Dr. Ambedkar Institute of Technology

Department of Electronics and Instrumentation Engineering

Report on One Week Training Programme

Introduction to ESP32 and C programming

The Department of Electronics and Instrumentation Engineering, in association with Loginware Softtech Pvt. Ltd., Bangalore, organized a One Week Training Programme on "Introduction to ESP32 and C Programming" for second-year students. The training was conducted from 22nd September 2025 to 26th September 2025 with the objective of providing hands-on ESP32 and C training – bridging classroom theory with practical engineering skills. This program aimed to enhance the technical skills of students by exposing them to microcontroller-based embedded systems design, enabling them to apply theoretical knowledge in practical applications

The programme began with a formal inaugural ceremony. Our respected Principal, along with our Head of the Department (HOD), graced the occasion and addressed us with their encouraging words. The inaugural session also featured Mr Panish , CEO of Loginware Softtech Pvt. Ltd., Bangalore, who was introduced and warmly welcomed. The speeches delivered by our Principal, HOD, and the distinguished guest provided us with valuable motivation and set the tone for the training week.

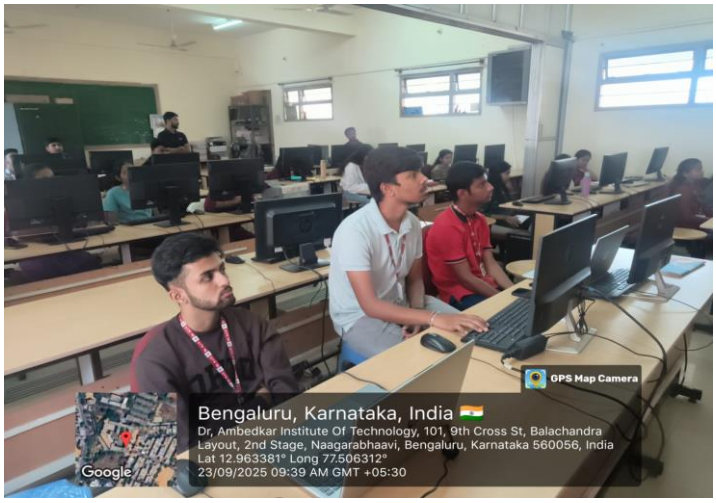
Programme Details

Day 1: Monday, 22nd September 2025

Day One began with the Inauguration. Following this, the technical training commenced with an overview of the ESP32 microcontroller and guidance on setting up the required development environment. In the afternoon session, the focus was on foundational programming skills, where the basics of C programming for embedded systems were introduced. Topics such as data types, variables, operators, conditional statements, and loops were covered. A few simple programs were demonstrated, with each line of code explained in detail for better clarity. A basic interfacing program was also executed, reinforcing both the programming concepts and their application to the ESP32. The overall objective for the day was to establish the development environment and build a clear understanding of the ESP32 architecture.

Day 2: Tuesday , 23rd September 2025

The second day was focused on practical interfacing techniques. The morning session covered Digital I/O and interfacing, with emphasis on GPIO control for input and output operations. This was followed by switch and button interfacing, where concepts like pull-up, pull-down, and debounce logic were explained. In the afternoon session, digital sensors with ESP32 were taken up. Along with this, a few topics in C programming such as functions, arrays, and pointers were discussed, with sample programs explained line by line. An introduction to the ESP32's basic pins and their functions was also given. Overall, the sessions provided a better understanding of both C programming concepts and hardware interfacing.

