Activity Report: Design of Single Board Computer Workshop

Activity	**One Day Workshop: Design of Single Board Computer**
Organizing Body	IoT Club Members
Institution	Dr. D Y Patil Pratishthan's College of Engineering Salokheanagar
Date	1st November 2025
Target Audience	Second Year Engineering Students
Participation	15 Students

Objectives of the Workshop

The primary objectives of the workshop were to:

- **Introduce** the fundamental concepts, architecture, and components of Single Board Computers (SBCs).
- **Impart** practical skills in setting up, programming, and interfacing peripherals with an ESP32 micrcontroller.
- **Foster** a hands-on learning environment for designing simple SBC-based applications.
- **Encourage** teamwork, problem-solving, and the use of modern engineering tools.

Observations

The workshop was conducted smoothly and successfully, led entirely by the **IoT Club members**, demonstrating strong peer-to-peer learning and student leadership.

- **High Engagement:** The 40+ second-year students showed high levels of enthusiasm and active participation throughout the day.
- **Effective Peer Mentoring:** The IoT Club members acted as excellent trainers, providing clear instructions and personalized guidance, which enhanced the learning experience.
- **Hands-on Focus:** The majority of the workshop was dedicated to practical activities, allowing students to directly apply theoretical knowledge. Common activities included OS installation, basic I/O programming (like blinking an LED), and interfacing simple sensors.
- **Resource Management:** The organizing team ensured efficient utilization of the available hardware (SBC kits, laptops, and basic components) for all participating groups.
- **Skill Gap Identification:** Initial sessions highlighted a variance in prior knowledge, but the structured, hands-on approach helped quickly bring all participants to a common working level.

Outcomes

The workshop contributed significantly to the attainment of several **Program Outcomes (POs)** defined by the National Board of Accreditation (NBA), specifically focusing on knowledge application, practical skills, and teamwork.

- **PO1: Engineering Knowledge:** Students successfully applied knowledge of mathematics, science, and engineering fundamentals (e.g., digital logic, basic programming) to understand the SBC architecture.
- **PO2: Problem Analysis:** Participants identified and formulated technical problems related to SBC interfacing (e.g., debugging connection issues, optimizing code) and arrived at substantiated solutions.
- **PO3: Design/Development of Solutions:** Students were able to design and implement simple solutions, such as controlling an external device or gathering sensor data using the SBC.
- **PO5: Modern Tool Usage:** Students gained proficiency in selecting, creating, and applying modern engineering and IT tools (SBC platform, specific IDEs/programming environments, and basic Linux commands) for complex engineering activities.
- **PO9: Individual and Team Work:** The entire activity was conducted in teams, fostering the ability to function effectively as a member or leader in diverse, multidisciplinary settings.
- **PO12: Life-long Learning:** The exposure to a new and rapidly evolving technology like SBCs fostered the recognition of the need for, and preparation for, independent and life-long learning.

Sustainable Development Goals (SDGs) Achieved

The workshop aligns with the following relevant United Nations Sustainable Development Goals by focusing on education, innovation, and industry-relevant skills.

SDG Goal	Relevance to Workshop
SDG 4: Quality Education	Promoted **lifelong learning opportunities** by providing high-quality, relevant technical training and hands-on, experiential learning for future innovators.
SDG 8: Decent Work and Economic Growth	Enhanced **employability skills** and **innovation** in high-demand technologies like embedded systems and IoT, preparing students for better job prospects.
SDG 9: Industry, Innovation, and Infrastructure	Directly contributed to **building resilient infrastructure** and **promoting inclusive and sustainable industrialization** by fostering technical expertise and innovation in design and development.

NAAC Criteria Attained

The workshop positively contributes to the documentation and achievement of multiple criteria required for NAAC accreditation.

NAAC Criterion	Key Indicator	Attainment Description
Criterion I: Curricular Aspects	1.3 Curriculum Enrichment	The workshop serves as a **Value-Added Course/Activity** to impart transferable and life

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		skills beyond the prescribed syllabus.
Criterion II: Teaching-Learning and Evaluation	2.3 Teaching-Learning Process	Demonstrated the use of **student-centric methods** like **experiential learning** and **problem-solving methodologies** (hands-on SBC design).
Criterion V: Student Support and Progression	5.1 Student Support	Organized **capacity development and skills enhancement activities** for improving students' capability in current technologies.
Criterion VI: Governance, Leadership and Management	6.3 Faculty Empowerment Strategies	The club members conducting the session utilized the opportunity for **peer-level faculty/student-trainer development** and professional growth.

Conclusion

The "Design of Single Board Computer" workshop was an impactful and successful event, effectively bridging the gap between theoretical concepts and practical industry skills. The initiative by the IoT Club members not only empowered the second-year students with technical proficiency in a core area of IoT and embedded systems but also provided a clear demonstration of the institute's commitment to achieving NBA outcomes, supporting relevant SDGs, and meeting NAAC quality criteria.

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Glimpse of the Event