A Report on Three-Days Workshop on "Design Thinking in IoT Development"
Organized by Department of Electronics & Communication Engineering
in association with Institution Innovation Cell
from 20.11.2024 to 22.11.2024

Report Submitted by: G. Charan Kumar, Assistant Professor Department of ECE.
Event Organised by: Mr. G. Mahammed Rafi, Assistant Professor, Department of ECE and G Charan Kumar Assistant Professor Department of ECE.
Report Received on 25.11.2024.
Mode of Conduct: Offline

The Department of Electronics and Communication Engineering (ECE), in collaboration with the Institution Innovation Cell, successfully organized a **Three-Day Workshop on Design Thinking in IoT Development** from 20th to 22nd November 2024. The workshop aimed to provide participants with a comprehensive understanding of applying design thinking principles in developing innovative IoT solutions.

Resource Persons: The sessions were facilitated by three distinguished faculty members are Mr. G. Mahammed Rafi, Assistant Professor, Department of ECE; Mr. Kashiraj V. Kalshetti, Assistant Professor, Department of ECE; Mr. M. Vamsi Krishna, Assistant Professor, Department of ECE

Attendees: The workshop was attended by *Dr. S. Rajasekaran, Head of the Department, ECE* and 45 Students from Various Departments.

Student Coordinators: I Manvitha – 22691A04I7 – III Year ECE C Sec; C Navya – 22691A04G8 – III Year ECE C Sec; C Sanjeeva Manikanta – 22691A04N7 – III Year ECE D Sec and D Amaresh – 22691A0411 – III Year ECE A Sec.
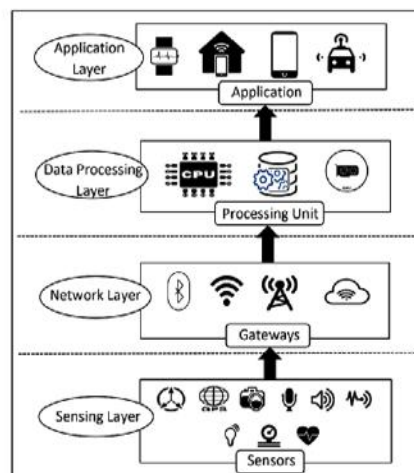
Workshop Objectives:

The primary objectives of the workshop were:
1. To introduce the concept of design thinking and its relevance to IoT development.
2. To enable participants to understand the IoT ecosystem, including hardware and software integration.
3. To develop problem-solving skills using real-world IoT case studies.

DAY 1: 20.11.2024

- **Resource Person**: Mr. M. Vamsi Krishna, Assistant Professor, Department of ECE.

- The primary goal of the workshop was to introduce participants to the principles of design thinking and its application in developing innovative IoT solutions.
- It aimed to foster a creative mindset and problem-solving skills in students, essential for tackling real-world challenges in the IoT domain and also workshop focused on integrating design thinking methodologies with IoT development processes.
- Students were exposed to practical approaches in developing user-centric IoT solutions. The session emphasized the importance of empathy, ideation, prototyping, and testing in the IoT development lifecycle.

1.3 COMPONENTS OF IOT/IOT ARCHITECTURE/HOW IOT WORKS?

- **Introduction to Design Thinking**: Mr. Vamsi Krishna began the session with an overview of design thinking, emphasizing its iterative and user-centered approach.
- **IoT Fundamentals and Applications**: Participants were introduced to the basics of IoT, its architecture, and real-life applications in industries.
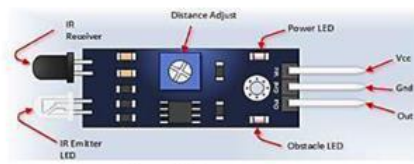

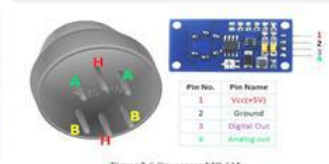Figure 2.1 IR sensor structure

Figure 2.6 Gas sensor MQ 135

Figure 2.3 Temperature Sensor

Figure 2.4 BMP 280 Pressure sensor

- **Hands-on Design Session**: Students worked in teams to conceptualize IoT-based solutions to address specific societal problems.
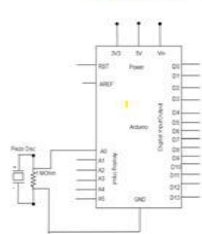

