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Preface

Teaching and Learning Pedagogies

The educational approach at Manav Rachna University puts the students at the center of the learning process. This shift from teacher-centered to student-centered learning necessitates a change in thinking and instructional methods. To facilitate this shift, the Department of Electronics and Communication Engineering has incorporated multiple teaching methodologies, including Flipped Classroom learning, active participation, peer-to-peer Collaborative learning, and Simulation-based learning.

In recent years, faculty members have been actively seeking out new and innovative ways to improve the overall effectiveness of teaching and learning. As a result, there has been a significant increase in the utilization of technology as a teaching and learning tool. The integration of technology has allowed for a more engaging and interactive learning experience that has demonstrated improvements in learning outcomes. As such, this note aims to delve deeper into the role of technology in faculty innovations for teaching and learning pedagogies.

As teachers, adopting fresh and inventive teaching techniques can be challenging. However, we can overcome these challenges through proper channels. In this note it explores the challenges educators face when adopting new teaching methods and suggest potential solutions.

1. Active Learning

Active learning is a method of teaching that focuses on involving students in the learning process. It promotes student engagement through activities such as group work, discussions, and problem-solving. Research has shown that this approach leads to better learning outcomes and retention rates for students. Working together in groups can improve learning as it encourages the sharing of thoughts, viewpoints, skills and limitations, resulting in a more knowledgeable and unified learning setting. Although active learning has its benefits, it can pose certain obstacles, such as managing group dynamics and ensuring equal involvement. Furthermore, some students may experience difficulty transitioning from traditional lecture-style education to active learning.

2. Collaborative Activity

Collaborative learning is an increasingly popular approach to teaching and learning in higher education. It involves students working together in groups to solve problems, complete projects, and share ideas. While this approach has many potential benefits, it also presents some challenges that faculty must address to ensure that students are able to learn effectively.

Benefits of Collaborative Learning

- Improved critical thinking and problem-solving skills
- Increased engagement and motivation among students
- Opportunities for students to learn from each other and develop leadership skills

Challenges of Collaborative Learning

- Difficulty in managing group dynamics and ensuring that all students are contributing equally
- Potential for group think and lack of diversity in ideas

- Difficulty in assessing individual student learning outcomes

Transforming Traditional Classroom Settings

The potential benefits of collaborative learning, faculty must be willing to transform traditional classroom settings. This may involve creating more opportunities for group work, providing students with resources and support to facilitate collaboration, and using technology to facilitate communication and collaboration among students.

3. Flipped Classroom-Based Learning

In this pedagogy, students are introduced to the learning material and are asked to prepare the topics and apply and reinforce them. They are asked to give presentations to their peers which also allows teachers to spend more time facilitating and supporting student learning, rather than lecturing and delivering. Some faculty have adopted this pedagogy in their subject where the students are provided with the learning material and are asked to present their learning among peers.

Methods Used for Flipped Learning

- Pre-recorded Video Lectures: Video Lectures are created with the content required by students for learning. The videos can be rewatched so that the students can learn at their own pace.
- Study Material: Faculty can provide study material to the students beforehand to be discussed in the class.
- Classroom-based activities: Various classroom activities are organized like presentations and group discussions where students are allocated some topics on which they prepare the content and present it to the entire class.
- Case-study based: - The students are allocated some topics and based on which they prepare a cast study and deliver it in the form of a presentation.

Benefits of Flipped Teaching

- Increased student engagement and participation
- Personalized learning
- Improved learning outcomes
- Increased confidence
- Increased motivation and retention

Reproducibility and Reusability by other scholars for further development

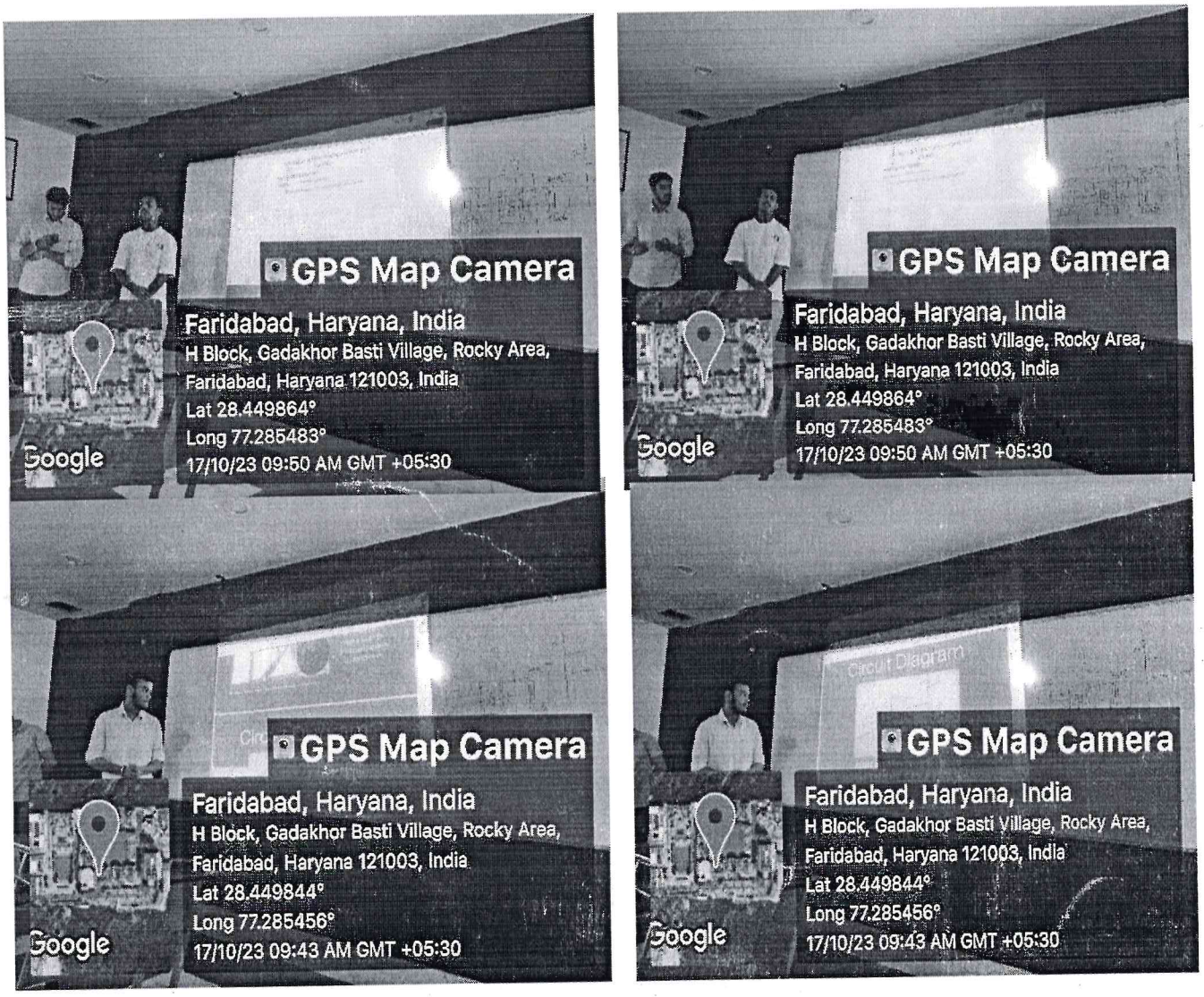
Flipped learning helps in reusing and reproducing the pedagogy using several ways:

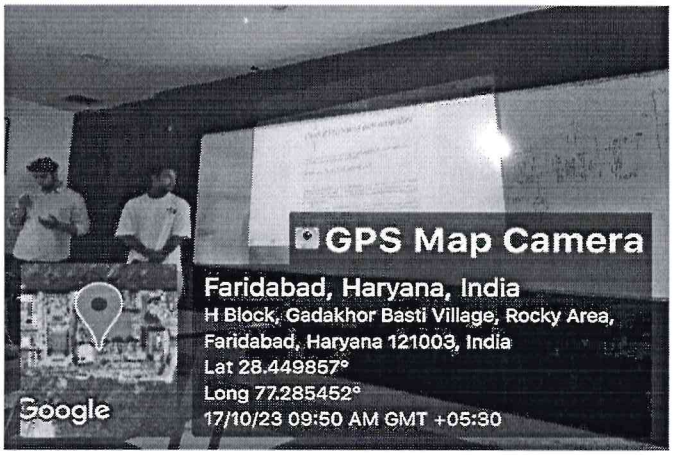
- Reusability of Learning resources: -Faculty video lectures can be updated and re-used on regular basis. This saves time and utilize in other aspects.
- Reproducing of resources: -The video lectures can be reproduced anytime by students whenever and wherever required.

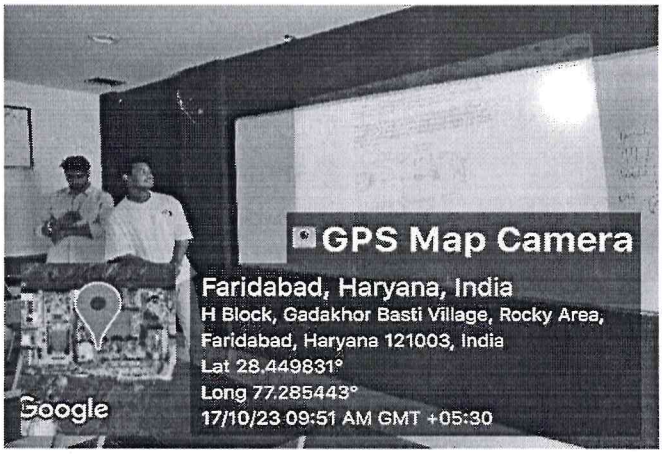
Outcomes of Flipped Classroom.

- Students developed the capability of self-learning on a topic and presenting to the audience (students of the class).
- Enhanced presentation skill
- Students developed the ability to answer various questions from a large audience (45 students) on the topic
- Students got an opportunity to demonstrate their documentation skills (in creating the PPT with diagrams, examples, formulae, etc.)
- Students were able to identify problems on the topic and developed Mini Projects.

Glimpses of students conducting sessions





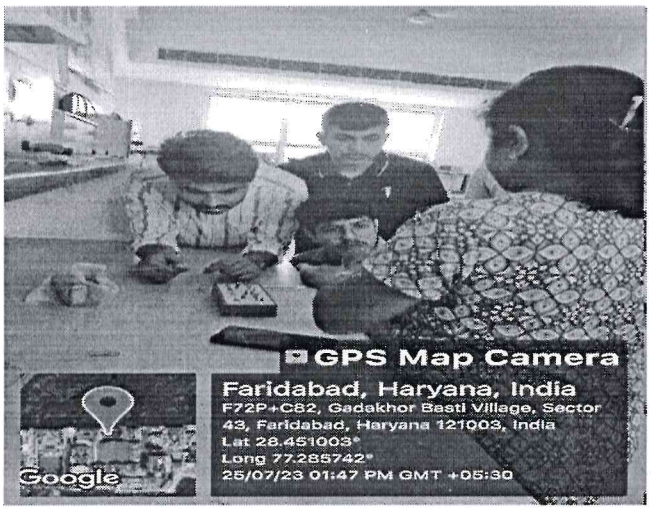


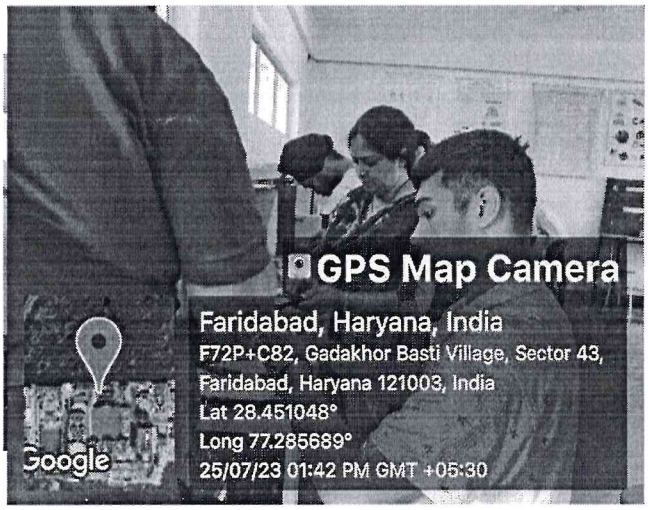
4.Project-Based Learning

Project-based learning is another innovative teaching method that involves students working on a project over an extended period. This method has been shown to improve critical thinking and problem-solving skills, as well as student engagement and motivation.

