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Report on Extra-Curricular activities done as a part of

ACXC123N: Robotics For Engineers

Submitted by

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Register Number: 23BCE0291

To

Professor Name: Dr. BRISILLA R M

Fall Semester, 2024-2025

S. No	Event & Activities Name	Date	Hours Spent	Page No.
1	Electronics Decoded	08/01/2025	2.5	3
2	Arduino Made Easy	17/01/2025	2.5	4
3	RPI Fundamentals	15/02/2025	2.5	5
4	Foundation of Fusion 1.0	11/03/2025	2.5	6
5	Foundation of Fusion 2.0	12/03/2025	2.5	7
6	NLP and Robotic Systems	13/03/2025	2.5	8
7	Control Systems with PID	29/03/2025	2.5	9
8	Prototyping with PCB's	30/03/2025	2.5	10
9	Simulating Reality with ANSYS	31/03/2025	2.5	11
10	Python and MATLAB	20/12/2024	10	12
11	Programming in C and Data Structures and Algorithms	25/12/2024	10	12
12	Kinematics	23/01/2025	10	12
13	Manufacturing Processes and Materials	06/02/2025	10	13
14	Final Assessment Test	05/04/2025	3	13
15	Project	18/04/2025	48	
16	Report preparation		5	
		Total Hours	**118.5**	

Description of Events/Activities

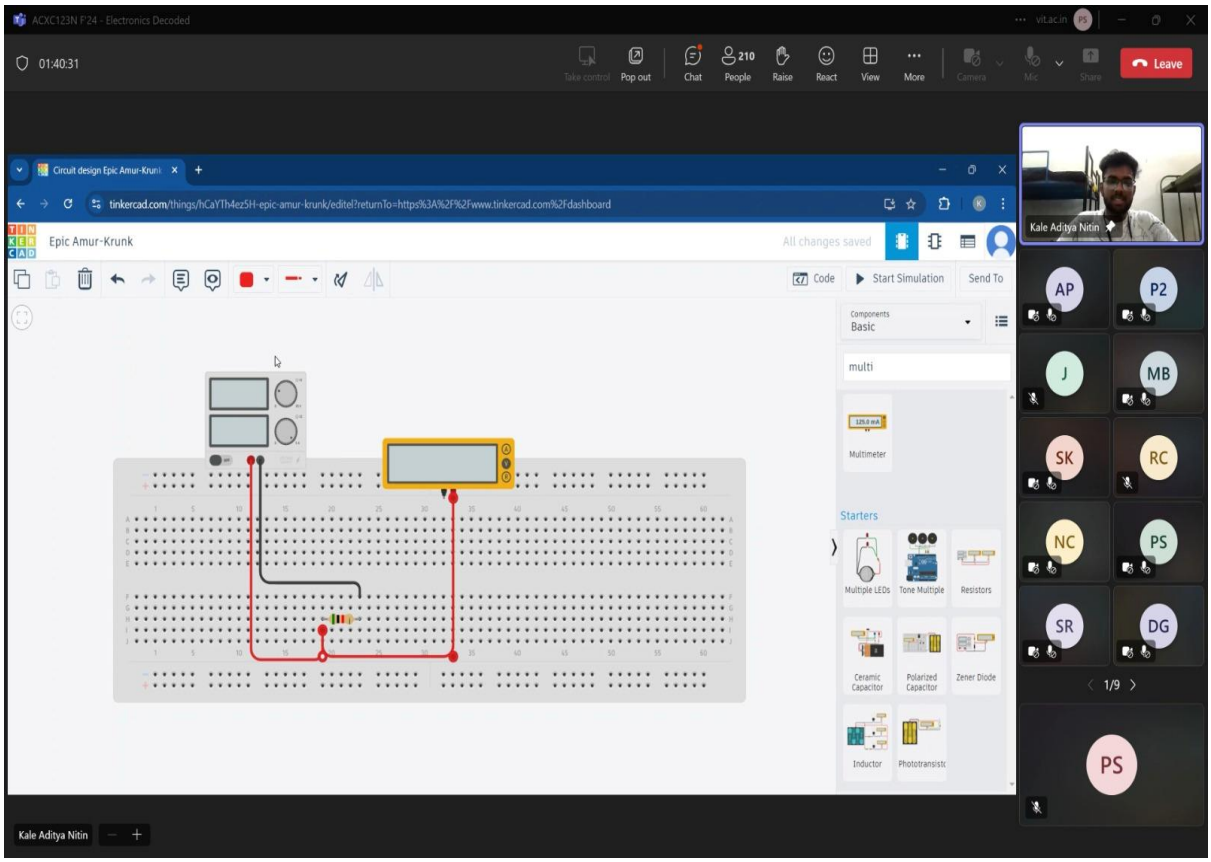
1. Electronics Decoded

Date: 8th January 2025

Number of Participants: 277

EVENT COMPLETION SUMMARY:

The event "Electronics Decoded" was successfully conducted on 8th January 2025 on Microsoft Teams, starting at 9 PM. Organized by RoboVITics, the session aimed to simplify key electronics concepts and provide hands-on learning. It covered topics such as basic electronic components, the use of breadboards, and the functions of resistors, potentiometers, and pull-up and pull-down resistors. Participants also learned about logic gates and their importance in digital electronics, as well as actuators like rotary and linear types with applications in robotics and automation. The session included a hands-on activity using Tinkercad, where participants designed and simulated circuits, making the experience interactive and practical. The event also featured a quiz to engage participants and a Q&A session for clearing doubts. The event was well-organized and provided valuable knowledge, encouraging participants to explore the field of electronics further.