Actuator Interfacing with Arduino

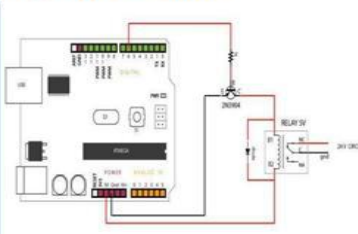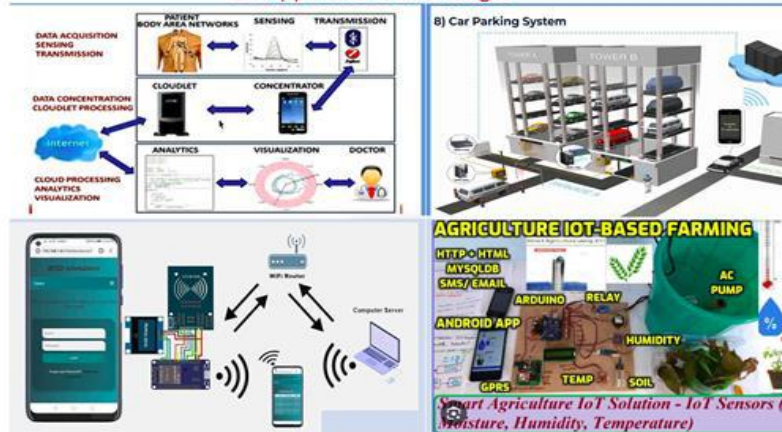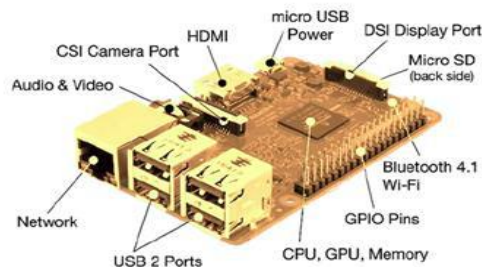Figure 2.7 Interfacing between Piezoelectric actuators and Arduino

Figure 2.8 Interfacing between Pneumatic actuators and Arduino

- **Prototyping and Feedback**: Each team presented their ideas and received constructive feedback to refine their designs.
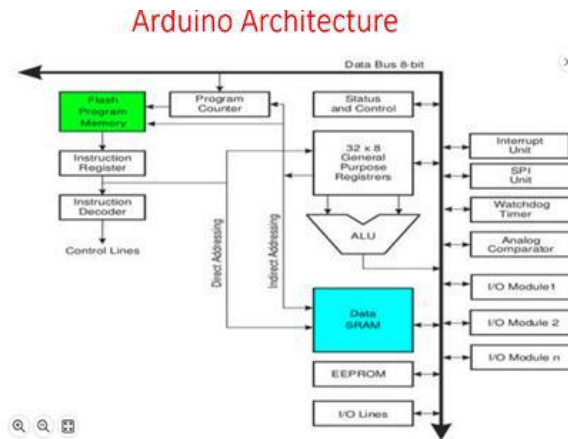

IOT Applications and usages

Components of Raspberry Pi

Outcomes:

- The students gained insights into integrating design thinking with IoT development, enhancing their ability to ideate and innovate.
- The interactive format encouraged collaboration and teamwork among students, preparing them for interdisciplinary problem-solving.