Benefits observed and Skills developed by the incorporation of PBL methodology

- Engages both heart and mind which gives better results
- Acquire a Deeper understanding of the algorithms applied while solving the problem
- Increase their confidence in real-world problem solving making them more employable
- They feel more satisfied when they see the real-world impact of their product which encourages them for more innovation in future
- Learn Teamwork which helps develop the attitudes of openness, respect for each other's views, curiosity, diversity and moving outside the comfort zone.
- Learn how to communicate their efforts put into that project to the audience
- Increases teacher-student relationship
- Investigating a real problem, exploring the data for new insights, critical analysis of results, and innovating new techniques & solutions lead to knowledge creation.
- Confident enough to participate in various hackathons and pitch their innovative ideas.
- Alignment of Problem statements with UN SDG



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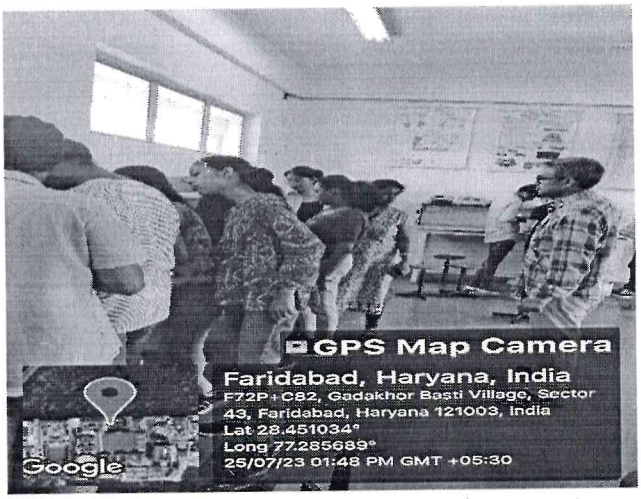
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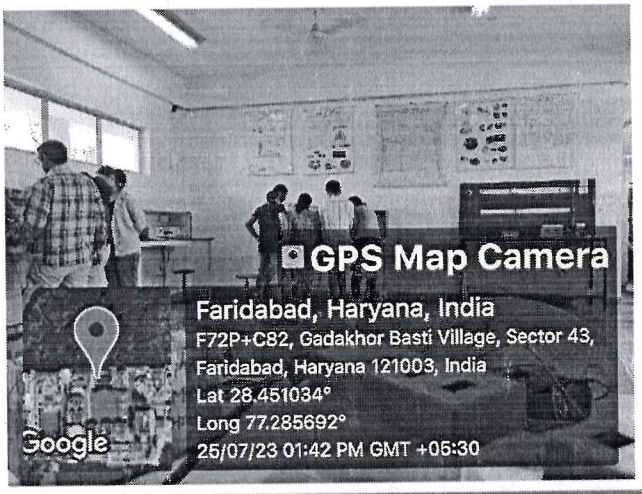
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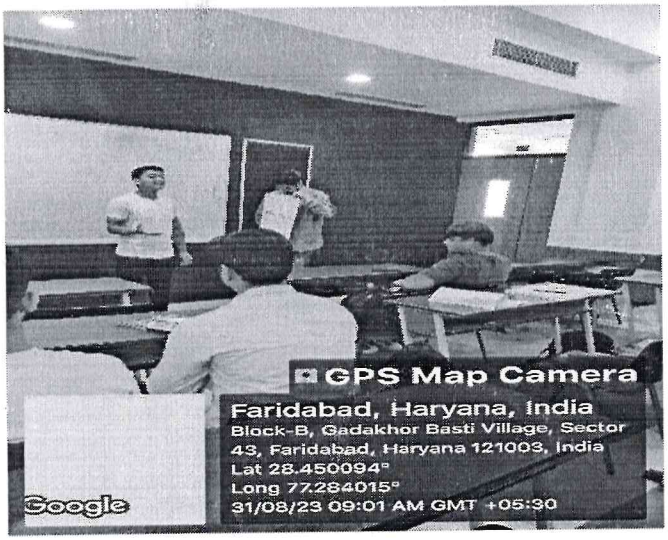
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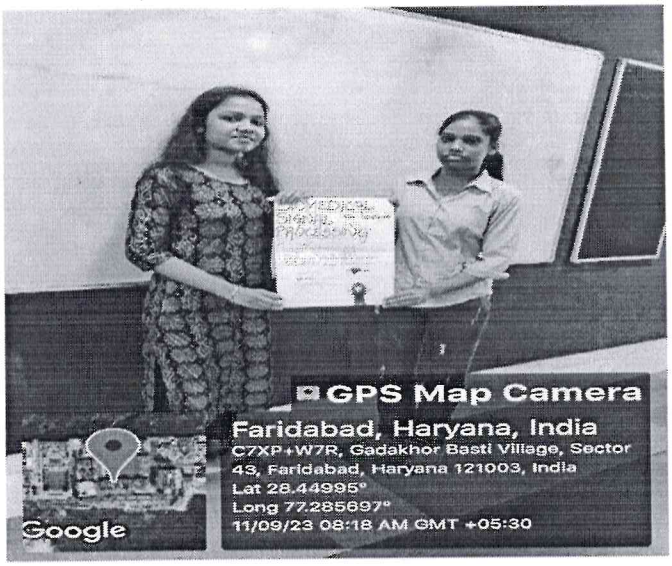
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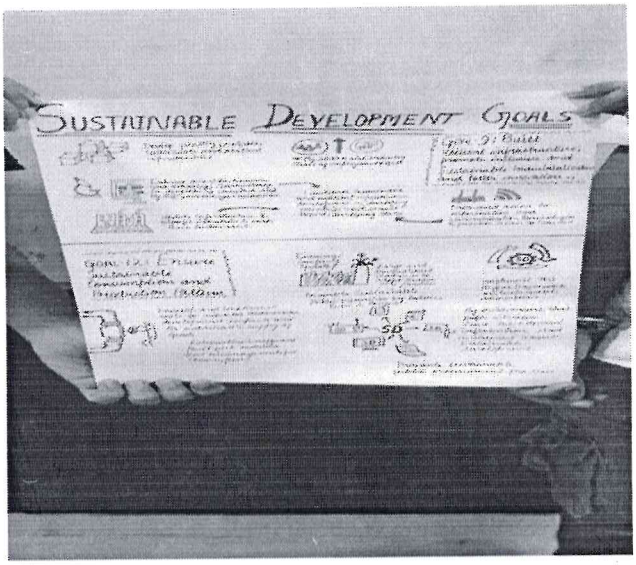
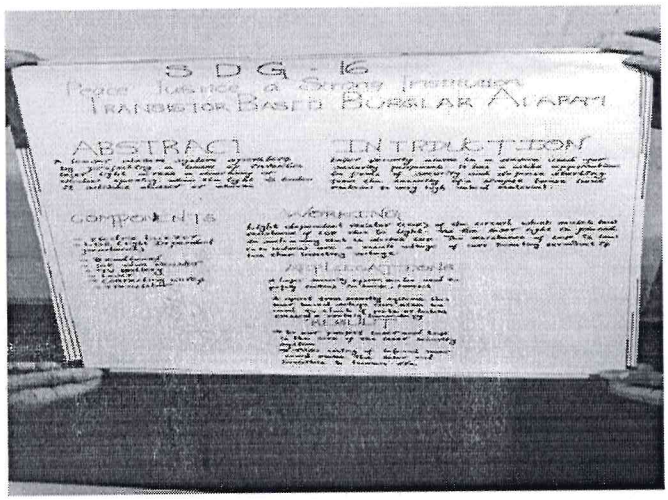
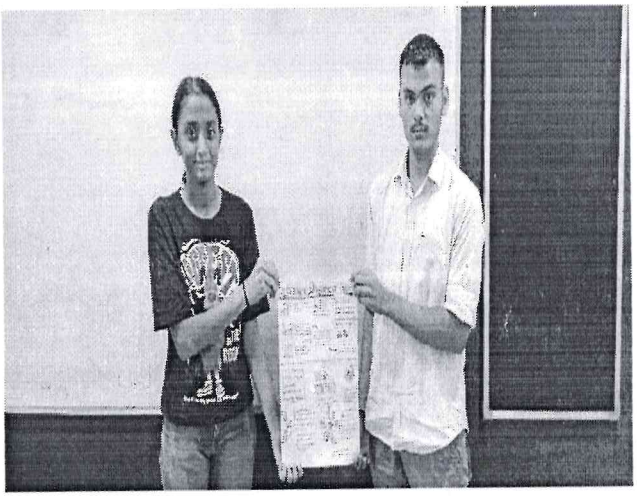
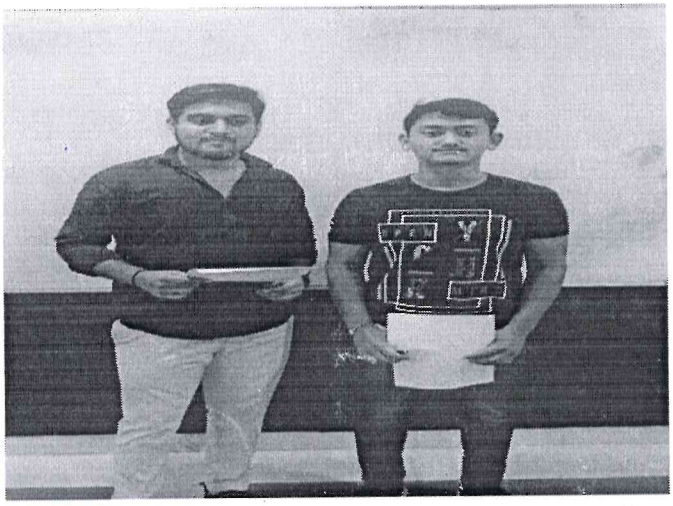
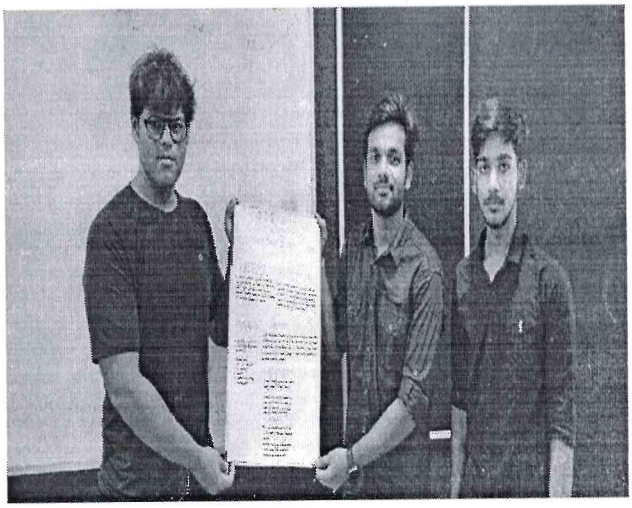

SUSTAINABLE DEVELOPMENT GOALS


SDG - 16
ABSTRACT
INTRODUCTION







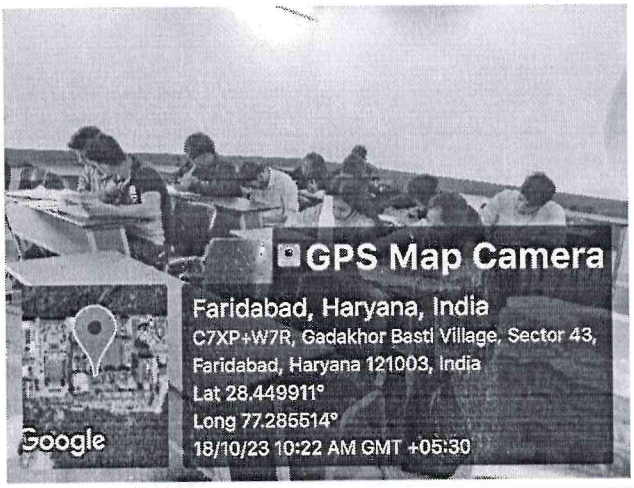
5. Peer-to-peer Learning

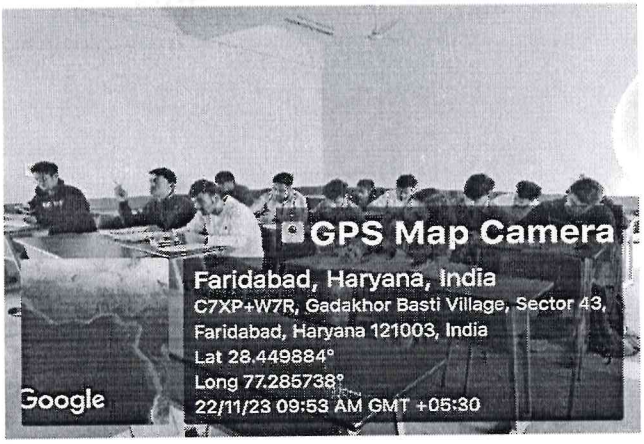
Peer-to-peer learning is a powerful tool for student engagement and retention. Faculty play a crucial role in facilitating this type of learning by creating a supportive and collaborative environment for students to work together.

