



Course on **Robotics and IoT with ESP32**

(15 days hands-on learning + internship opportunity)

The explosive growth in the Electronics & semiconductor industry has created a shortfall of trained engineers with practical design abilities in embedded systems.

Makxenia Product School's **Certification Course in Robotics and IoT with ESP32** is a blend of hands-on projects along with theoretical sessions focused on fundamentals to learn practical design and prototyping skills. The course includes sessions with Electronics industry experts. All required electronic tools and components will be provided to attendees. Participants will gain in-demand design skills which will let them hit the ground running in the Electronics industry.

Internship Opportunity

Candidates successfully completing the course will be given priority for **2 to 6 month internships** at **hardware startups or companies** based in Pune, Bangalore, and Nagpur. The internships will let you work with Embedded designers and experts on ongoing EV, Mining, and Automotive projects, and come with **benefits of placement/ pre-placement opportunity** with partner industries.

Course Overview

Duration	15 Days (25+ hours) (11 hours Theory + 14 hours Practical hands-on)
Venue	107, Baji Prabhu Nagar, Nagpur (Near VNIT)
Number of participants	Class of 15
Fees	5999/-
Who can join	1st year to Final year Engineering Undergrads
Benefits	Interview opportunity will unlock post successful completion of course

Projects Structure & Outcome

Session	Content	Projects	Learnings
1	Introduction 1. Robotics 2. Embedded Systems 3. IoT 4. Course	-	Robotics, IoT, and Embedded System utility in daily life and Career in its field
2	Embedded Systems, Microcontrollers, Arduino Ecosystem, Arduino Installation, Espressif ESP Boards, ESP32 Board setup in Arduino IDE	ESP Board installation in Arduino IDE	Automated embedded system, Microcontroller working, Arduino Open Source system, Microcontroller with WiFi system SOC, Arduino Software Setup for external Board Support
3	Onboard LED Blink with ESP32, Convert code for LED Glow, Optimize code for small code size, External LED Blink on breadboard, LED Running pattern generation	LED Glow & Blink, Multiple LED glow & blink, LED Running	Digital Output Embedded C LED Pattern Algorithm Development Breadboard LED Interfacing Right Resistor Selection for LEDs
4	Switch Types, Switch Circuit, Pull Up Pull Down concept, Switch to Serial Monitor, Switch to LED - If Else Logic, Serial Monitor Experiment	Switch to Serial, Switch to LED, Serial Communication	Digital Input Switch types & application Resistor used as pull-up and pull-down Serial Communication If-else in Embedded coding
5	Motor its types, Differential Drive, H-Bridge design, Motor Driver, Motor control using ESP32, Keyboard controlled Robot implementation	Motor control using embedded code, Keyboard controlled Robot	Motor and its type H-Bridge & motor driver Motor control & Differential Drive Back EMF reading data serially

Projects Structure & Outcome

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6	Bluetooth in ESP32 Android App controlled Robot implementation	Android App controlled Robot	Bluetooth Protocol Bluetooth SPP Profile
7	Line Follower & its uses Sensors for Line Follower IR Sensor working Line Following algorithm White Line Follower Robot implementation	White Line Follower Robot	Line Follower algorithm Opamp as Comparator IR Sensor Working AGV Automated Guided Vehicle
8	Black Line Follower Robot Implementation, Edge Avoider Robot use case Edge Avoider Algorithm, Edge Avoider Robot Implementation, Obstacle Avoider Robot use-case	Black Line Follower Robot, Edge Avoider Robot	Black Line Follower Robot, Edge Avoider Robot
9	TSOP Sensor working, Obstacle avoider algorithm, Obstacle avoider Robot, Implement Servo motor Control, Intelligent Obstacle Avoider Robot, Wall Following Robot Algorithm, Wall Following Robot implementation	Obstacle Avoider Robot, Multi-Directional Obstacle Avoidance, Wall Follower Robot	TSOP Sensor Working, Obstacle Avoiding Algorithm, Pulse Width Modulation PWM Servo Motor Control, Wall Following Algorithm
10	DHT11 sensor interfacing, Humidity and Temperature Monitor, Connecting ESP32 to Internet, Get & display IP address	Home Weather Monitor, IOT Web Connectivity	DHT11 Sensor Working, Single wire Data protocol, ESP Wi-Fi Protocol, IP Protocol

Projects Structure & Outcome

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11	Thingspeak introduction, Thingspeak channel setup, HTTP Protocol : POST Live, Weather monitor using Thingspeak	Thingspeak Dashboard setup, Line Weather monitoring	IoT system architecture, Cloud for IoT Thingspeak Platform, HTTP Post protocol
12	Custom Website Development Hosting Website, HTML Code for Weather Monitor, PHP Code to read and save data on website, Live Weather monitor with custom website	Custom website development, using HTML PHP, Live Weather, Monitoring with Custom Website	Website Development, Website Hosting, HTML PHP Basics
13	Relay Working & interface, Keyboard Controlled Home Automation, HTTP GET Protocol, ESP32 Server Setup, Web Controlled Home Automation	Relay Module Control, Keyboard Controlled Home Automation, ESP32 Home Automation	Relay Working, Home Automation, HTTP GET Protocol Server Setup
14	Custom Website for Home Automation, ESP Home automation Server Setup using Ngrok	HomeAutomation Live Website, Live Server Setup using ngrok	Converting laptop as Live Server Gateway
15	Course Revision, Career as Embedded Engineer, Project Product Ideas Discussion, Certificate Distribution Ceremony	-	How to implement projects ideas from the team