Arduino Architecture

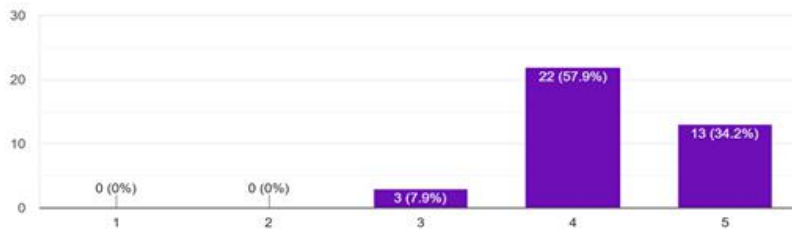## DAY 1 Feedback from Students:

1. The interactive session was scheduled at a suitable time
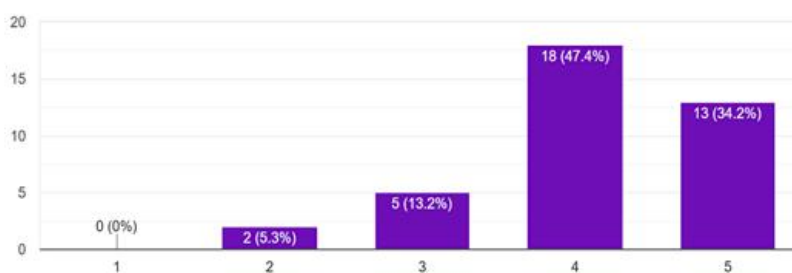38 responses
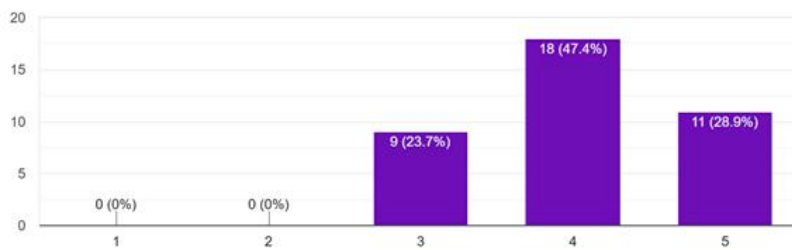
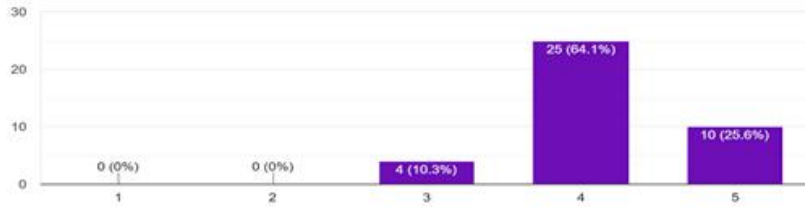2. The interaction was useful and resource person explanation.
38 responses

3. The information in the interaction was presented in a clear and organized manner.
38 responses

4. The presenter responded to questions an informative, appropriate and satisfactory manner.
39 responses

Rating	Count
1	0 (0%)
2	0 (0%)
3	4 (10.3%)
4	25 (64.1%)
5	10 (25.6%)

5. your impression of facilities provided by the institute for interaction.
39 responses

Rating	Count
1	0 (0%)
2	0 (0%)
3	8 (20.5%)
4	17 (43.6%)
5	14 (35.9%)
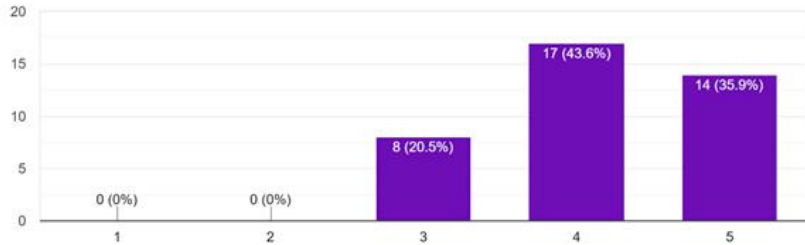
6. Overall, the session was informative and valuable.
39 responses

Rating	Count
1	0 (0%)
2	0 (0%)
3	3 (7.7%)
4	18 (46.2%)
5	18 (46.2%)
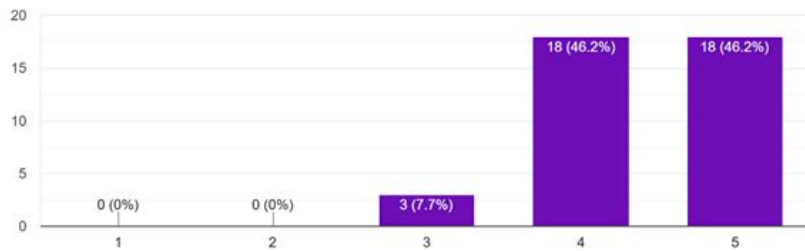
7. In what ways could this interaction have been improved to better suit your needs?
39 responses