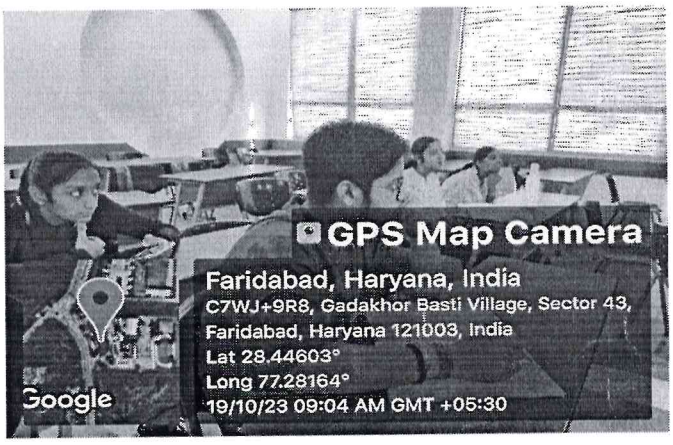
Some innovative approaches to faculty in teaching and learning for peer-to-peer learning include:

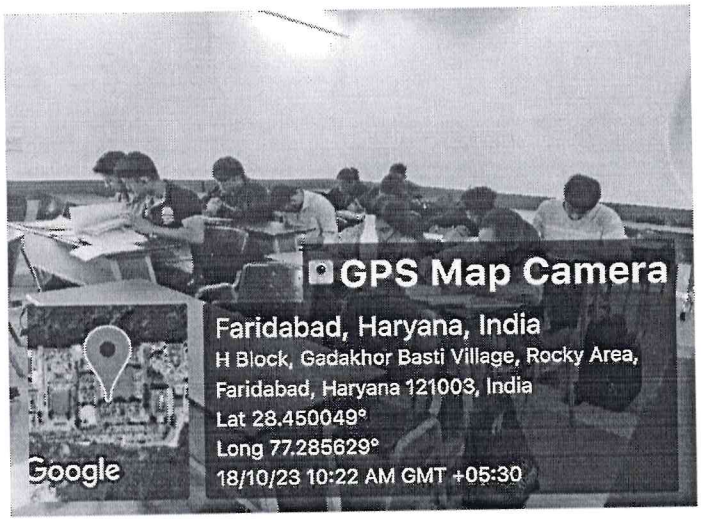
- Flipped classrooms, where students watch lectures at home and use class time for group work and discussion.
- Collaborative learning projects, where students work together to solve real-world problems and apply their knowledge in a practical setting.
- Online platforms and tools, such as discussion forums and collaborative document editing, that facilitate communication and collaboration among students.

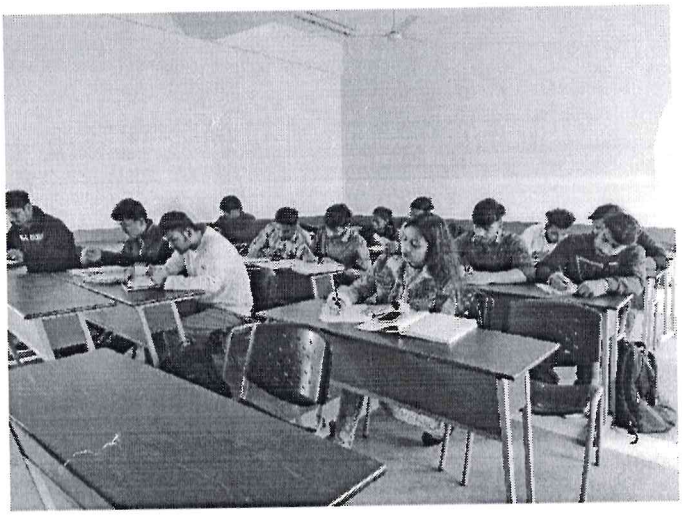
Peer-to-peer learning is an approach that involves students teaching and learning from each other. This approach has gained popularity in recent years due to its potential benefits, such as increased engagement, motivation, and retention. However, it also presents some challenges that must be addressed by faculty.











6. Virtual Reality

The faculty has used virtual reality technology to create immersive learning experiences for students. This has been particularly effective in subjects such as history and science, where students can explore historical events or scientific concepts more engagingly and interactively.

7. Simulation-based techniques

Simulation-based techniques provide a dynamic and engaging way to teach and learn. These techniques allow students to apply theoretical knowledge in practical situations and to develop important skills that will prepare them for the real world. Here are some examples of simulation-based techniques that are being adopted by the Department of Electronics and Communication Engineering.

Methods used for Simulation-based techniques

A. Virtual simulations: Virtual simulations allow students to practice skills or situations in a digital environment. Students can use various programming virtual simulators available freely. In such cases students even perform small experiments using mobile phones also. This was very much helpful during the covid period, because of the unavailability of computers at home for some students. The URL https://www.orcad.com was given to the students for visualizing code execution to observe and understand the concepts of design using ORCAD.

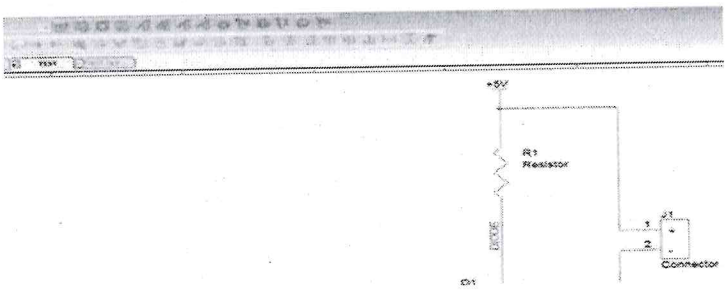
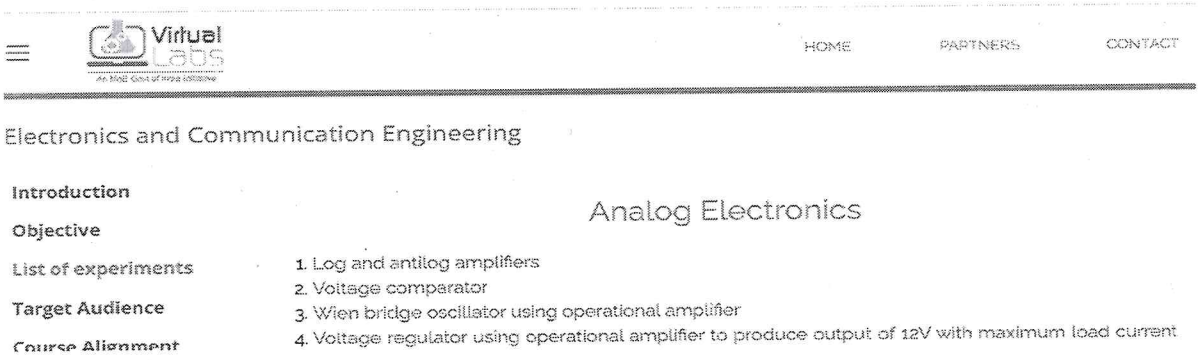


Figure Design using CADENCE

B. Simulated experiments on Virtual Labs

Simulated experiments involve using virtual or physical simulations to conduct experiments. This technique can be used to teach scientific concepts, such as Analog electronics, basic electronics, digital physics or chemistry (https://ae-iitr.vlabs.ac.in/List%20of%20experiments.html). MRU is associated with the Virtual Labs, IIT Delhi. Thus, Students of MRU including CST students avail the facility of Virtual Lab experiments available on vlab.co.in. on various engineering subjects as well as science subjects. The department is also associated with the True Chip who supports the students with software tool like Questa sim etc



LIST OF SUBJECTS WITH ASSOCIATED PEDAGOGIES			
	Sem-II	**SEM-IV**	**SEM-VI**
Cooperative	DHLD,BOEE,EDC	ADC,COMMUNICATION SYSTEMS	
Flipped classroom	DHLD,BOEE,EDC	COMMUNICATION SYSTEMS	WIRELESS AND MOBILE COMMUNICATION, DIGITAL SIGNAL AND IMAGE PROCESSING, CONTROL SYSTEM
Experiential	DHLD,BOEE,EDC		
Peer Teaching	EDC, DHLD	MPI, COMMUNICATION SYSTEMS	
Collaborative	DHLD,BOEE,EDC	MPI,ADC,COMMUNICATION SYSTEMS	WIRELESS AND MOBILE COMMUNICATION, CONTROL SYSTEM
Simulation based learning		ADC,COMMUNICATION SYSTEMS	INTRODUCATION TO WIRELSS SENSOR NETWORKS
Project Based Learning		VLSI DESIGN, FODE,EDW WORKSHOP	PLC PROGRAMMING AND APPLICATIONS, PLC WORKSHOP

MANAV RACHNA UNIVERSITY

PEDAGOGIES USED FOR ELECTRONIC DEVICES AND CIRCUITS (ECH106B)

Program Name	B.Tech ECE/VLSI
Year/Semester	1st year/2nd semester
Faculty Name	Dr. Shruti Vashist
Course Title/Code	ECH106B
L-T-P/ Course Credits	3-0-0
Teaching Pedagogy Used	Project Based Learning

MANAV RACHNA UNIVERSITY

SCHOOL OF ENGINEERING

Department of Electronics and Communication Engineering

Electronic Devices and Circuits -II sem -ECH106B

Experiential learning played a pivotal role in the Electronics Devices and Circuits course, enabling students to deeply engage with electronic principles and real-world challenges. Through hands-on activities, collaborative problem-solving, and self-directed learning, students developed a comprehensive understanding of electronic devices and circuit principles. Moreover, experiential learning, including Problem-Based Learning (PBL), facilitated the analysis of real-world problems and the development of innovative solutions, sharpening critical thinking skills. By undertaking projects aligned with Sustainable Development Goals (SDGs), such as creating a floor cleaner or an air quality indicator, students effectively applied their electronics knowledge to address global challenges. This experiential approach also fostered interdisciplinary learning, encouraging students to explore the intersection of electronics with environmental sustainability, public health, and safety. Through the lens of SDGs, students gained an awareness of the ethical and social implications of their work, cultivating a sense of responsibility for creating positive societal impact through technology.