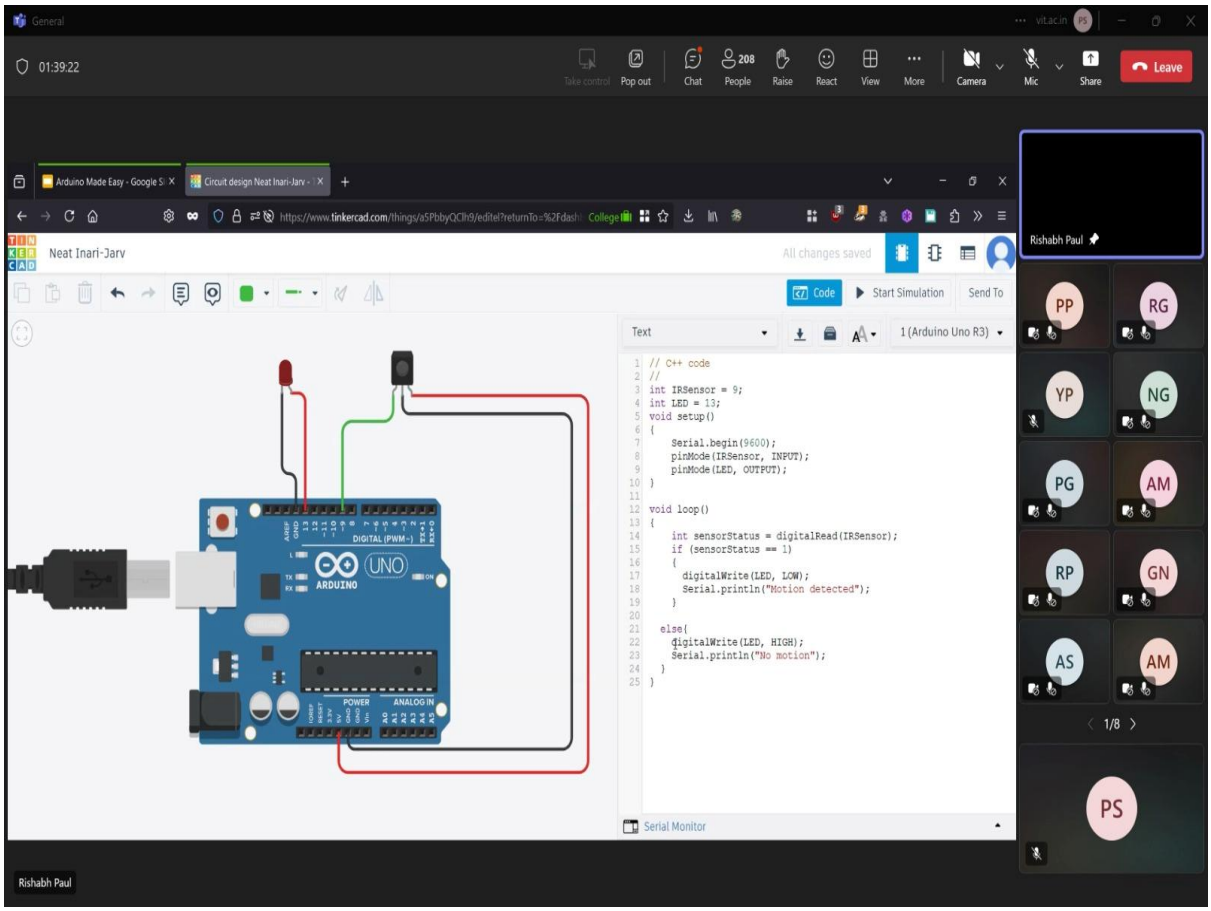
2. Arduino Made Easy

Date : 17th January 2025

Number of Participants: 232

EVENT COMPLETION SUMMARY:

On 17th January 2025, RoboVITics conducted "Arduino Made Easy" online via Microsoft Teams at 9 PM. The session aimed to simplify microcontroller concepts and introduce participants to the Arduino platform. It began with an overview of microcontrollers, their architecture, and applications, followed by an introduction to Arduino Uno, its features, and its role in robotics. Participants explored key concepts like pulse-width modulation (PWM) for creating analog-like outputs from digital signals. Practical examples included a blinking LED to demonstrate digital output control and a fading LED to illustrate brightness adjustment using PWM. Using Tinkercad, participants simulated a blinking LED, designed a fading LED, worked with an ultrasonic sensor for distance measurement, a TMP36 sensor for temperature reading, and experimented with an infrared sensor for object detection. The session concluded with a quiz and Q&A, encouraging attendees to explore microcontroller projects.