Rating	Count
1	0 (0%)
2	0 (0%)
3	7 (17.9%)
4	21 (53.8%)
5	11 (28.2%)
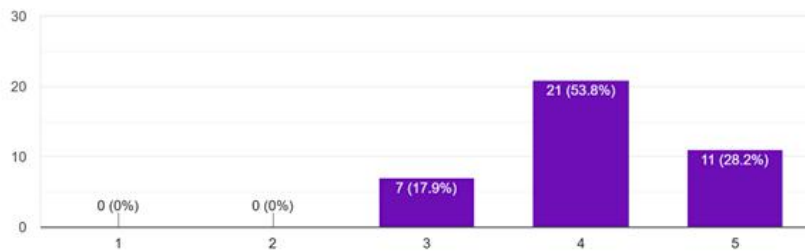
8. Any Other Comments
28 responses
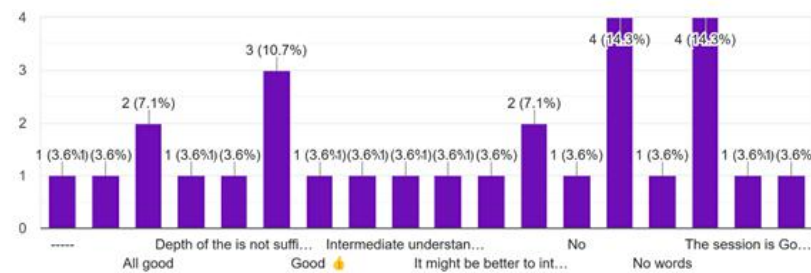
DAY 1 WORKSHOP IMAGES on 20.11.2024

Day 2 and Day 3: 21 .11.2024 and 20.11.2024

Resource Person: Mr. G Mahammed Rafi   & Mr Kashiraj V Kalshetti Assistant Professor, Department of ECE
The students with the foundational programming and interfacing skills required in IoT development.
Through practical sessions, students gained exposure to:

>   a.   Design thinking principles for IoT applications.
>   b.   Hands-on experience with Arduino hardware and sensors.
>   c.   Problem-solving strategies in IoT system integration.

Session Topics

Basic Programming of Arduino UNO:
>   1.   Participants were introduced to the Arduino IDE and its installation process.
>   2.   A practical hands-on session was conducted on blinking an LED using Arduino UNO, providing attendees with an understanding of basic programming and debugging techniques.

Interfacing a Gas Sensor with Arduino UNO:
>   1.   The process of integrating a gas sensor with Arduino UNO was demonstrated.
>   2.   Attendees learned about sensor functionality and its application in IoT systems, focusing on real-time data diffusion.

Arduino IDE Setup and Configuration:
>   1.   Detailed walkthrough of Arduino IDE installation process
>   2.   Introduction to the Arduino development environment

Practical Hands-on Sessions
>   1.   LED Blinking Exercise with Arduino UNO
>   2.   Step-by-step implementation and demonstration
>   3.   Basic circuit connections and programming concepts

Sensor Integration:
>   1.   Introduction to gas sensor interfacing with Arduino UNO
>   2.   Practical demonstration of sensor integration
>   3.   Discussion of sensor data acquisition and processing

DAY 2 Feedback from Students

1. The interactive session was scheduled at a suitable time
29 responses
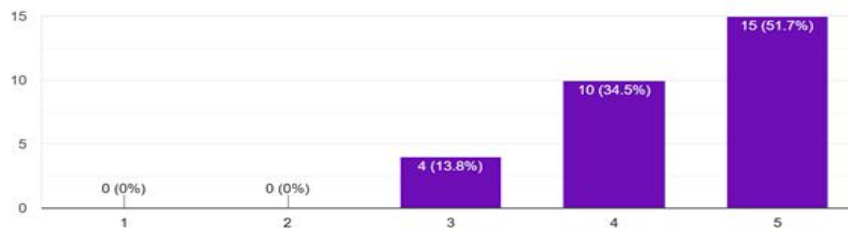
2. The interaction was useful and resource person explanation.
29 responses