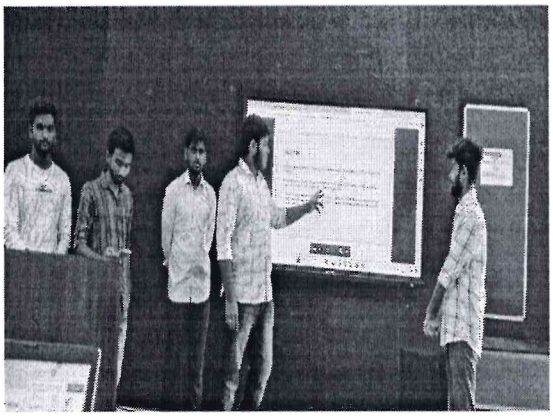
	ROLL	NAME	Group No.	Project Title
1	2K23ECUN03001	ALLA MOKSHAGNA REDDY	5	Smart irrigation system
2	2K23ECUN03002	AMIT YADAV	4	Air quality analyser
3	2K23ECUN03003	ANUMANTHULA VIGNESH YADAV	5	Smart irrigation system
4	2K23ECUN03004	AVULA CHANDRA SEKHAR REDDY	2	accident prevention and indication
5	2K23ECUN03005	AZEEM PARVEZ	3	Water level indicator
6	2K23ECUN03006	BADHAM DIVYA RAGHAVENDRA TEJA	5	Smart irrigation system
7	2K23ECUN03007	CHALLAGUNDLA NARENDRA	2	accident prevention and indication
8	2K23ECUN03008	CHENNAMPALLI NAGARJUNA	2	accident prevention and indication
9	2K23ECUN03009	CHILUKURI CHETAN SIDHARTHA	2	accident prevention and indication
10	2K23ECUN03010	DAPPILI MANVITHA	5	Smart irrigation system
11	2K23ECUN03011	KOTTALA SAI SANDEEP KUMAR	2	accident prevention and indication
12	2K23ECUN03012	NITIN PANDEY	4	Air quality analyser
13	2K23ECUN03013	SAURAV KUMAR	1	Fire alarm
14	2K23ECUN03014	VANSH MALIK	1	Floor cleaning Robot
15	2K23ECUN03015	VANSH SHARMA	3	Water Indicator
16	2K23ECUN03016	VISHESH	3	Water Indicator
17	2K23ECUN03017	YASH RAWAT	3	Water Indicator
18	2K23ECUN03018	YOGITA	4	Air quality analyser
19	2K23ECUN03019	KONKAYALA SAI SRIKANTH REDDY	5	Smart irrigation system
ECE CORE 2nd semester				
1	2K23ECUN01001	AMAN P R	1	Floor cleaning Robot

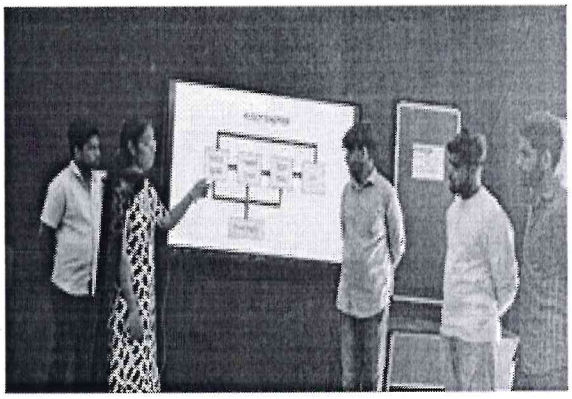
2	2K23ECUN01002	HARSH MALIK	1	Floor cleaning Robot
3	2K23ECUN01003	NISHANT SINGH	3	Water Indicator
4	2K23ECUN01004	SAURAV BHARDWAJ	4	Air quality analyser

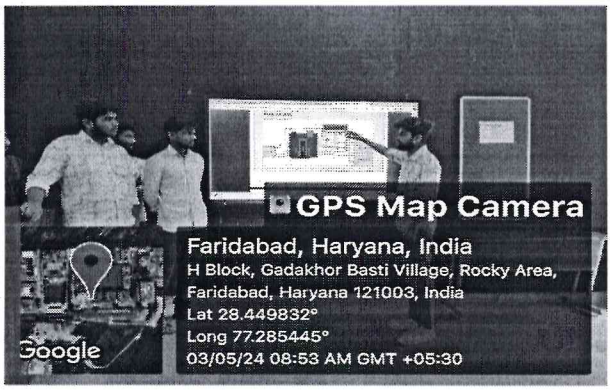
Outcome

Based on the projects developed by students in the Electronics Devices and Circuits course, the following outcomes can be observed, along with the Sustainable Development Goals (SDGs) they contribute to:

- Students produce functional prototypes or models of projects such as floor cleaners, water irrigation systems, air quality indicators, accident prevention devices, and water level indicators, addressing SDGs 6 (Clean Water and Sanitation), 11 (Sustainable Cities and Communities), 12 (Responsible Consumption and Production), and 13 (Climate Action).
- Students demonstrated proficiency in identifying, analyzing, and addressing specific challenges related to the projects, showcasing their problem-solving abilities within the context of electronic devices and circuits.
- Students applied their understanding of electronic principles to design, construct, and troubleshoot the projects, highlighting their practical skills and mastery of relevant concepts.
- students exhibited creativity in the design and implementation of projects, proposing novel solutions or features that contribute to the effectiveness or efficiency of the final product.
- Projects aligned with Sustainable Development Goals, addressing pressing global challenges such as clean water access, environmental sustainability, public health, and safety, demonstrating students' awareness of societal needs and their ability to contribute meaningfully to addressing them.
- Students effectively communicated their project objectives, methodologies, and findings to peers, instructors, or external stakeholders, demonstrating their ability to articulate complex technical concepts clearly and compellingly.
- Projects have the potential to have a tangible impact beyond the classroom, contributing to sustainability efforts, improving quality of life, or addressing specific societal needs, thereby exemplifying the practical relevance and applicability of the course content.



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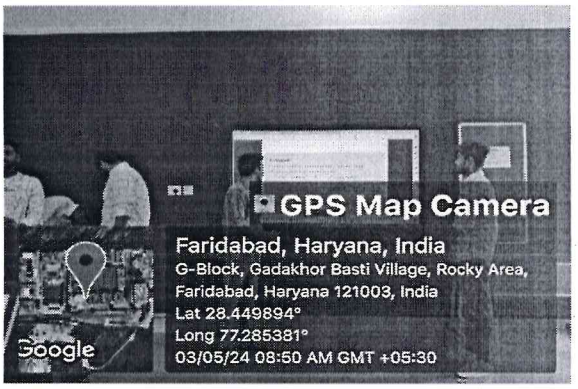
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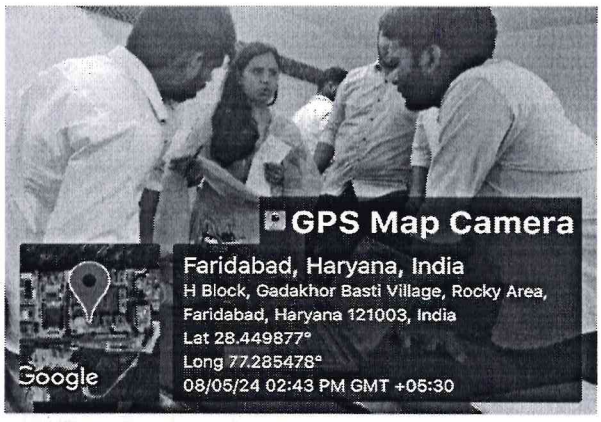
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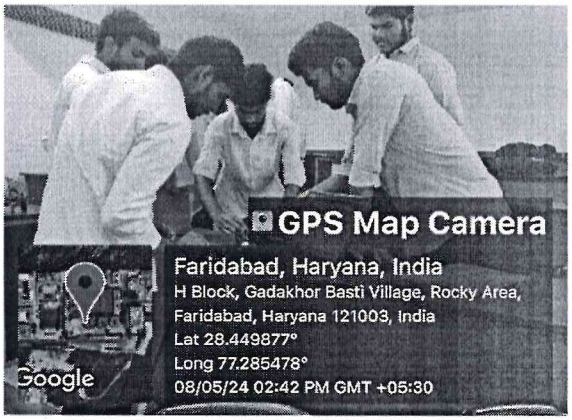
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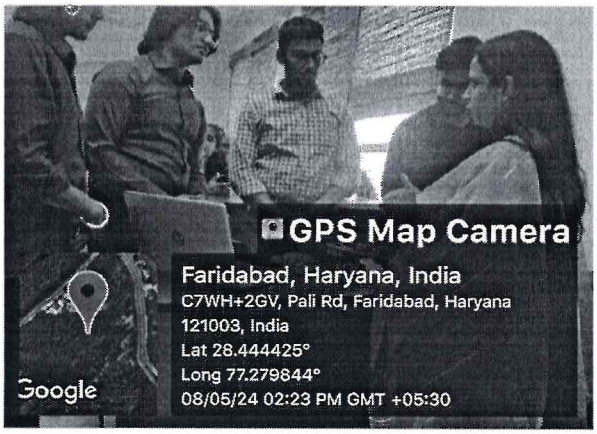
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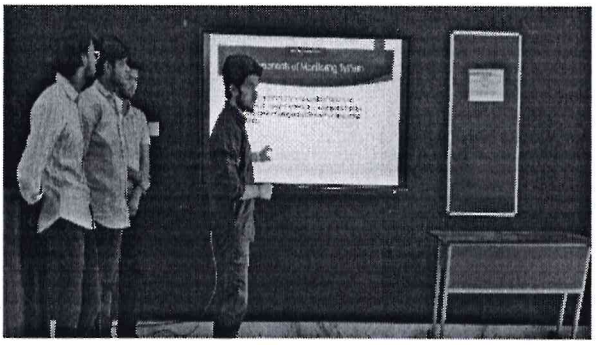

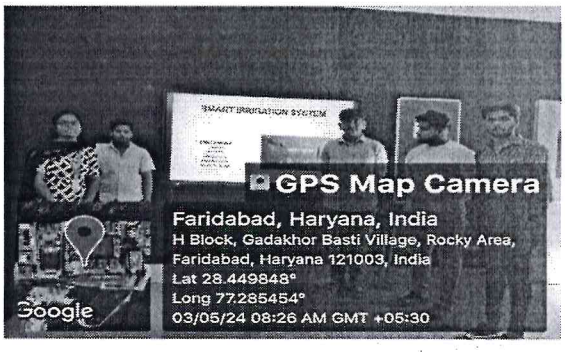
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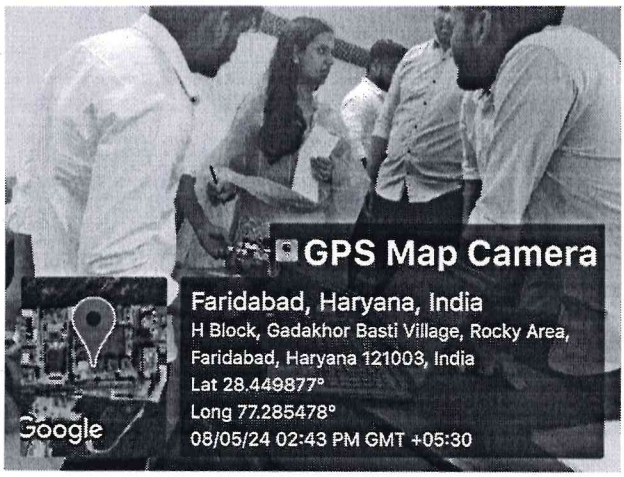
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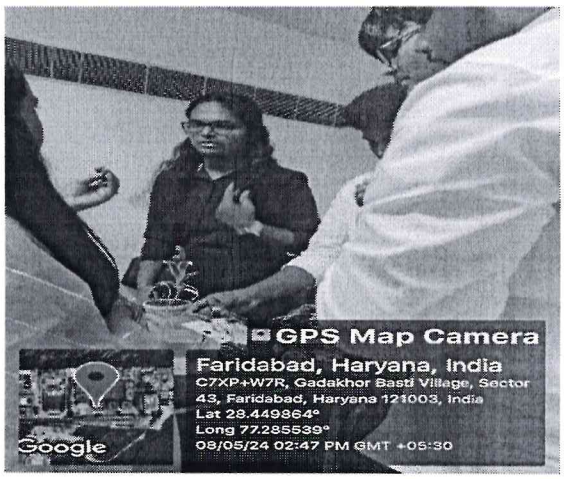
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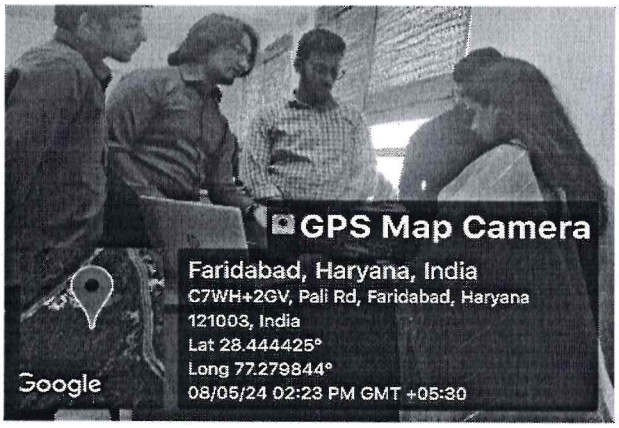
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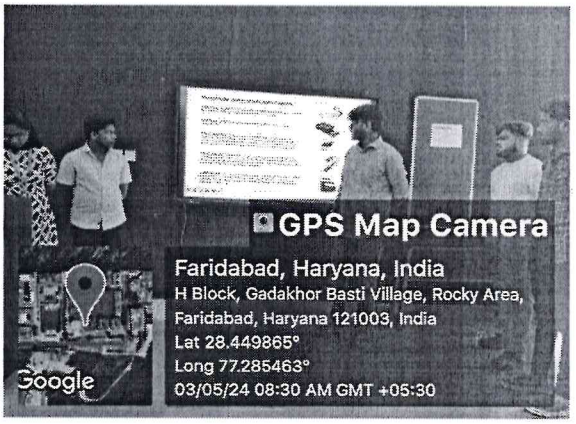
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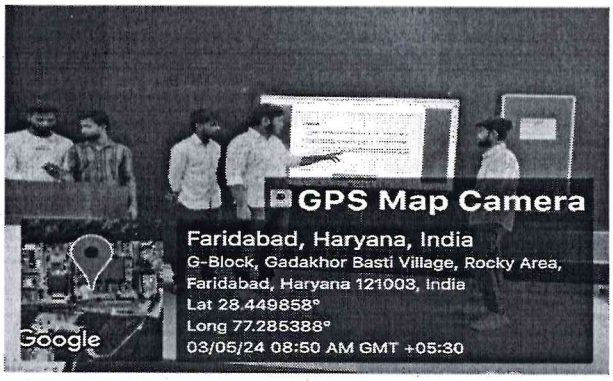
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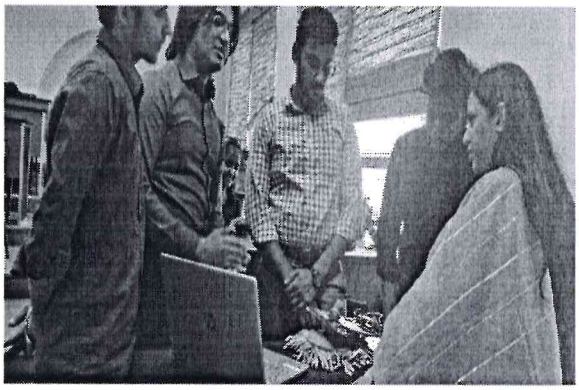


