MAKE Clouds
DESIGN.DEVELOP.DELIVER.

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Value Added Course

Course Title

ESP-Based Robotics Systems and Industrial Automation

Proposed By:

Makeclouds

Proposed For:

Jeppiaar Engineering College

Course Overview

Makeclouds proposes a 5-day Value Added Course for students of Jeppiaar Engineering College, focusing on ESP32-based embedded systems, robotics, and industrial automation.

This course is designed to bridge the gap between academic curriculum and industry requirements by providing hands-on exposure to hardware interfacing, embedded programming, sensor integration, motor control, encoder feedback systems, and cloud-based monitoring.

Through structured theoretical sessions, guided laboratory practice, and system-level integration, students will gain practical experience in building real-world robotic and industrial automation systems using ESP platforms.

Course Objectives

- Understand ESP32/ESP8266 architecture and programming
- Interface motors, sensors, and encoders with ESP32
- Implement closed-loop control systems
- Develop mobile app–controlled robotic systems
- Integrate cloud platforms for real-time data storage and monitoring
- Apply IoT concepts to industrial automation use cases

Course Outcomes

- Program ESP32 boards using Arduino IDE
- Control DC, stepper, and servo motors using motor drivers
- Read and process encoder feedback for motion control
- Interface industrial sensors for automation systems
- Develop IoT-enabled robotic systems with mobile and cloud connectivity
- Design and demonstrate a complete working automation or robotics project

Course Modules

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Day 1: Introduction to Embedded Systems & ESP Boards

- Embedded systems overview
- ESP32 vs ESP8266 comparison
- ESP32 architecture, GPIOs, ADC, PWM
- Development environment setup (Arduino IDE)
- Basic GPIO programming and LED control

Day 2: Motor Control & Sensor Interfacing

- Control of DC motors, stepper motors, and servo motors
- Motor driver modules: L298N, TB6612FNG
- Interfacing sensors: Ultrasonic, IR sensors, limit switches
- Practical motor and sensor integration exercises

Day 3: Encoders & Feedback Systems

- Rotary and linear encoders
- Encoder signal types and working principle
- Reading encoder pulses using ESP32
- Basics of closed-loop control systems

Module 4: Mobile App & Cloud Integration

- IoT communication concepts
- Mobile app control using makeclouds
- Cloud platforms: Firebase and ThingSpeak
- Real-time data visualization dashboards

Module 5: System Integration & Demonstration

- Integrating motors, sensors, and encoders
- Mobile-controlled robotic system design
- Industrial automation case studies
- Mini project development and demonstration

Student Learning Outcomes

- Understand ESP32 board architecture and programming
- Control motors and implement encoder-based feedback
- Integrate sensors and real-time data acquisition systems
- Develop mobile-controlled robotic applications
- Store, monitor, and visualize data using cloud platforms
- Apply embedded systems knowledge to real-world automation problems

Benefits to Students

- Hands-on experience with industry-relevant tools and hardware
- Strong foundation in embedded systems, IoT, and robotics
- Improved problem-solving and system integration skills
- Exposure to real-time industrial automation scenarios
- Support for mini-projects, internships, and advanced learning

Benefits to Jeppiaar Engineering College

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1. Academic Skill Enhancement

- Strengthens students’ practical skills beyond classroom learning
- Aligns curriculum with current industry trends

2. Institutional Value Addition

- Enhances the college’s academic profile in embedded systems and robotics
- Encourages innovation-driven learning and project-based education

3. Industry Readiness

- Prepares students for internships, placements, and real-world projects
- Introduces modern automation, cloud, and IoT technologies

4. Research & Collaboration

- Promotes faculty-student research initiatives
- Enables collaboration with Makeclouds for internships, mentorship, and final-year projects