## 3. The information in the interaction was presented in a clear and organized manner.
29 responses

Rating	Count
1	0 (0%)
2	0 (0%)
3	6 (20.7%)
4	9 (31%)
5	14 (48.3%)

4. The presenter responded to questions an informative, appropriate and satisfactory manner.
29 responses

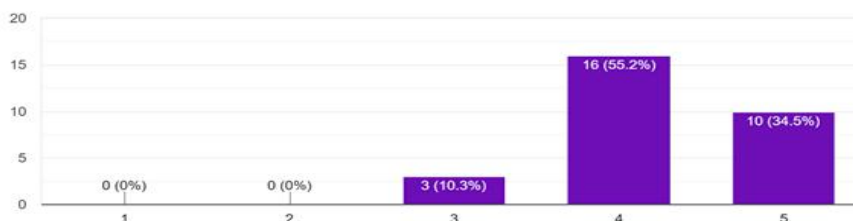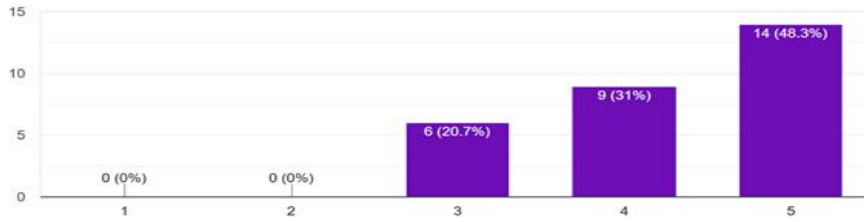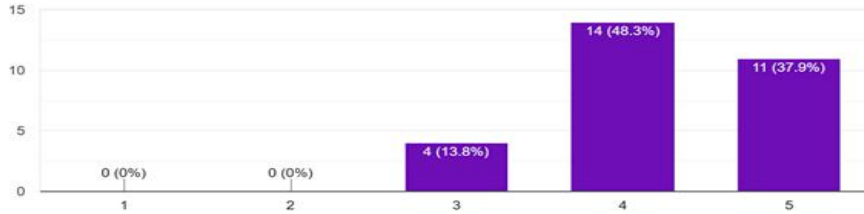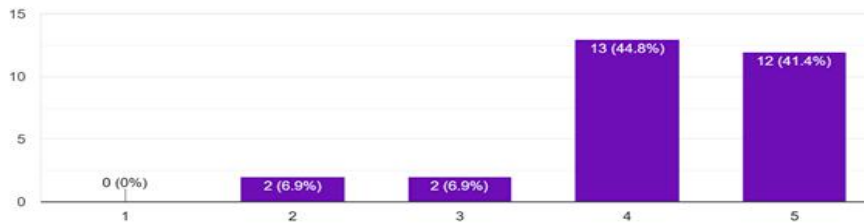| Rating	Count
1	0 (0%)
2	0 (0%)
3	4 (13.8%)
4	14 (48.3%)
5	11 (37.9%)

5. your impression of facilities provided by the institute for interaction.
29 responses

Rating	Count
1	0 (0%)
2	2 (6.9%)
3	2 (6.9%)
4	13 (44.8%)
5	12 (41.4%)

6. Overall, the session was informative and valuable.
29 responses

Rating	Count
1	1 (3.4%)
2	0 (0%)
3	4 (13.8%)
4	11 (37.9%)
5	13 (44.8%)
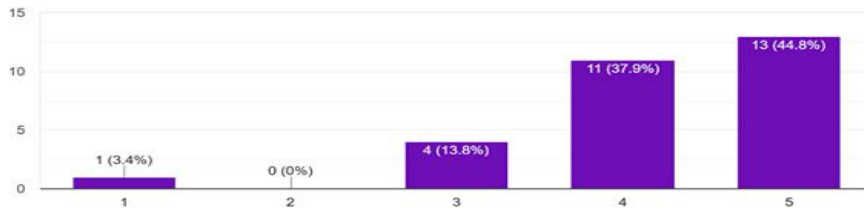
7. In what ways could this interaction have been improved to better suit your needs?
29 responses