PEDAGOGIES USED FOR

DIGITAL LOGIC AND HARDWARE DESIGN (ECH110B)

Program Name	B. Tech CSE
Year/Semester	1st/2nd
Faculty Name	Dr. Meenakshi Gupta
Course Title/Code	ECH110B
L-T-P/ Course Credits	5
Teaching Pedagogy Used	Classroom Teaching/ Collaborative, Experiential learning, Flipped Class room, Cooperative and Peer teaching.

Course: Digital Logic & Hardware Design (ECH 110B)

Pedagogy: Collaborative, Experiential learning, Flipped Class room, Cooperative and Peer teaching.

Objective: To foster interactive and teamwork-oriented learning, we implemented a dynamic approach to understanding circuitry through collaborative activities such as peer teaching and flipped classroom techniques. By engaging students in hands-on experiences, we aimed to deepen comprehension, sharpen problem-solving abilities, and cultivate effective teamwork and presentation skills.

Methodology:

Group Formation: Students were divided in teams to encourage collaboration and share learning experiences.

Students received a concise theoretical introduction to circuits, centered around the concept of logic gates, with a focus on exploring their practical applications and importance within digital electronic circuits.

Hands-on Circuit Building: Every group received essential components for constructing digital circuits, promoting hands-on experiential learning. Students actively engaged in circuit construction, fostering collaboration and practical application of their theoretical understanding. Together, they designed circuits and worked collaboratively to troubleshoot any issues, applying their knowledge to real-world scenarios. They documented their results and analyzed the outcomes to deepen their understanding.

Outcome :

- Hands-on experiences for a thorough understanding
- Strengthened problem-solving abilities
- Development of effective communication and teamwork
- Application of theoretical knowledge in practical scenarios
- Heightened comprehension of digital electronic circuits
- Acquisition of vital practical skills
- Enhanced communication through presentations
- Cultivation of a collaborative mindset

Students Project list with their problem statement, project objective and SDG Goals:

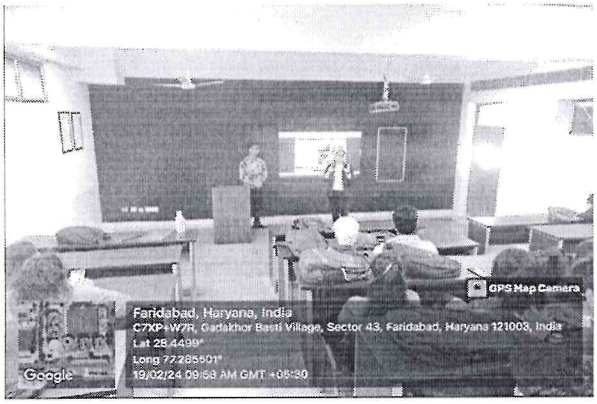
Group Name	Project Name	Problem Statement	SDG Goals	Project Objective
HARSHIL ARON UJJAWAL ARORA	DIYA CRUSHER	Recycling diyas that are wasted or broken after usage	SDG 9 SDG 11 SDG 12 SDG 13 SDG 14 SDG15	ZERO WASTAGE
RAGHAV GAUR PRATHAM DEEP	CROP & SOIL MANAGEMENT	Farmers face several challenges related to crop selection, soil management, disease identification and other factors, which can impact agriculture productivity and sustainability. To address these challenges, we need an application to help farmers	SDG 2	ZERO HUNGER
MAYANK CH. HIMANSHU DIXIT	REVOLUTIONIZING URBAN MOBILITY: THE SMART CAR PARKING SYSTEM	Design and implement a Smart Cart Parking System to address the increasing need for efficient management of parking spaces in urban areas. The system should utilize smart sensors, IoT technology, and data analytics to optimize parking space utilization, minimize congestion, reduce vehicle	SDG 9	OPTIMIZING PARKING SPACE UTILIZATION
JATIN KAUSHIK KARTIK SHAUKEEN	SHORTEST PATH FINDER ROBOT		SDG 9	PATH PLANNING
VAMSHI TEJA CHANDRASHEKHAR	AUTOMATIC SANITIZATION SYSTEM	Due to travelling of heavy passengers in the trains there is a possibility of getting infected with the people suffering from various disease. To address the issue, a system is to be developed for proper sanitization without manual involvement	SDG 3	GOOD HEALTH AND WELL BEING
DEV DIXIT ARJUN SOROUT	SMART STREET LIGHT SYSTEM		SDG 7	
MOHIT NARANG HIMAIN SHARMA				
NITIN KUMAR AYUSH SHARMA	LINE FOLLOWER ROBOT	The Line Follower Robot Project aims to demonstrate the capabilities of autonomous robotics in tasks such as logistics, surveillance, and automated guided vehicles, while also serving as an educational tool for students and hobbyists	SDG 4 SDG 9 SDG 12 SDG 13 SDG17	

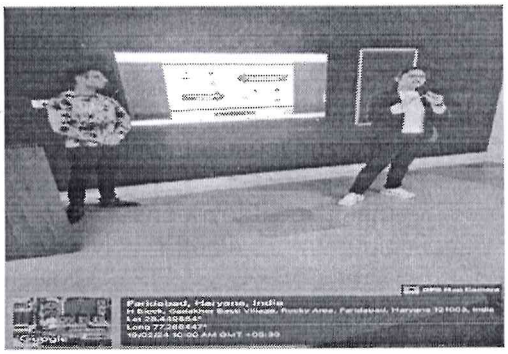
Assessment: Presentations & Viva

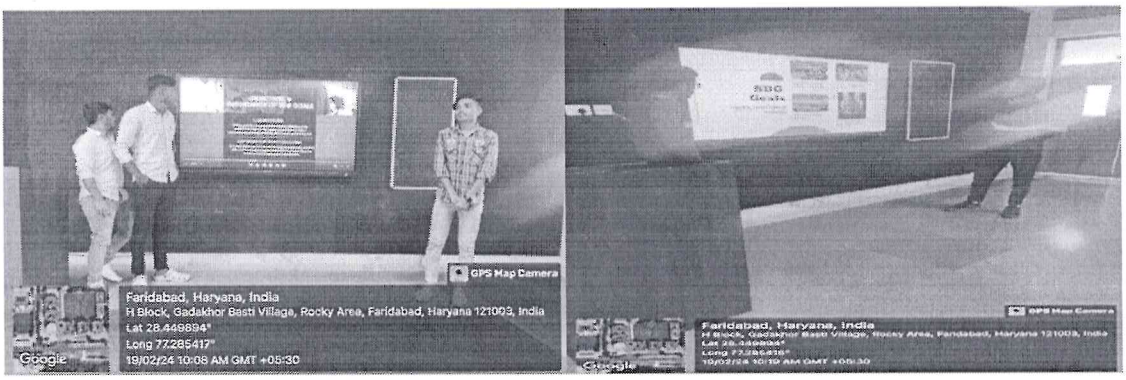
- Assessment based on hands-on tasks, gauging precision in circuit construction, adept problem-solving, and adaptability to experimental situations concerning Clipper and Clamper circuits.
- Evaluation of active involvement in collaborative endeavors, such as peer teaching, group discussions, and problem-solving. Effective communication, teamwork, and peer engagement were pivotal.
- Review of presentations summarizing discoveries, hurdles, and resolutions encountered during practical exercises. Criteria encompassed clarity of content, depth of comprehension, and proficiency in conveying intricate concepts.
- Photographs of the Student Presentation.

Some Glimpses:

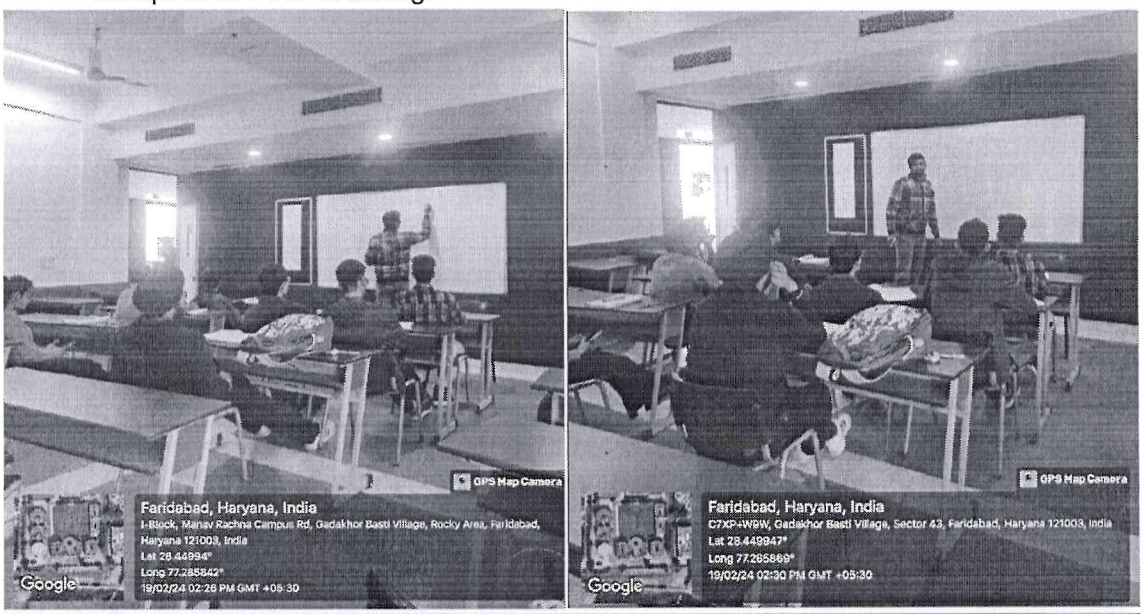
- Glimpses of Collaborative & Flipped Class Room Teaching:

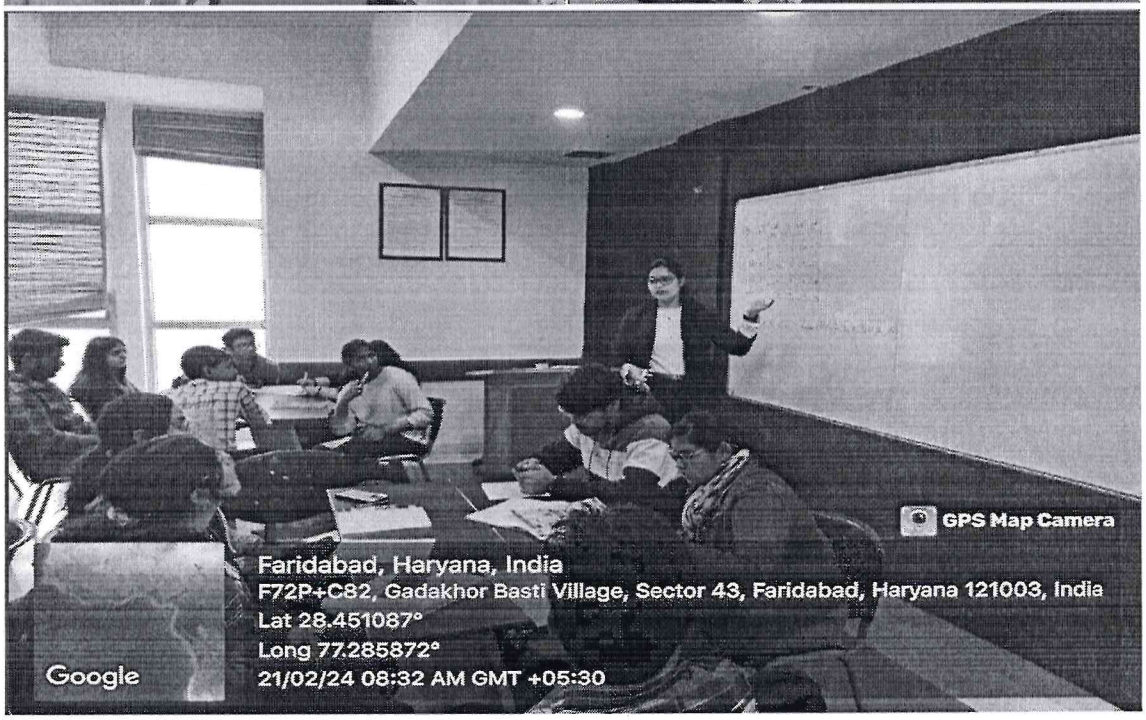




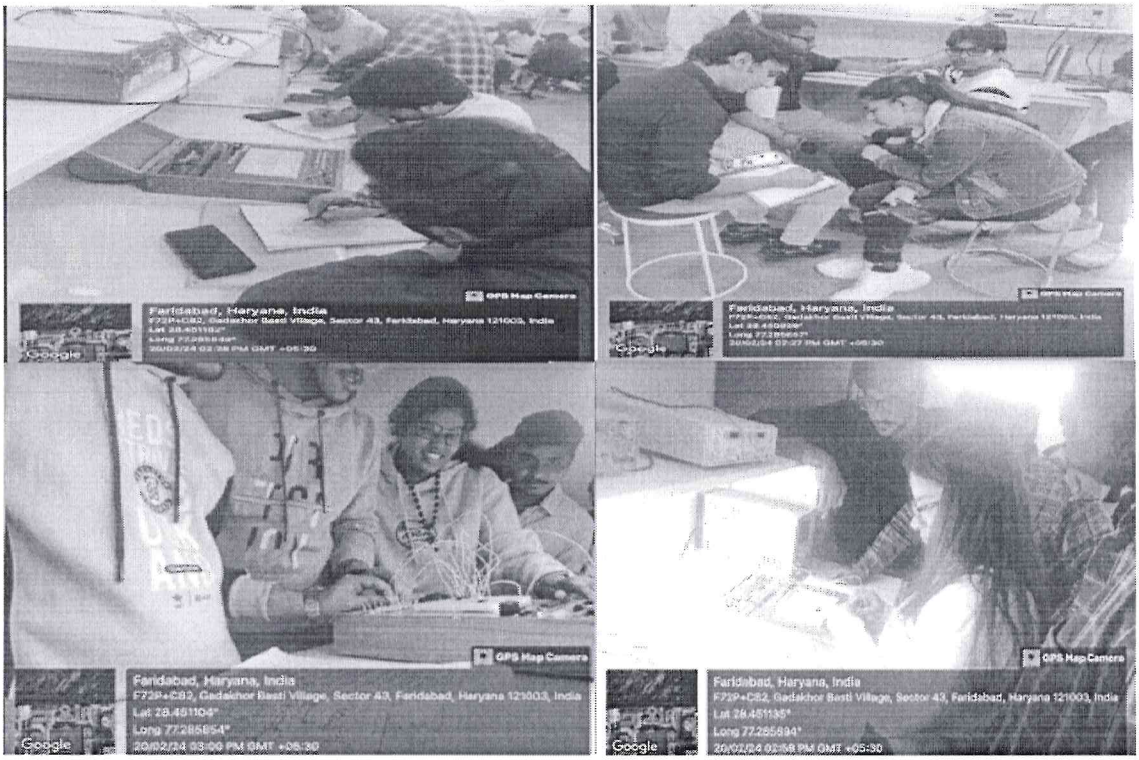


- Glimpses of Peer Teaching:

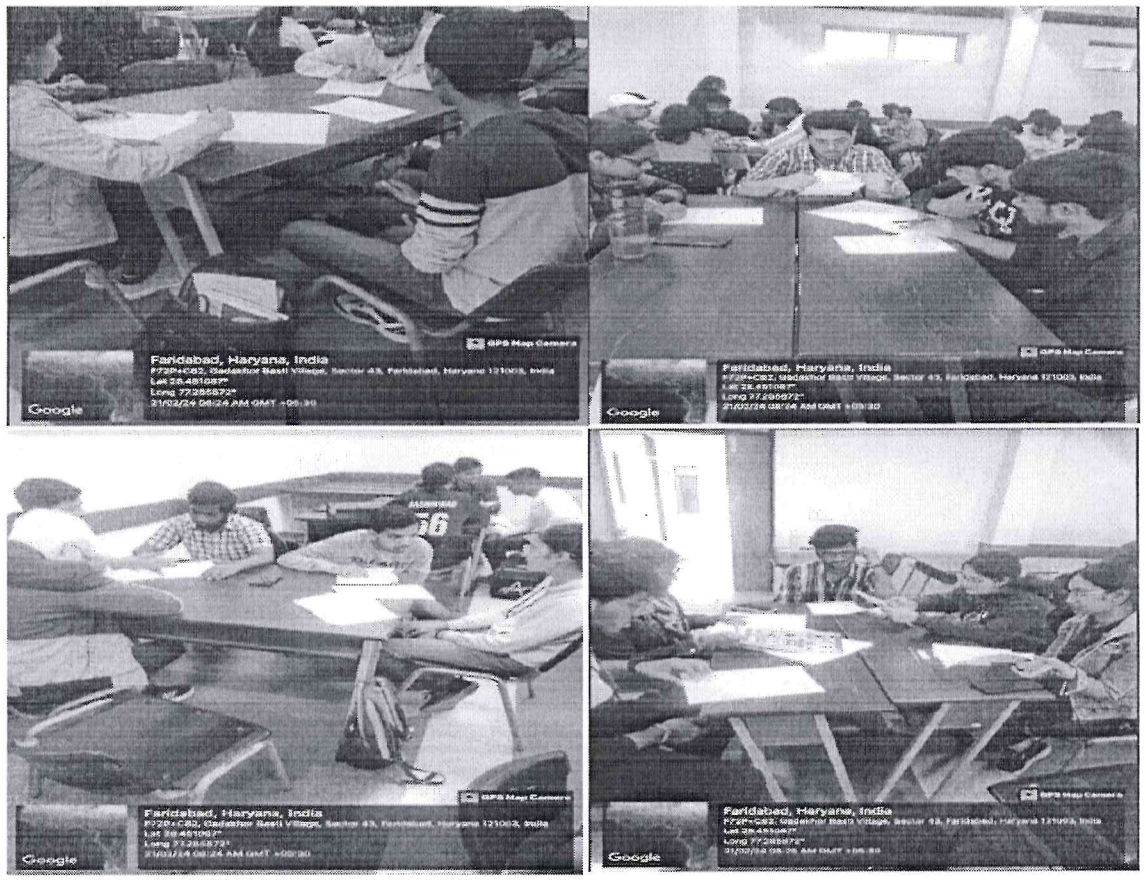




- Glimpses of Experiential Learning:

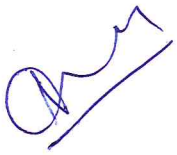


- Glimpses of Cooperative Learning:



PEDAGOGIES USED FOR FUNDAMENTAL OF DIGITAL ELECTRONICS (ECH223BT-P)

Program Name	B.Tech CSE
Year/Semester	4th
Faculty Name	Dr. Nitika
Course Title/Code	**ECH223BT-P**
L-T-P/ Course Credits	3-1-2
Teaching Pedagogy Used	Classroom Teaching Collaborative, Experiential learning, Flipped Class room, Cooperative and Peer teaching



School of Engineering
Department of Electronics and Communication Engineering

Course Name/Code: Fundamentals of Digital Electronics/ECH223B-T/P

Class / Semester: CSE/AIML/CDFD/CSTI-4th

Pedagogy: Collaborative, Experiential learning, Flipped Class room, Cooperative and Peer teaching.

Objective: To enhance the effectiveness of instruction, facilitate meaningful learning experiences, impart knowledge, cultivate comprehension, and promote critical thinking skills among learners through different pedagogies. Activities related to cooperative learning, experiential learning, and peer teaching help to promote active engagement, deepen understanding, develop essential skills, and help positive social interactions among students.

Working in groups encourages students to analyze information censoriously, evaluate different perceptions, and make ideas to solve problems.

Build a circuit: All the necessary parts for building digital circuits were given to each group, encouraging practical experience learning. By actively building circuits, students promoted teamwork and the application of their academic knowledge in real-world settings. They collaborated to develop circuits and jointly troubleshooted any problems, bringing their collective knowledge to practical situations. To increase their comprehension, they recorded and examined their findings.

Outcomes:

- Hands-on experiences for a thorough understanding
- Strengthened problem-solving abilities
- Development of effective communication and teamwork
- Application of theoretical knowledge in practical scenarios

Project based learning:

Objective: To give students the opportunity to develop knowledge and skills through engaging projects set around challenges and problems they may face in the real world.
It helps to identify a real-time problem and provide a solution

Outcomes:

- Choose appropriate project topics
- Understand and analyze project documentation effectively.

- Effective planning
- Platform for self-expression
- Explore and thrive for software projects

Blended Learning

Blended learning combines classroom teaching with online learning modules, creating a flexible and dynamic learning environment. Students completed a course on digital electronics through Infosys Springboard.

Outcomes:

- It allows students to access course materials and resources online at their own pace and convenience.
- Blended learning leverages technology to enhance the learning experience.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The certificate is awarded to

Garima Pandey

for successfully completing the course

Digital Electronics- Online Digital Electronics Courses

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Congratulations! You make us proud!

Thirumala Arohi
Senior Vice President and Head
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The certificate is awarded to

Anuj singh

for successfully completing the course

Digital Electronics- Online Digital Electronics Courses

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Senior Vice President and Head
Education, Training and Assessment (ETA)
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COURSE COMPLETION CERTIFICATE

The certificate is awarded to

Vibhor Sharma

for successfully completing the course

Digital Electronics- Online Digital Electronics Courses

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Senior Vice President and Head
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Senior Vice President and Head
Education, Training and Assessment (ETA)
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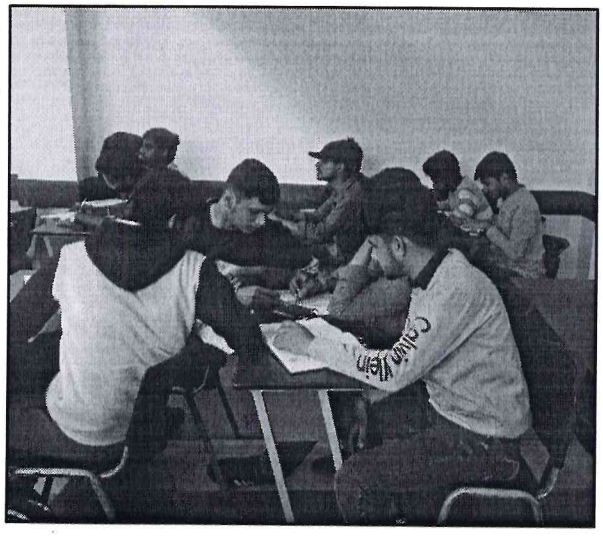
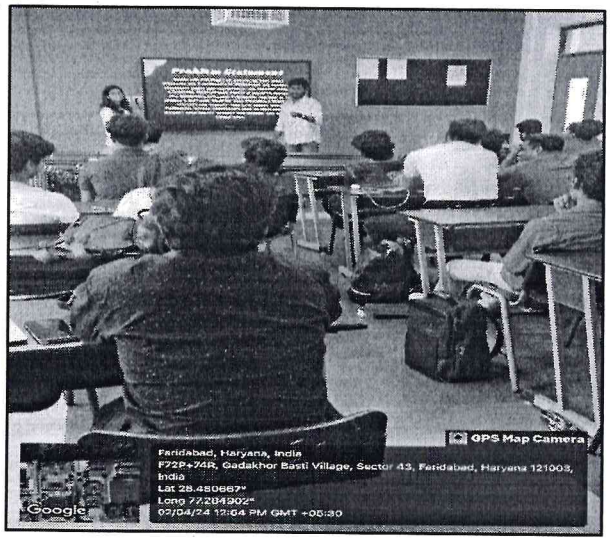
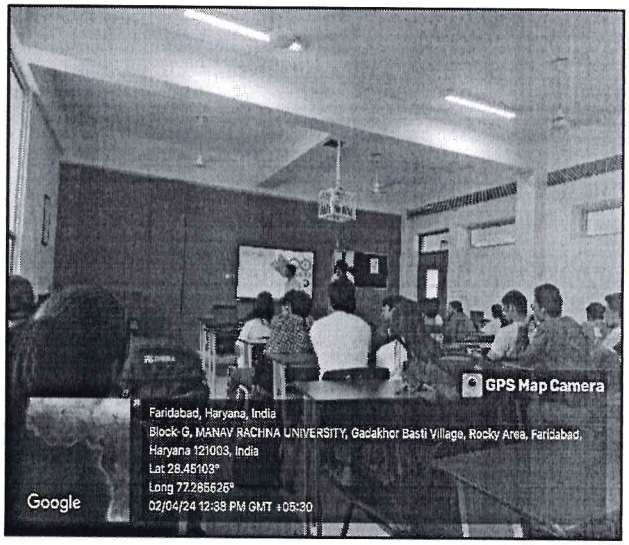
Some Glimpses:

- Glimpses of Cooperative Learning:

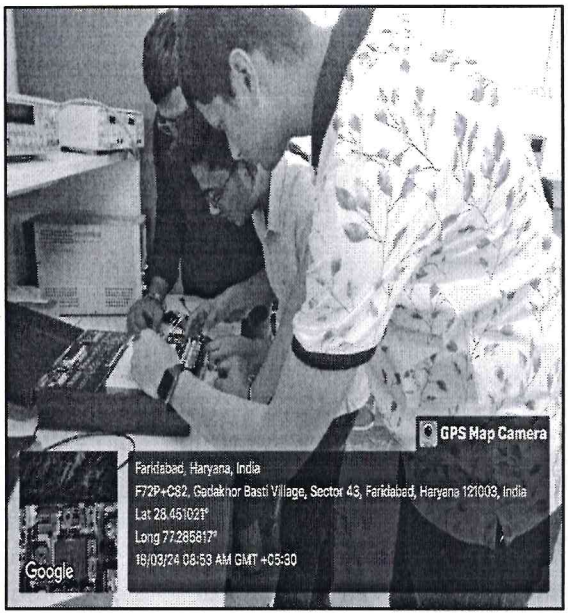


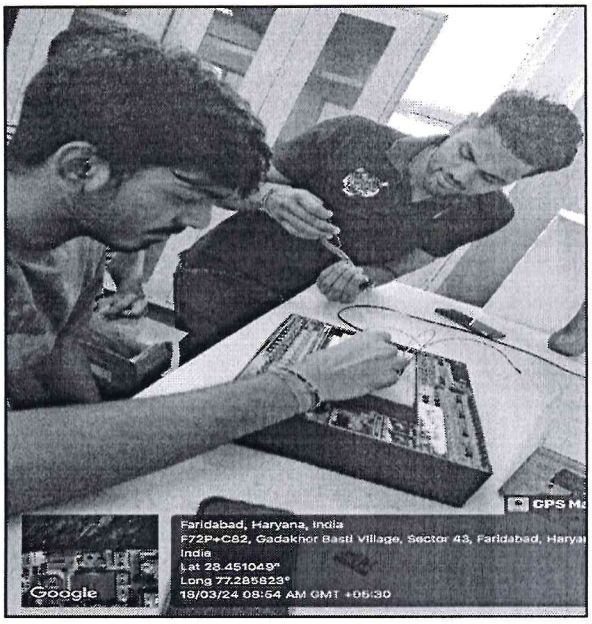
- Glimpses of Collaborative & Flipped Class Room Teaching:

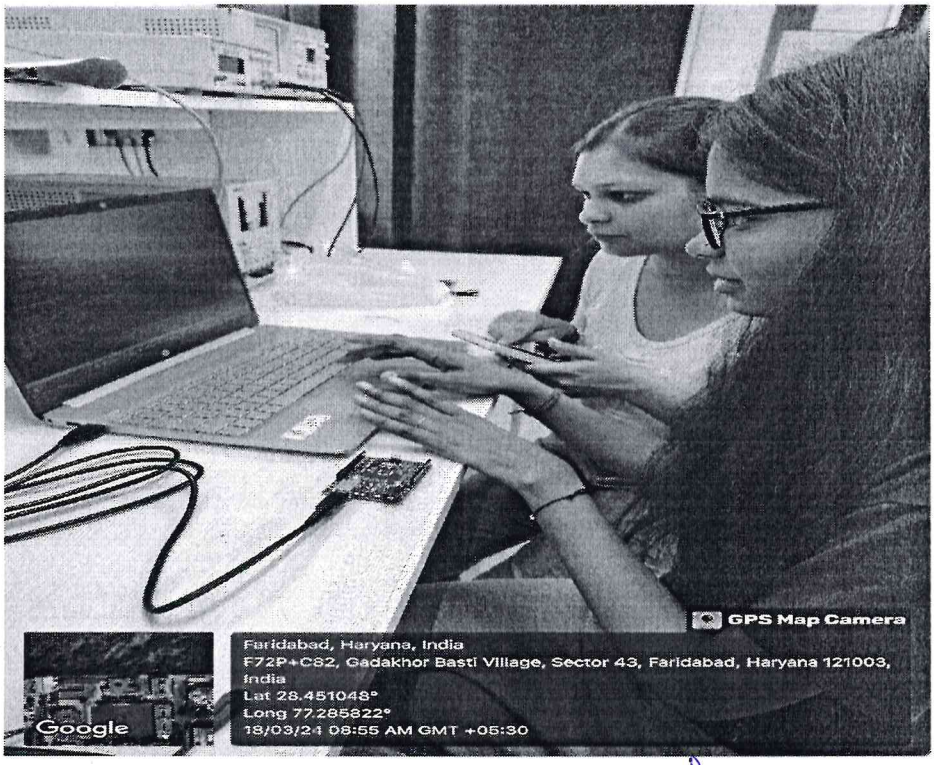




- Glimpses of Experiential Learning:







Conclusion:

Students participated in Event Tech Showcase(an event to showcase their project). Certifocates attached) and one group with team name **Proper 12** won 1st position with **project name Hand Gesture Controlled PC.**

One of the group of students filed for patent with project name Rain Detector alarm.


MANAV RACHNA UNIVERSITY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

OF PARTICIPATION

AWARDED TO :

AALEKH KUMAR

FOR PARTICIPATING IN THE COMPETITION " TECH SHOWCASE" ORGANISED BY THE DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ON 28TH OF MARCH , 2024.

Dr. Shruti Vashist — Dr. Meenakshi Gupta — Mr. Bhanu Pratap Chaudhary

Certificate No. ECE/MAR24/830


MANAV RACHNA UNIVERSITY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

OF PARTICIPATION

AWARDED TO :

MALLIKA

FOR PARTICIPATING IN THE COMPETITION " TECH SHOWCASE" ORGANISED BY THE DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ON 28TH OF MARCH , 2024.

Dr. Shruti Vashist — Dr. Meenakshi Gupta — Mr. Bhanu Pratap Chaudhary

Certificate No.ECE/MAR24/026


CERTIFICATE

OF ACHIEVEMENT

AWARDED TO :

MARK , ANKIT , CHIRAG (TEAM - Proper 12)

FOR WINNING **FIRST POSITION** IN THE COMPETITION " TECH SHOWCASE" ORGANISED BY THE DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING ON 28TH OF MARCH , 2024.

Dr. Shruti Vashist
DEAN ACADEMICS , MRU

Dr. Meenakshi Gupta
ASSOCIATE HEAD, ECE

Mr. Bhanu Pratap Chaudhary
FACULTY COORDINATOR

PEDAGOGIES USED FOR VLSI DESIGN (ECH209B)

Program Name	B.Tech ECE
Year/Semester	4th
Faculty Name	Bhanu Pratap Chaudhary
Course Title/Code	**ECH209B**
L-T-P/ Course Credits	3-0-0
Teaching Pedagogy Used	Project Based Learning

SCHOOL OF ENGINEERING

Department of Electronics and Communication Engineering

VLSI DESIGN -IV sem -ECH209B

Project-based learning in VLSI design provides an effective way for students to grasp fundamental concepts while applying them in practical contexts. By undertaking projects such as designing simple digital circuits or creating basic logic gates, students gain hands-on experience with VLSI design tools and methodologies. Through these projects, they learn how to navigate Tanner EDA design software, analyze circuit behavior, and troubleshoot common issues. Moreover, project-based learning fosters creativity and problem-solving skills as students work independently and in teams to complete their designs. This approach not only solidifies theoretical knowledge but also builds confidence and enthusiasm for further exploration in VLSI design. Overall, project-based learning in VLSI design for basic study offers a dynamic and engaging way to introduce students to the fascinating world of semiconductor technology. The list of projects done by the students is attached herewith.

Group No	Roll No.	Name of Student	Problem Statement
1	2K22ECUN03013	Shaina Dass	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 2-NAND 3. Full adder
	2K22ECUN03006	Lovanya	
2	2K22ECUN03003	Aryan Singh Chauhan	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 3-NAND 3. D Flip Flop
	2K22ECUN03014	Shivam Kumar Meena	
	2K22ECUN03008	Nishchay Raj	
	2K22ECUN03015	Tushar Suhag	
3	2K22ECUN03007	Naman Verma	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 2-OR 3. Half Substractor
	2K22ECUN03011	Rohan Sharma	

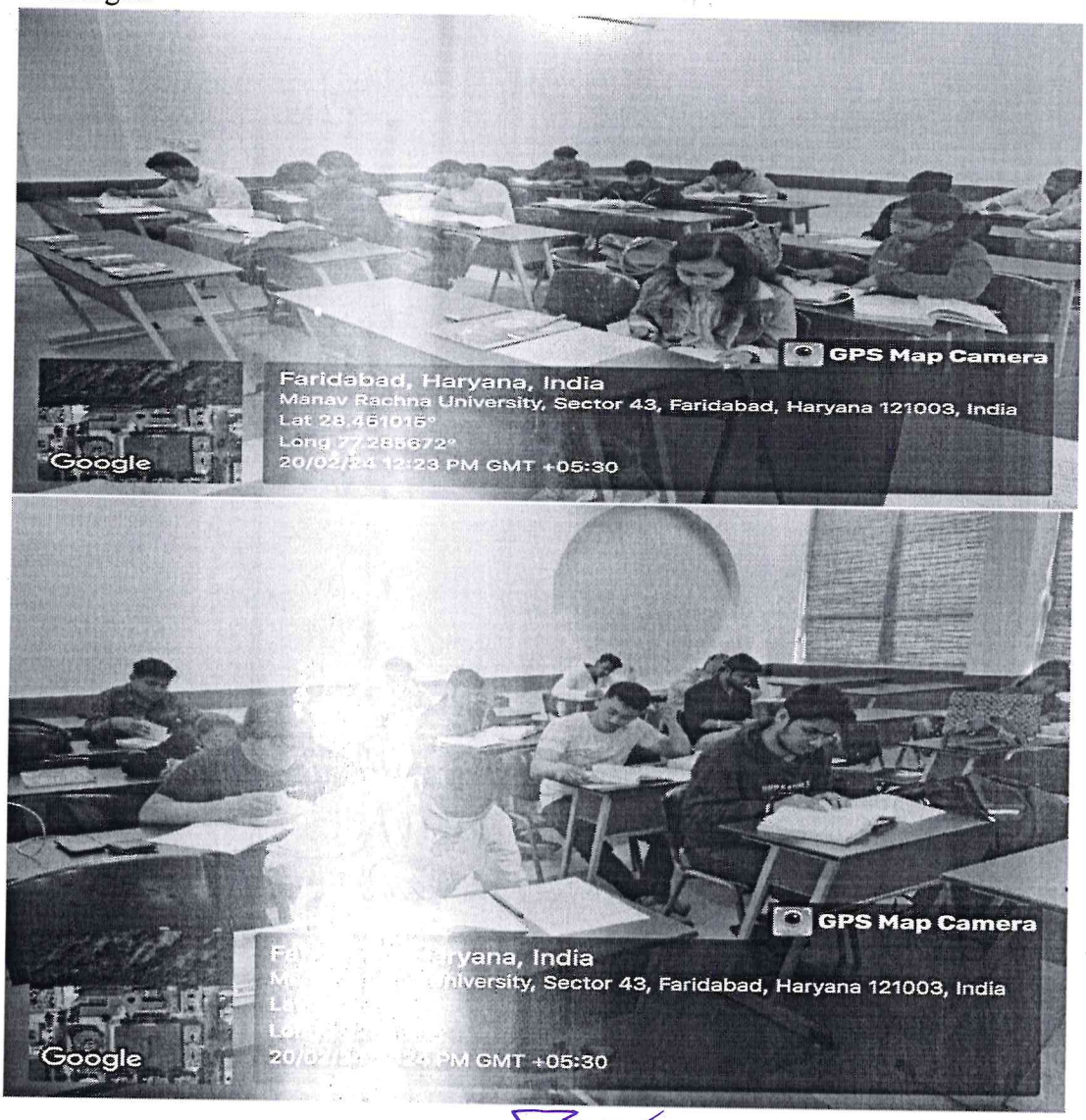
4	2K22ECUN03009	Prawar Aswal	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 3-NOR 3. D Flip Flop
	2K22ECUN03010	Rama Krishna Reddy	
	2K22ECUN03004	Deenisanaala Tagore Sanjay	
5	2K22ECUN03001	Anuj Sharma	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 2-AND 3. Half Adder
	2K22ECUN03002	Arun Rana	
6	2K22ECUN03005	Ishpreet Kaur	Design and simulate the following using CMOS inverter circuit using Tanner EDA, ensuring 5V supply voltage. Calculate delay and power consumption of each schematic. 1. CMOS Inverter 2. 2-NOR 3. Full Substractor
	2K22ECUN01003	Sandeep Gupta	