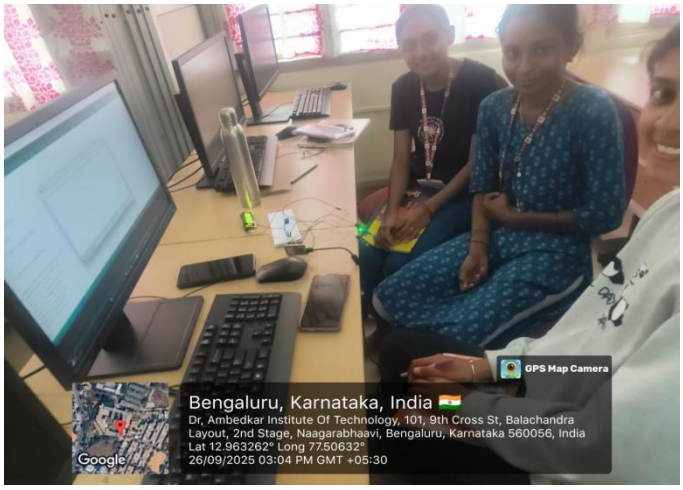


Day3: Wednesday , 24th September, 2025

Day Three began in the morning with detailed instructions on wiring and control using the ESP32. The session included sensor interfacing, where the DHT11 sensor was taken as an example. The training covered the data pin connection of the sensor and the process of displaying the acquired temperature and humidity values on the Serial Monitor. Along with demonstrations, code was written and executed to observe the working of the DHT11 in real time. This provided participants with hands-on experience in reading sensor data and understanding how such information can be processed through embedded programming. In addition, discussions were held on possible project applications using the DHT11 sensor, giving a broader idea of how it could be integrated into real-world systems.

Day 4: Thursday , 25th September, 2025

Day Four focused on more complex interfacing and project-based activities. The morning session introduced advanced interfacing, specifically the use of analog sensors through the ESP32 ADC. In the mid-morning session, the concepts of keypad interfacing were explained, with practical demonstrations using a 4x4 keypad. The afternoon session was dedicated to a hands-on activity in which a basic calculator was developed using the keypad and Serial Monitor, allowing participants to apply concepts learned in earlier sessions. In addition to these activities, ultrasonic and infrasonic sensors were also introduced, and basic projects were carried out by integrating these sensors with an LCD display. These exercises not only reinforced theoretical knowledge but also encouraged problem-solving and provided a clearer understanding of how multiple modules can be combined in embedded system applications



Day 5: Friday , 26th September , 2025

The final day was dedicated entirely to synthesizing the concepts learned throughout the week through project-based activities. Participants formed small groups of three to four members and worked on developing innovative IoT applications. Among the projects undertaken were a smart parking system, a smart counter for tracking entries and exits in spaces such as libraries and malls, and smart home automation systems that included safety features such as a buzzer alert for fire detection. These projects demonstrated the integration of ESP32 with various sensors and modules, reflecting both creativity and technical understanding. In the afternoon, the Valedictory Function was conducted. The Dean of Academics visited the sessions, reviewed the projects, and appreciated the efforts of the participants. The program concluded with a group photo, marking the successful completion of the training.

Outcomes of the Training Programme

- Understood the architecture of the ESP32 microcontroller and successfully set up the development environment.

- Acquired foundational knowledge of C programming for embedded systems, including data types, variables, operators, conditional statements, loops, functions, arrays, and pointers.

- Gained practical exposure to digital and analog interfacing concepts such as GPIO control, switch/button interfacing, debounce logic, and use of sensors.

- Learned to work with essential sensors and modules, including DHT11, LDR, ultrasonic, and infrasonic sensors, and displayed real-time data using the Serial Monitor and LCD.

- Explored actuator control through motor driver interfacing and developed confidence in integrating hardware components with ESP32.

- Participated in group projects that demonstrated IoT applications such as smart parking systems, smart counters, and home automation, encouraging teamwork and innovation.

- Strengthened problem-solving abilities and project development skills by applying programming concepts to real-world applications.

Acknowledgement

The Department of Electronics and Instrumentation Engineering gratefully acknowledges the constant support of the Principal and the Head of the Department in making this training programme possible. Sincere thanks are extended to Loginware Softtech Pvt. Ltd., Bangalore, for delivering the sessions, and to the Dean of Academics for encouragement. The Department also appreciates the efforts of the faculty coordinators and the enthusiastic participation of the students, which contributed to the overall success of the event.