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1	0 (0%)
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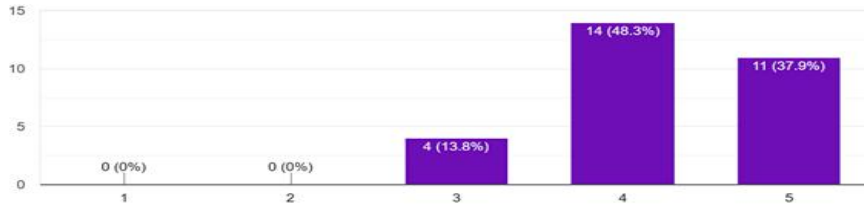
8. Any Other Comments
17 responses

Response	Count
All good	1 (5.9%)
	1 (5.9%)
GOOD	1 (5.9%)
Increase Equipment for flexibility…	4 (23.5%)
	1 (5.9%)
	1 (5.9%)
Kits are not there	1 (5.9%)
	1 (5.9%)
Nice session	1 (5.9%)
	1 (5.9%)
Nothing	2 (11.8%)
	1 (5.9%)
good	1 (5.9%)
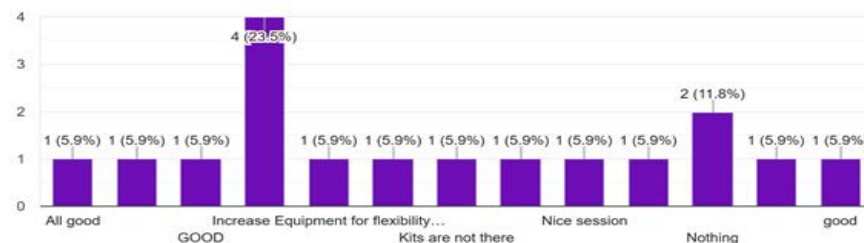
DAY 2 WORKSHOP IMAGES

DAY 3 : 22.11.2024

- **Resource Person:** Mr Mr. Kashiraj V. Kalshetti & G Mahammed Rafi Assistant Professor, Department of ECE

Workshop Highlights:

Interfacing of IR Sensors with Arduino:

- Participants were introduced to the basic concepts of IR sensors and their practical applications in IoT.

- A hands-on session was conducted to demonstrate the step-by-step process of interfacing an IR sensor with an Arduino board.

Practical Hands-On Session:
- The attendees performed practical exercises on connecting and programming Arduino boards for sensor interfacing.

- Troubleshooting techniques and best practices in circuit design were discussed.

Connection of Android Phones with Arduino UNO via Bluetooth Module:
- The session explored IoT applications by connecting Android devices to Arduino UNO using Bluetooth modules.

- The demonstration showcased how mobile applications can interact with hardware systems, enabling real-world IoT solutions.

Objectives and Outcomes:

The workshop aimed to provide students with a comprehensive understanding of IoT concepts through a Design Thinking approach. By encouraging practical problem-solving and innovation, participants gained insights into:

- The integration of sensors and IoT hardware.
- Wireless communication between devices.
- Development of prototypes using Arduino and Android platforms.

The resource person, Mr. Kashiraj Vittal, engaged the students with his expertise, making the workshop both interactive and insightful.

DAY 3 FEEDBACK from Students

2. The interaction was useful and resource person explanation.
38 responses

3. The information in the interaction was presented in a clear and organized manner.
38 responses

4. The presenter responded to questions an informative, appropriate and satisfactory manner.
38 responses

Rating	Responses
1	0 (0%)
2	0 (0%)
3	8 (21.1%)
4	15 (39.5%)
5	15 (39.5%)

5. your impression of facilities provided by the institute for interaction.
38 responses

