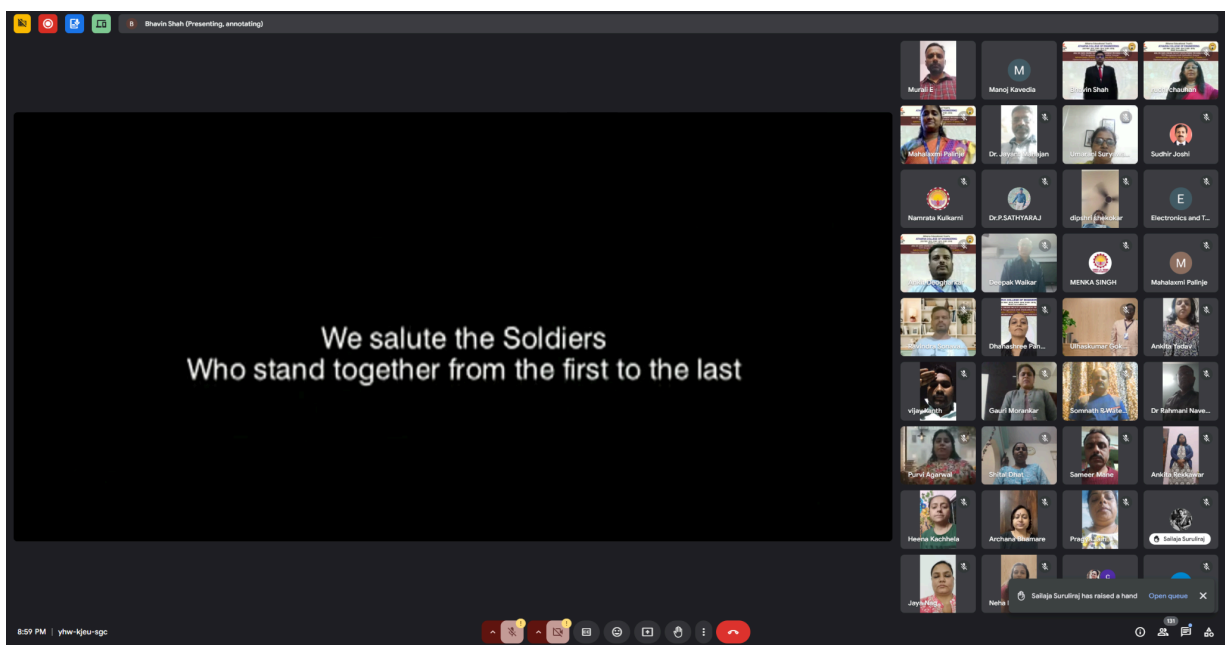
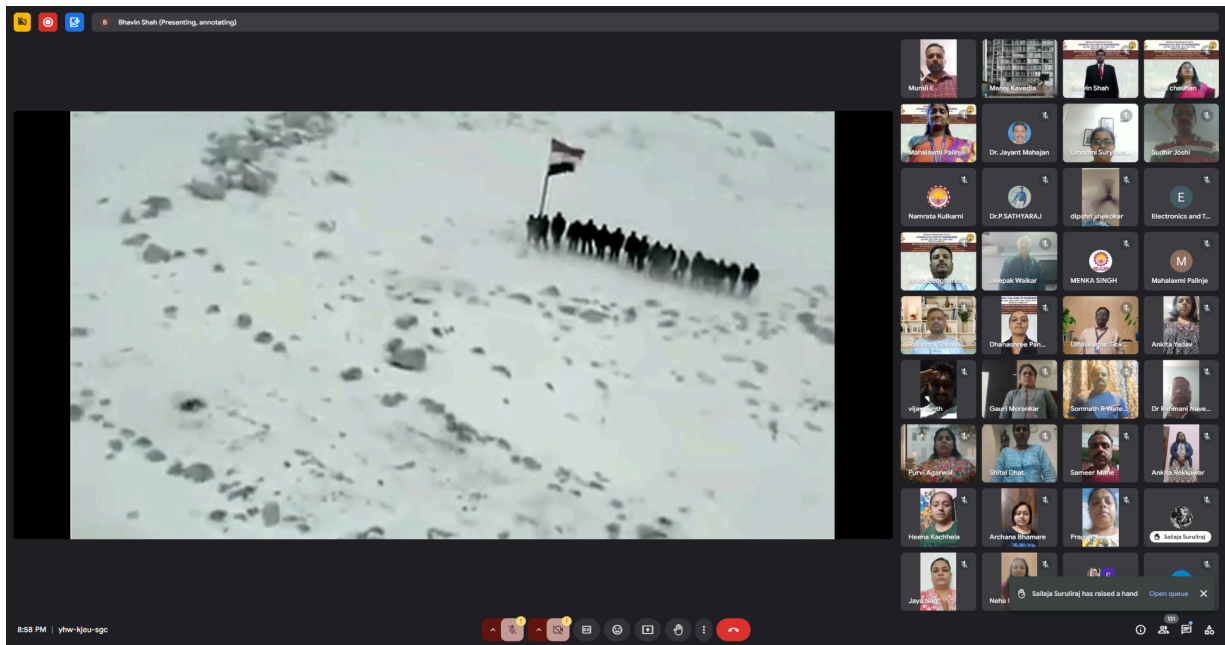
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