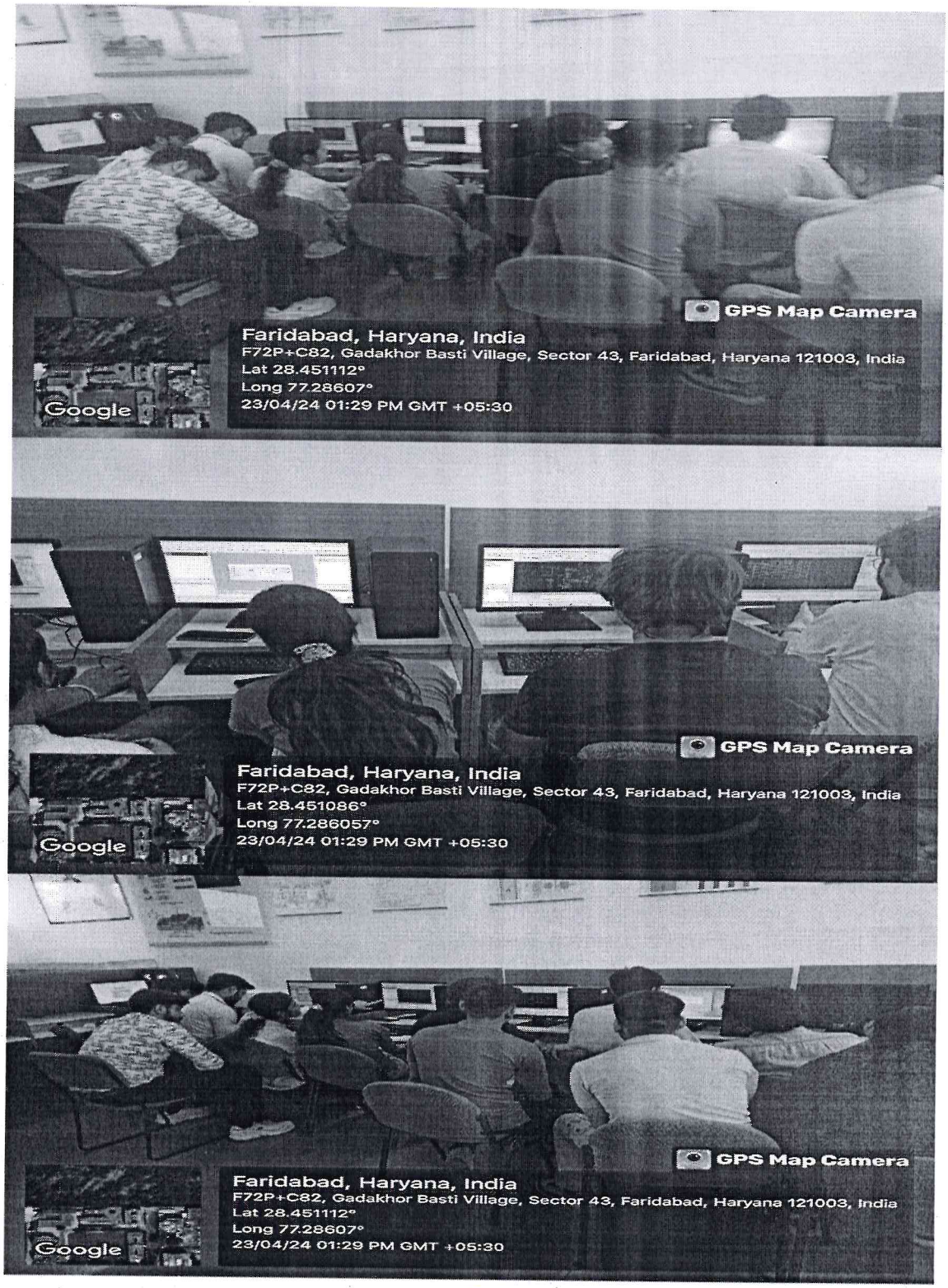
Outcome

Based on the projects developed by students in the this course, the following outcomes can be observed

- Students gain a deeper understanding of VLSI design concepts by applying them in basic projects. This hands-on approach allows them to see theoretical principles in action, reinforcing their learning.
- Through project-based learning, students develop practical skills in using Tanner Eda for VLSI design tools, analyzing circuits, and problem-solving. These skills are essential for success in both academic and professional settings.
- Engaging in projects encourages students to think creatively and innovatively to solve design challenges. This creates an environment where new ideas and approaches are encouraged and explored.
- Working on projects in teams promotes collaboration and communication skills among students. They learn to effectively communicate ideas, divide tasks, and work together towards a common goal.
- Simulation-based study allows students to visualize and simulate the behavior of VLSI circuits before actual implementation. This provides a deeper understanding of circuit functionality and performance characteristics, complementing the hands-on experience gained through projects.
- Exposure to simulation-based study prepares students for real-world applications of VLSI design, where simulation tools are commonly used in industry for pre-silicon validation, verification, and performance analysis. Familiarity with simulation techniques equips students with valuable skills applicable to future academic and professional endeavors in the field.
- Open-book tests prompt students to engage in critical thinking and problem-solving as they navigate complex VLSI design scenarios. Rather than relying solely on

memorization, students must analyze questions, assess available resources, and formulate reasoned responses, mirroring the cognitive demands of real-world design challenges.

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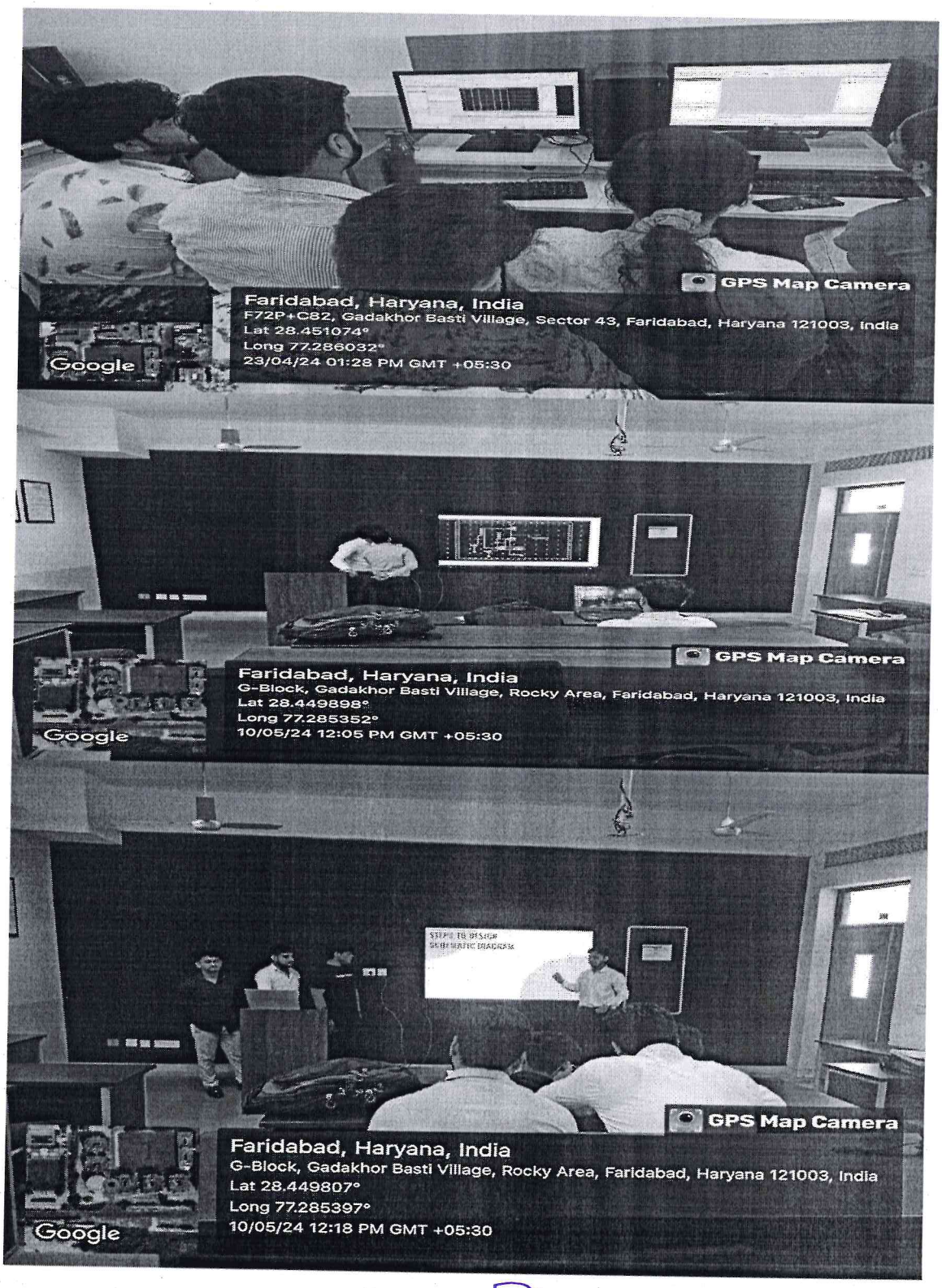
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Faridabad, Haryana, India
G-Block, Gadakhor Basti Village, Rocky Area, Faridabad, Haryana 121003, India
Lat 28.449898°
Long 77.285352°
10/05/24 12:05 PM GMT +05:30
Google
GPS Map Camera
Faridabad, Haryana, India
G-Block, Gadakhor Basti Village, Rocky Area, Faridabad, Haryana 121003, India
Lat 28.449807°
Long 77.285397°
10/05/24 12:18 PM GMT +05:30
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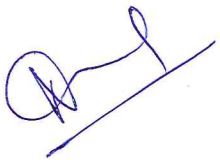
PEDAGOGIES USED FOR MICROPROCESSOR & INTERFACING(ECH215B-T)

Program Name	B.Tech ECE/VLSI
Year/Semester	4th
Faculty Name	Dr. Nitika
Course Title/Code	**ECH215B-T**
L-T-P/ Course Credits	3-0-2
Teaching Pedagogy Used	Classroom Teaching/ Collaborative Learning



PEDAGOGIES IMPLEMENTED AND OUTCOMES

Collaborative Learning:

Collaborative learning emphasizes on active participation, interaction, and collaboration among students. It involves students working together in groups to solve problems, exercises and also explain topics to each other in case any student is not completely through with it.

Outcomes:

- By engaging in collaborative activities, students can gain a deeper understanding of control systems concepts. Through discussions, debates, and peer teaching, they can clarify their doubts and reinforce their learning.
- Collaborative learning requires students to communicate effectively with their peers. They learn to articulate their thoughts, explain concepts, and justify their reasoning, which are essential skills in the field of electronics and beyond.
- Collaborative learning helps students develop teamwork skills.