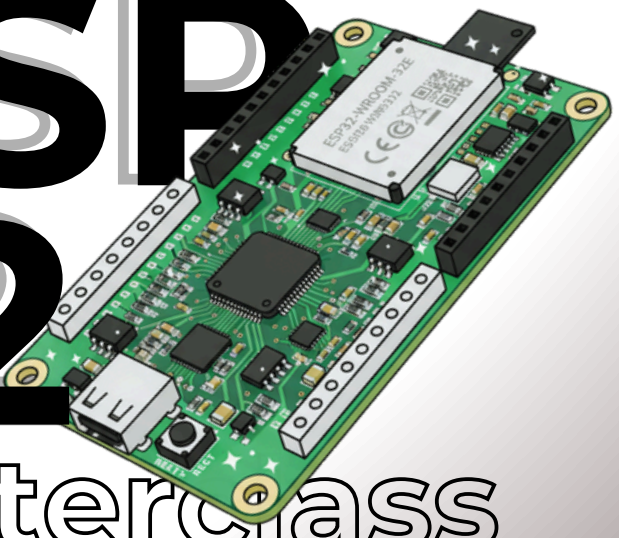
SARVAJANIK EDUCATION SOCIETY
SARVAJANIK UNIVERSITY
SARVAJANIK COLLEGE OF ENGINEERING & TECHNOLOGY

SYNERGY.io

EVENT REPORT

@MARK.3

ESP 32 Masterclass



1. INTRODUCTION

The **SYNERGY.io Club**, an innovative student initiative within the Mechanical Engineering Department at Sarvajanik College of Engineering and Technology (SCET), successfully organized a specialized hands-on workshop titled **"ESP32 - Masterclass."** This two-hour session, held on ***October 4, 2025***, between 2:00 pm to 4:00 pm, aimed to introduce and provide practical expertise on the E*SP32 microcontroller, a low-cost, high-performance platform critical for modern Internet of Things (IoT) and embedded systems development. An online simulator **"WOKWI"** was used to create ESP32 embedded systems.*

The masterclass was met with overwhelming enthusiasm, drawing a crowd of ***over 85+ active participants*** **from across the departments of SCET**. The high attendance underscores the students' keen interest in acquiring practical skills in wireless communication and embedded programming. The event was smoothly coordinated by **Bhavya Ladumor (2nd Year - I.T.)**, with the support of Club Presidents **Archan Sharma (2nd Year - Mech) and Vedant Acharya (2nd Year - Civil),** and Club Vice President **Raivat Purohit (2nd Year - Mech)** and other Core Team Volunteers of SYNERGY.io Club.

2. WORKSHOP CONTENT AND JOURNEY

The ESP32 Masterclass was structured as a progressive learning journey, moving participants from foundational concepts to complex practical implementation using the Wokwi simulation platform, eliminating hardware **barriers and allowing for immediate, hands-on coding.**

A. Core Concepts and Capabilities

The session began with an introduction to the ESP32, highlighting its features:

- Dual-core processing running up to 240 MHz.
- Built-in Wi-Fi and Bluetooth capabilities, making it ideal for IoT.
- Over 30+ General-Purpose Input/Output (GPIO) pins for external connections.
- Demonstration of the ESP32's real-world versatility in applications like an MQTT client, a Robocar, and a 4-legged bionic robospider (ACEBOT).

B. Hands-on Learning Modules

The core of the workshop involved three progressive hands-on modules:

- Basic Programming ("Hello World"): Participants were first guided through setting up the programming environment and executing the foundational "Hello World" task—blinking an LED.

- Module Integration: Building on the basics, the workshop proceeded to integrate multiple external components:
  - Pushbutton Integration: Participants learned input control by connecting a pushbutton and using the digitalRead function to toggle the LED, effectively creating an interactive digital switch.
  - Sensor Integration (DHT22): The session then introduced environmental sensing by incorporating the DHT22 temperature and humidity sensor.
  - Buzzer Integration: Finally, a buzzer was integrated, covering concepts like tone() and noTone() to generate audio output, laying the groundwork for alarm systems.

C. The Challenge and Application

To consolidate their learning, participants were presented with a culminating "Your Objective - Challenge" task to upgrade the simple prototype into a smart, temperature-reactive alarm system.

The challenge required two main tasks:

- Implement Temperature Alerts: Transform the device into a smart alarm reacting to temperature thresholds:
  - Normal (<28◦C): LED and Buzzer OFF.
  - Warning (28◦C−32◦C): LED Blinks Slow, Buzzer OFF.
  - Danger (>32◦C): LED Solid ON, Buzzer Continuous ON.

- Repurpose the Button: Change the pushbutton function to print "System Status: OK" to the Serial Monitor when pressed. A Bonus Challenge further encouraged creativity by asking participants to implement different beep frequencies for Warning and Danger states.

- This final challenge required attendees to synthesize their knowledge of reading sensor data, using conditional logic (if/else statements), and controlling multiple output modules simultaneously.

3. CONCLUSION

The ESP32 Masterclass proved to be a significant success, fulfilling the SYNERGY.io Club's mission to promote practical, technology-driven skills among students. The workshop provided a robust foundation in embedded systems and IoT, essential skills for today's multidisciplinary engineering landscape.
The hands-on use of simulation ensured all participants gained valuable experience regardless of immediate access to physical hardware.

We sincerely acknowledge the invaluable support and guidance of our Faculty Coordinator, **Dr. Samip Shah**, our Head of Department, **Dr. Pankaj Gohil**, and our Principal, **Dr. Hiren Patel**, whose encouragement played a key role in the smooth execution of the event.

Building on this momentum, SYNERGY.io aims to conduct more such innovative and skill-enhancing events, continuing to foster a culture of creativity, learning, and technology-driven growth within the department.