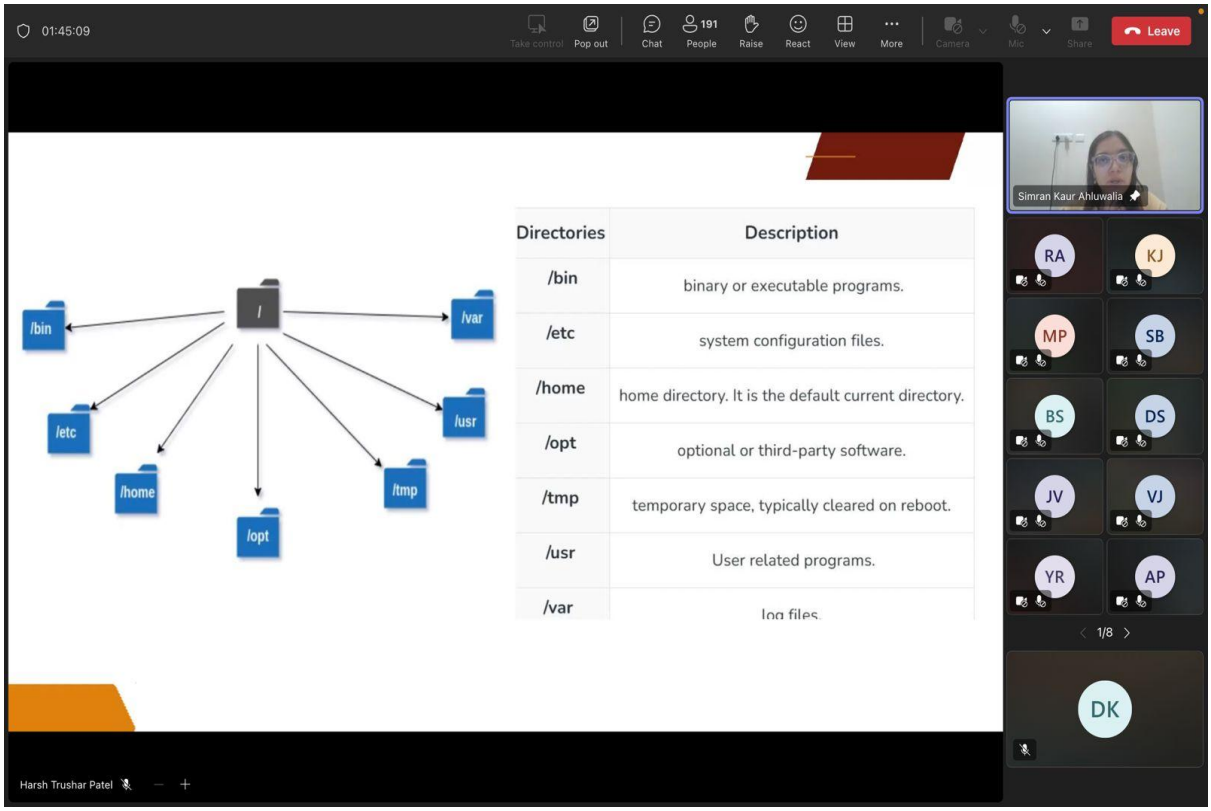
3. RPI Fundamentals

Date : 15th February 2025

Number of Participants: 236

EVENT COMPLETION SUMMARY:

On 15th February 2025, RoboVITics conducted "RPI Fundamentals" online via Microsoft Teams at 9 PM. The session aimed to simplify microcomputing concepts and introduce participants to the Raspberry Pi platform. It began with an overview of how Raspberry Pi works, its architecture, and top models, including a deep dive into the Raspberry Pi 5. Participants also explored real-world applications, the Pi OS, and the Linux file structure to understand system organization. The session then moved on to a hands-on demonstration of Raspberry Pi setup. Using Raspberry Pi Imager, participants learned how to flash the OS onto an SD card while enabling SSH. They then used Angry IP Scanner to identify the Pi's network IP and accessed it remotely through SSH. The next step involved enabling the VNC server, allowing participants to interact with the Pi's GUI wirelessly using RealVNC Viewer.