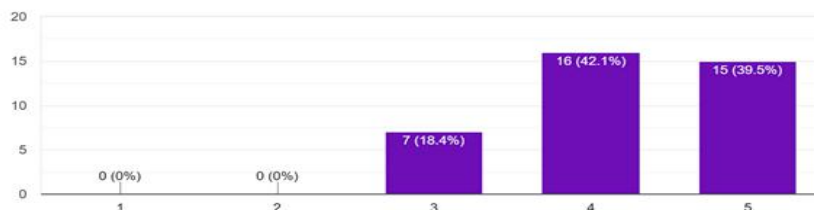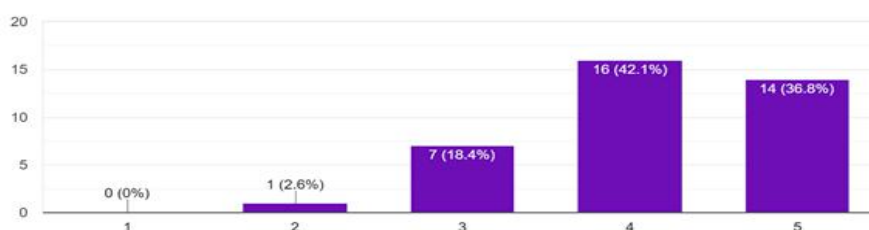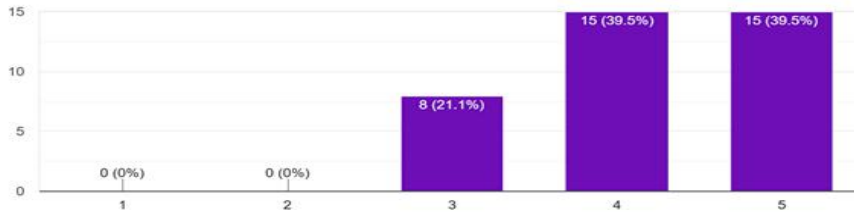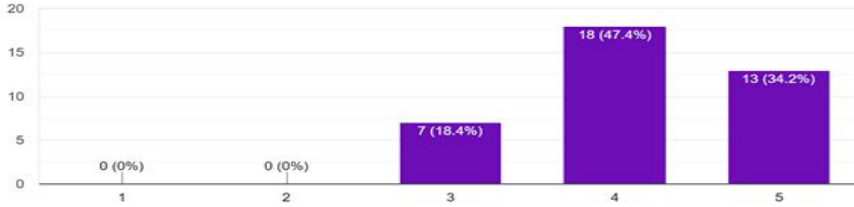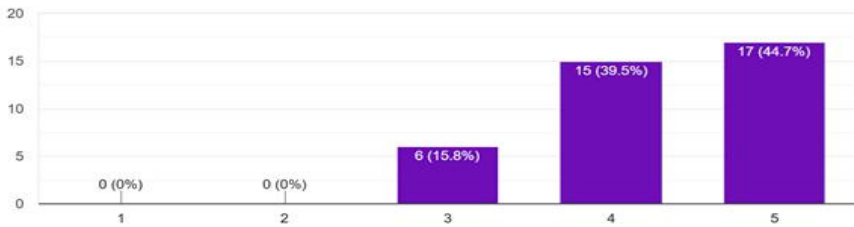| Rating	Responses
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38 responses

Rating	Responses
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7. In what ways could this interaction have been improved to better suit your needs?
38 responses

Rating	Responses
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2	0 (0%)
3	5 (13.2%)
4	20 (52.6%)
5	13 (34.2%)
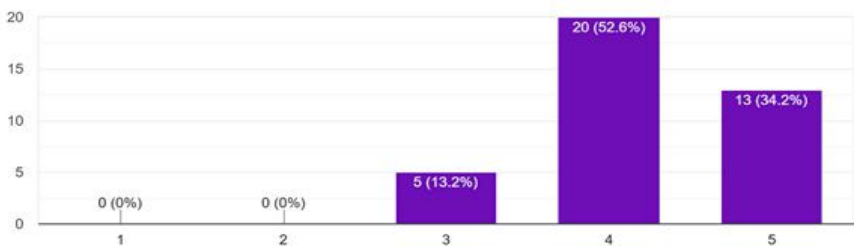
8. Any Other Comments
25 responses