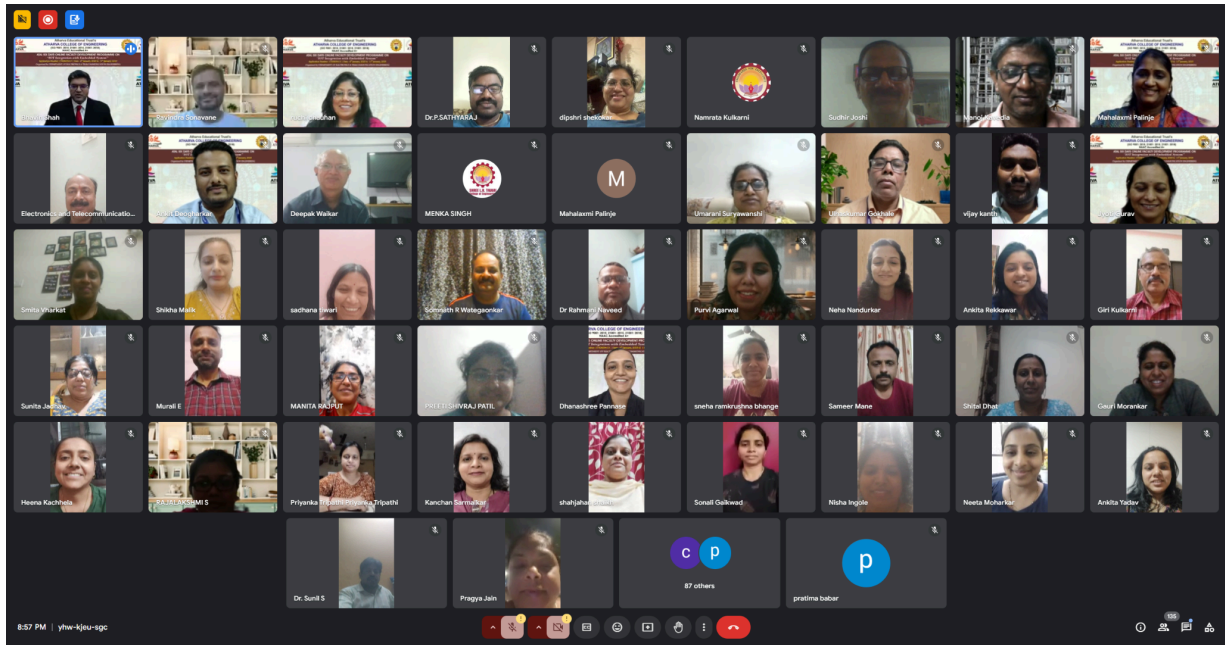
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THANK YOU!