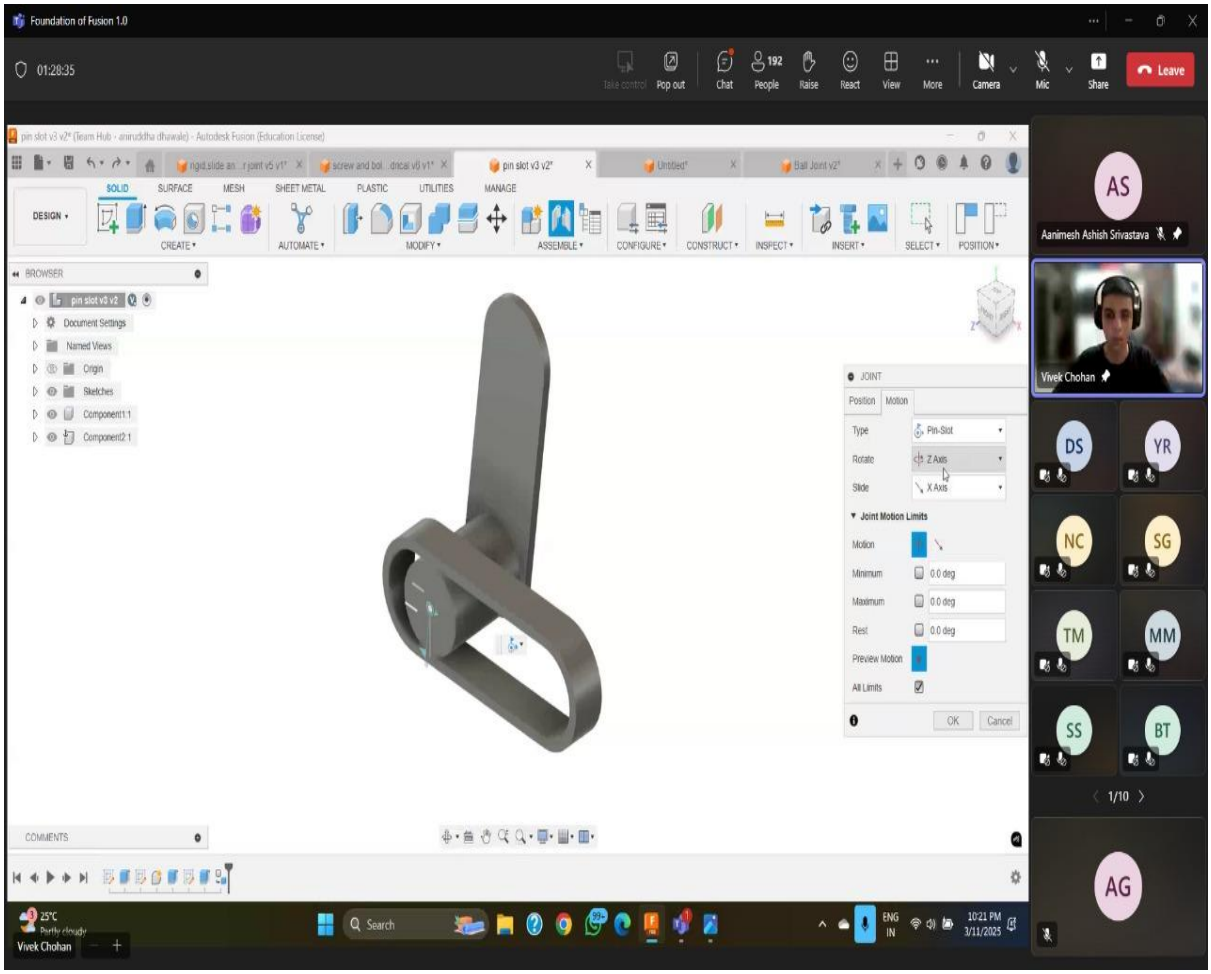
4. Foundation of Fusion 1.0

Date : 11th March 2025

Number of Participants: 191

EVENT COMPLETION SUMMARY:

This session provided a hands-on introduction to the basics of Fusion 360, focusing on 3D design and robotic fabrication. Participants learned fundamental CAD concepts, including interface navigation and essential modeling tools like Sketch, Extrude, Fillet, and Revolve. The session emphasized practical applications in robotics, enabling attendees to design and develop precise 3D models for robotic components and structures.