Category	Responses
All good	1 (4%)
	1 (4%)
Conduct more workshops I...	1 (4%)
Good appreciate and enjoy	6 (24%)
	1 (4%)
Intresting session	1 (4%)
	1 (4%)
Nice explanation	1 (4%)
	1 (4%)
No Comments	1 (4%)
	1 (4%)
Nothing	4 (16%)
	2 (8%)
	1 (4%)
These 3 days in IOT...	1 (4%)
	1 (4%)
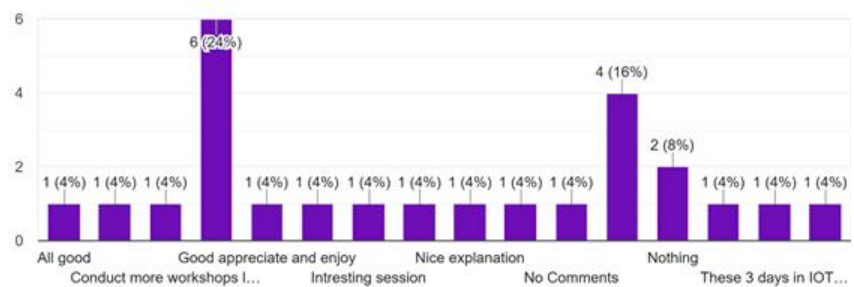
DAY 3 WORKSHOP IMAGES:
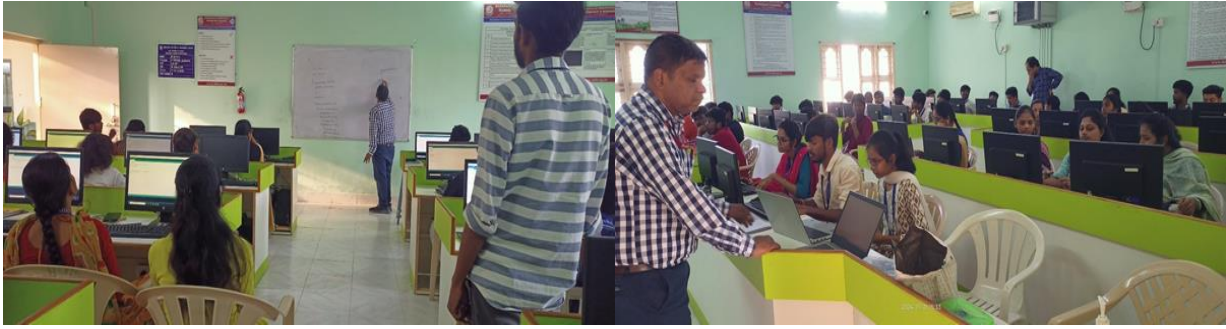
Vote of Thanks by C Sanjeeva Manikanta III Year ECE D Sec

Good evening everyone,

It is my honour and privilege to deliver the Vote of Thanks for today's insightful workshop on Design Thinking in IoT Development.

It is an honour and privilege to deliver the vote of thanks for this insightful workshop on "Design Thinking in IoT Development" held on 20th November 2024 in EB103. This workshop was a wonderful learning experience, offering us valuable insights into the intersection of creativity and technology in IoT.

First and foremost, I would like to extend my heartfelt gratitude to our esteemed resource persons:

Mr. Kashiraj V Kalshetti, Assistant Professor, Department of ECE
Mr. G. Mahammed Rafi K, Assistant Professor, Department of ECE
Mr. V. Vamsi Krishna, Assistant Professor, Department of ECE

Your expertise and engaging sessions have truly enriched our knowledge and inspired us to think innovatively.

I would also like to express my sincere appreciation to our Head of the Department, Dr. S. Rajasekaran, for his constant encouragement and support, which made this event possible.

A special thanks to the workshop coordinator Mr. G. Mahammed Rafi K, and co-coordinator Mr. G. Charan Kumar, Assistant Professors, Department of ECE, for their dedicated efforts in organizing this workshop seamlessly.

I would also like to acknowledge the invaluable support of our Management, respected Principal, and Vice Principals, for always providing the platform and resources needed for our growth.

Once again, thank you all for making this workshop a grand success. Let us take forward the insights gained today and strive to implement them in our academic and professional pursuits.