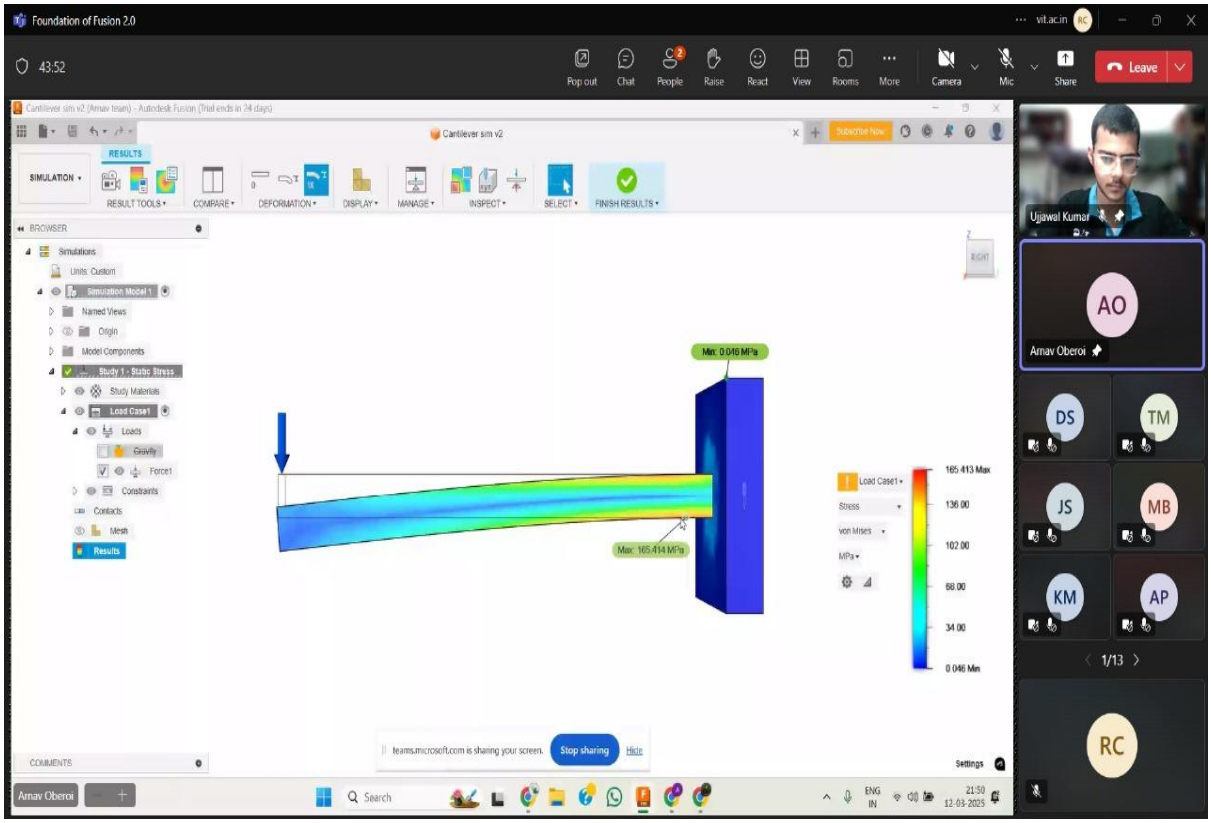
5. Foundation of Fusion 2.0

Date : 12th March 2025

Number of Participants: 235

EVENT COMPLETION SUMMARY:

The Fusion 360 session on March 12th immersed participants in advanced robotics design tools. The session commenced with detailed rendering instruction, covering realistic material application, scene adjustments, and cloud/local rendering distinctions. Animation techniques, essential for showcasing robotic motion, were then explored including keyframe animation and dynamic motion simulations. This allowed for compelling demonstrations of robotic functionality. A significant focus was placed on simulation and analysis, vital for robust robotic designs. Material selection, constraint application, and Factor of Safety (FOS) analyses were emphasized, ensuring structural integrity and informed design decisions. The session aimed to cover most of Fusion 360's tools, including advanced analysis and visualization, providing a comprehensive understanding of its potential for robotics design and concluded with a quiz based on the very same.



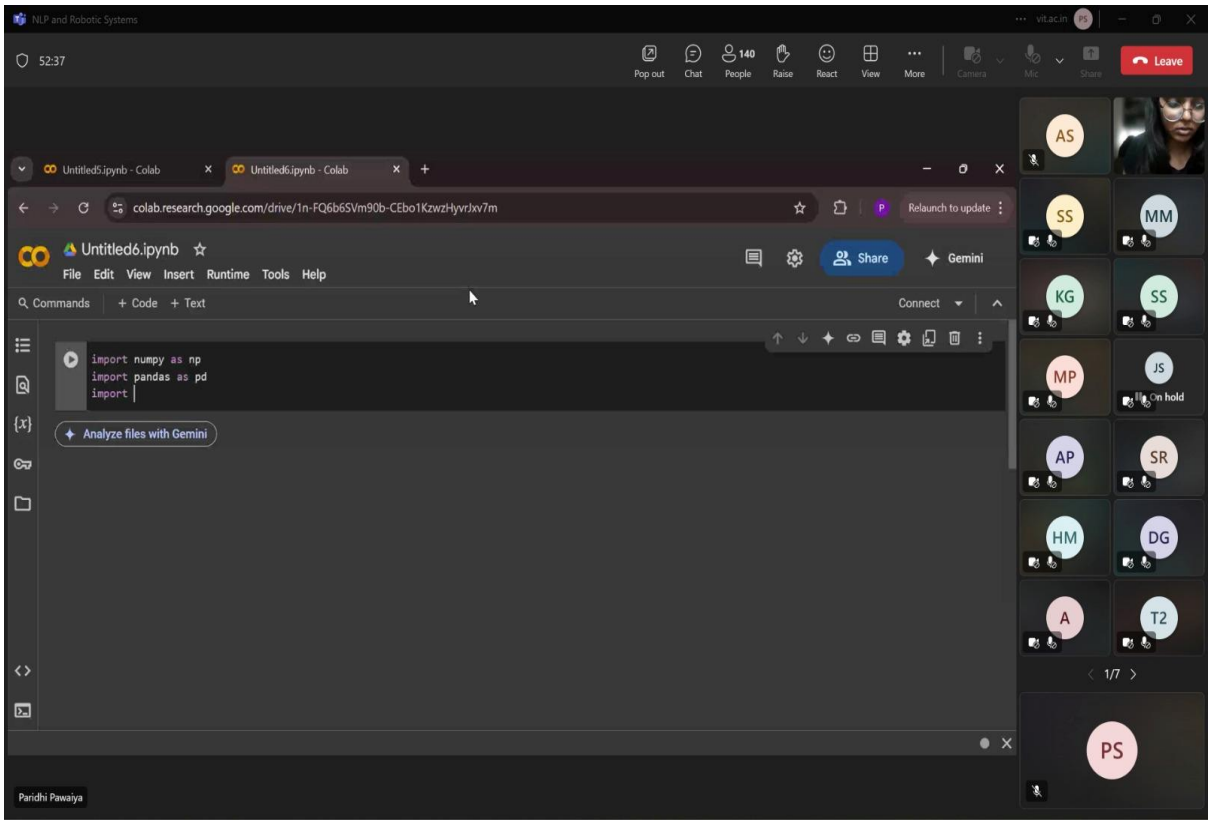
6. NLP and Robotic Systems

Date : 13th March 2025

Number of Participants: 234

EVENT COMPLETION SUMMARY:

This 1.5-hour session covered Natural Language Processing (NLP) and its core techniques, with a brief discussion on its potential applications in fields like robotics. The session explained tokenization, which breaks text into words, and the Bag of Words (BoW) model, which represents text as word frequency counts. Word embeddings were introduced to capture word meanings through numerical vectors. The practical demonstration involved loading a .tsv dataset, followed by text cleaning using regex, stopword removal, and stemming to prepare data for machine learning. The session further introduced the participants on how to convert the text into numerical features using CountVectorizer, and the split the selected data using train_test_split. A Logistic Regression model was trained to classify reviews as positive or negative, and its performance was evaluated using a confusion matrix and accuracy score, emphasizing the importance of precise text analysis in NLP tasks.



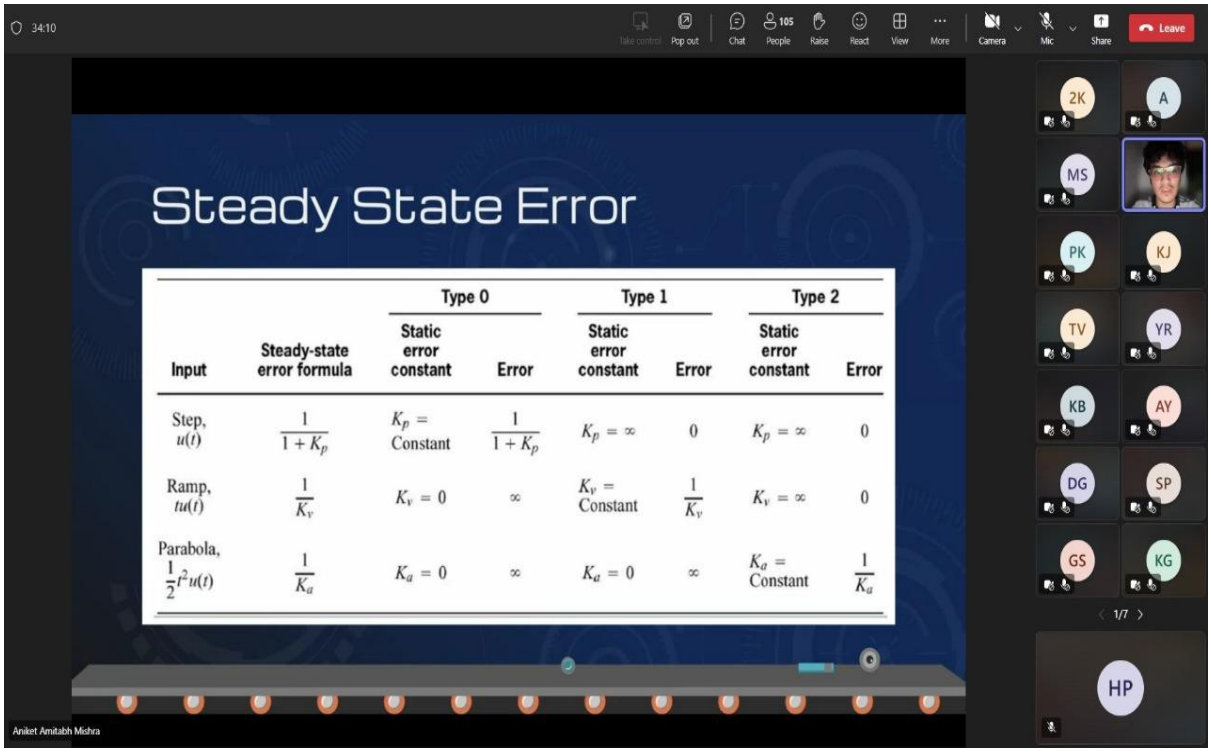
7. Control Systems with PID

Date : 29th March 2025

Number of Participants: 134

EVENT COMPLETION SUMMARY:

On 29th March 2025, RoboVITics conducted "Control Systems with PID" online via Microsoft Teams at 9 PM. The session introduced control system fundamentals, covering open-loop and closed-loop systems, transfer functions, and system responses, including first-order, second-order, and higher-order systems. Participants explored PID controllers, understanding proportional, integral, and derivative actions, along with tuning methods like manual tuning, Ziegler-Nichols, and auto-tuning algorithms to optimize performance and their application in robotics. The session also covered lead-lag circuits, explaining their role in improving system stability and response characteristics. The event concluded with a hands-on MATLAB Online session, where participants simulated PID control systems, analyzed their responses, and applied tuning techniques. A Q&A and quiz reinforced key concepts, ensuring practical learning and engagement.



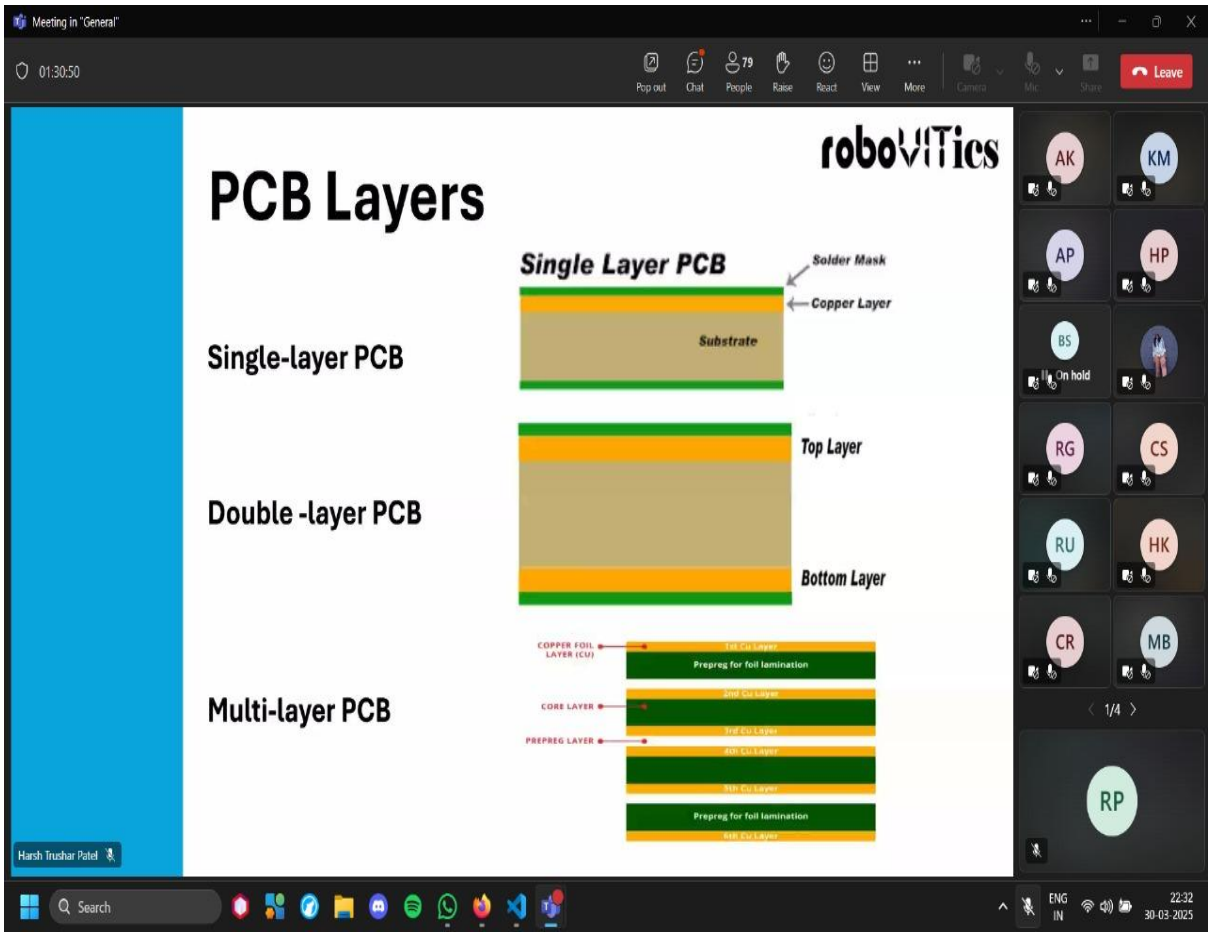
8. Prototyping with PCB's

Date : 30th March 2025

Number of Participants: 194

EVENT COMPLETION SUMMARY:

RoboVITics conducted "Prototyping with PCBs" online using Microsoft Teams on March 30, 2025, at 9:00 p.m. The session offered insights into PCB technology and design. Participants were introduced to PCB components, schematic design basics, and layout essentials like component placement, power planes, and trace routing. The importance of Rule Checks in ensuring correct designs was emphasized. The session explored the PCB manufacturing process including copper layer etching, solder mask application, and assembly techniques like surface-mount and through-hole technology. Quality control checks such as automated optical inspection and X-ray testing were also discussed, ensuring attendees understood how to maintain PCB reliability. Participants designed and simulated PCB layouts, applying learned concepts in a practical environment. The session ended with an interactive Q&A and quiz, fostering deeper interest in PCB prototyping and manufacturing.



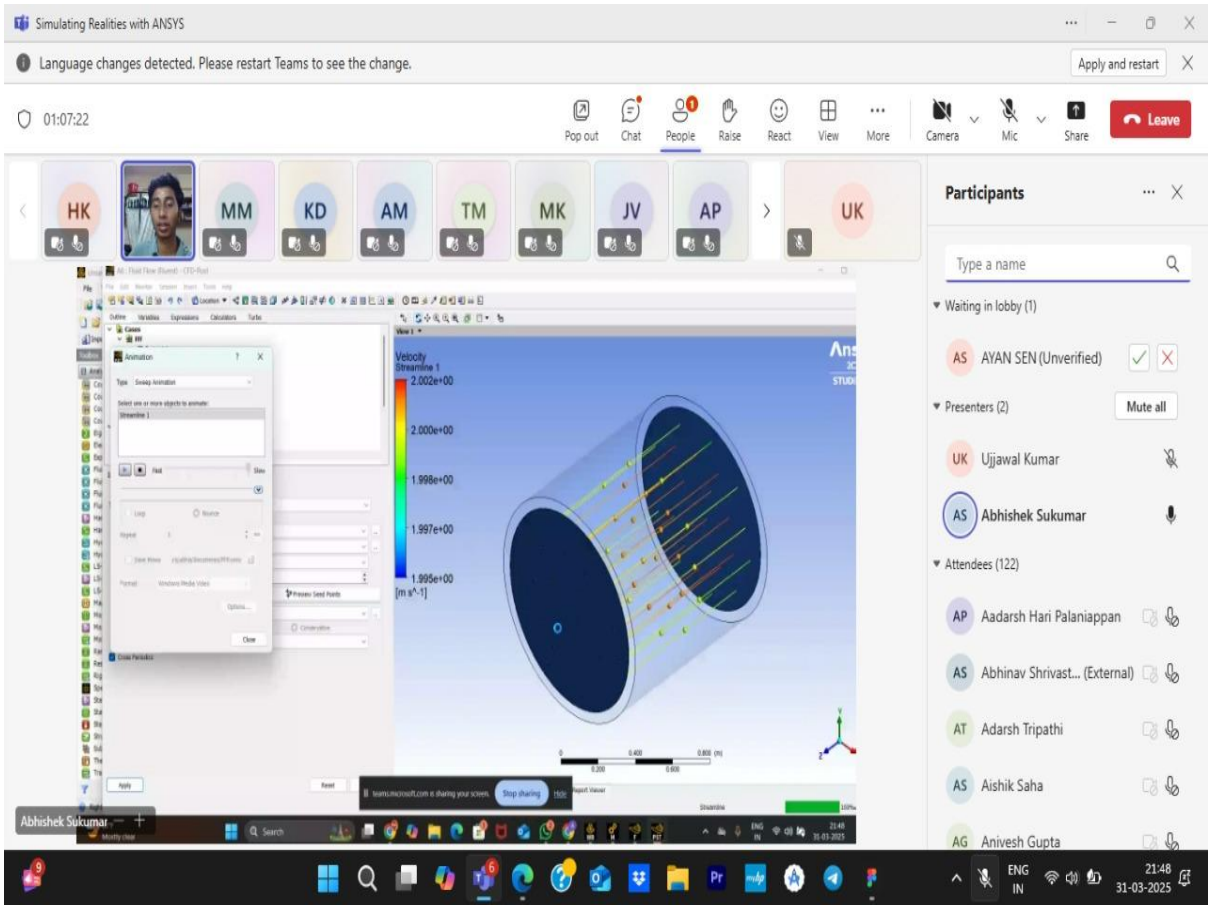
9. Simulating Reality with ANSYS

Date : 31th March 2025

Number of Participants: 201

EVENT COMPLETION SUMMARY:

At 9:00 p.m. on March 31, 2025, the RoboVITics conducted "Simulating Realities with ANSYS" online using MS Teams. Participants got the idea of how to down latest version of Ansys. They were given one line introduction about different types of CFD options. The session was about the Ansys Fluent(most common CFD simulation option). Where they were taught about the 5 steps to simulation. Participants were taught about, how to create a sketch(both 2-D and 3-D), which the first step in simulation. Next they were taught about Meshing. Wherein they had to divide their Geometry into elements and do Named Selections. Next they had gone through, Setup and Solution. Participants learned on how to apply boundary conditions, which model to select, how to initialize and how to select the required fluid. In the last, in the results, how to create Streamline and how to animate the streamline was taught. The session ended with a quiz, which was conducted to get them a better understanding in Ansys.



10. Python and MATLAB

Date : 20th December 2024

Number of Participants: 260

RoboVITics distributed a study material called 'Python and Matlab' covering various topics such as Basic Syntax and Functions in Python and Basic Operations and Control Statements in Matlab. The primary objective of the material was to assist beginners in learning these topics. Participants were required to read the material for a week and then take a quiz that covered all aspects of the material from basic to advanced concepts.

11. Programming in C and DSA

Date : 25th December 2024

Number of Participants: 260

RoboVITics distributed a study material named ‘C and DSA’ that covered various topics ranging from basic C to searching and sorting, and elaborated on linked lists, stacks, and queues. The primary aim of the material was to assist beginners in learning these topics. Participants were required to read the material for a week and then take a quiz that covered all aspects of the material, from basic to advanced concepts.

12. Kinematics

Date : 23rd January 2025

Number of Participants: 260

RoboVITics provided a study material called ' Kinematics' that covered topics such as Frames, Articulated Robots, translation and rotation of frames, combined transformations, inverse of transformation matrix, forward and inverse kinematics of robots, DH representation, and differential bots. The aim of the material was to assist beginners in learning these topics. Participants were expected to read the material for a week and take a quiz that tested their understanding of the material, covering both basic and advanced concepts.

13. Manufacturing Processes and Materials

Date : 6th February 2025

Number of Participants: 260

RoboVITics provided a study material called 'Manufacturing Processes and Materials' that covered topics such as Introduction to Manufacturing, Milling, Metal Casting, Materials for Pattern Making, and Drilling. The aim of the material was to assist beginners in learning these topics. Participants were expected to read the material for a week and take a quiz that tested their understanding of the material, covering both basic and advanced concepts.

14. Final Quiz

Date : 5th April 2025

Number of Participants: 260

RoboVITics distributed the hyperlink to the final quiz assignment for students to partake. The quiz encompassed questions spanning all topics taught throughout the course, and students were duly briefed on the pertinent rules and instructions. The students were accorded the liberty to attempt the quiz at their own discretion during the entire duration of the day.