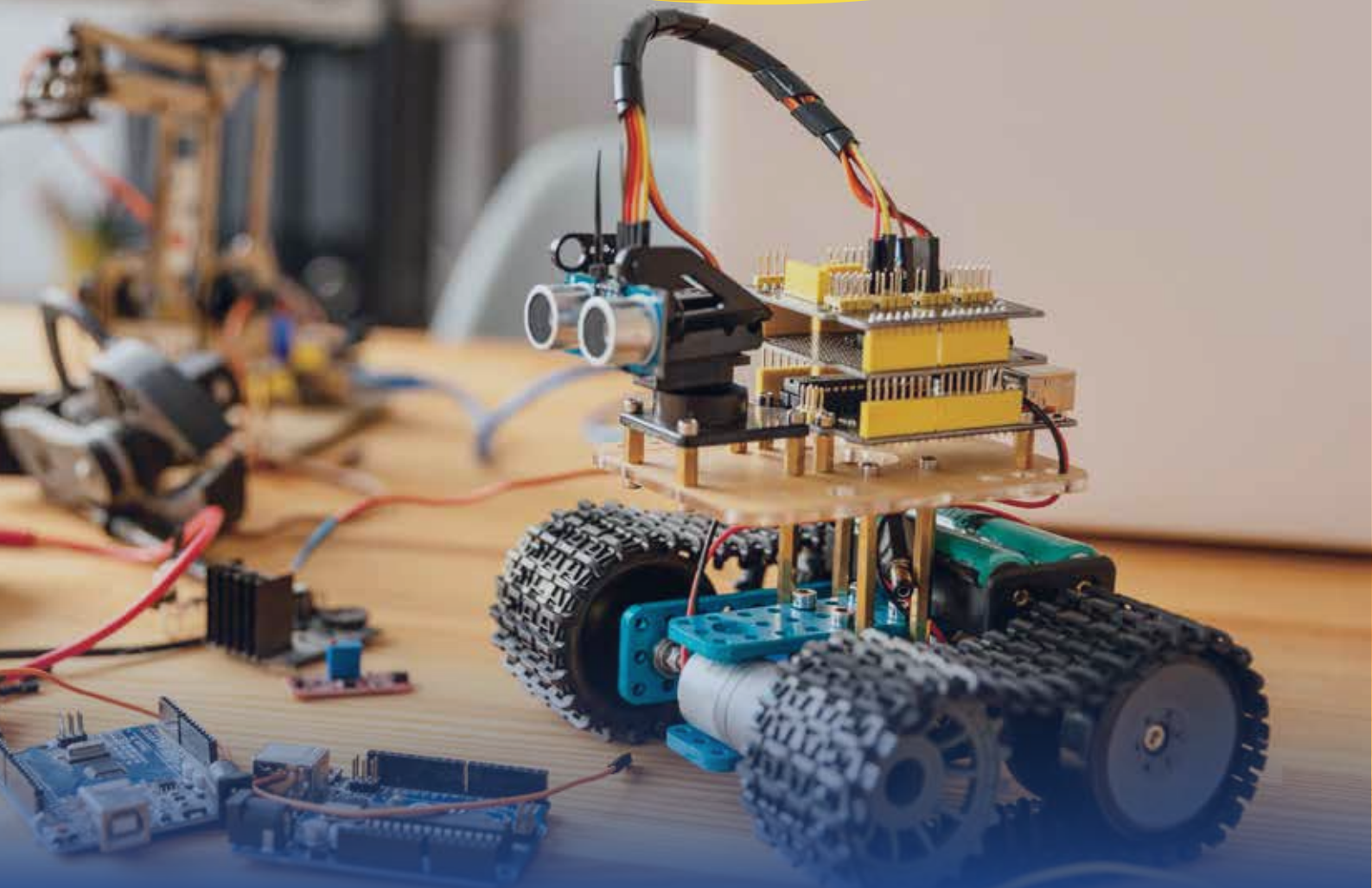




**Ed-Tech**  
A F R I C A

# ROBOTICS

6 Weeks | 3 Months  
6 Month Courses





# Ed-Tech

A F R I C A

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Transforming education  
through technology

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# Embedded System (Robotics)

## Curriculum Index

### \* INTRODUCTION

1. Electronics Languages
2. Embedded C Programming
3. Micro-controller Sensors

**1 WEEKS**

### \* BASICS OF ELECTRONICS

1. Number system
2. Boolean Algebra
3. About Basic Electronic Components
4. Power supplies, voltage regulators. Thermal considers.
5. Thermal considerations, heat sinks, parts kits.
6. Introduction to Embedded Systems Laboratory and equipment.
7. Logic circuits, voltmeters and oscilloscope; Debugging using
8. logic analyzers, state and timing information.
9. Interfacing different logic families, signal buffering,
10. pull ups/pull downs.
11. Overview of board development process, wire wrapping
12. and soldering.
13. Schematics and wiring diagrams, recommended
14. practices, and PCB Design.

**2 WEEKS**

### \* EMBEDDED C

1. Keywords and data type
2. Operators
3. Flow Control
4. Loops & Functions
5. Arrays & Pointers
6. Structure and union
7. Storage class

**2 WEEKS**

### \* ARDUINO & NODE MCU

1. Introduction
2. Board Description
3. Arduino IDE
4. Date types
5. Delay
6. Input Output Function
7. Blynk App
8. Connecting to Wi-Fi

**2 WEEKS**

### \* PROGRAMMING WITH ARDUINO

1. LED Blinking
2. LED with switch
3. LED with IR Sensor
4. Servo Motor
5. Relay and buzzer
6. LCD
7. 7-segment
8. Bluetooth

**2 WEEKS**

## \* PERIPHERAL PROGRAMMING

1. Timers
2. RTC
3. External hardware interrupts
4. ADC
5. PWM

**1 WEEK**

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## \* COMMUNICATION PROTOCOLS

1. UART/USART
2. SPI
3. I2C

**1 WEEK**

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## \* DEVICE & SENSOR INTERFACING

1. RFID
2. GSM
3. GPS
4. Temperature / Humidity Sensor
5. Gas Sensors
6. Ultrasonic Sensors
7. PIR Sensor
8. TSOP
9. OLED
10. LDR
11. LED with blynk App

**2 WEEKS**

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## \* BASIC OF COMPUTER ARCHITECTURE

1. RISC vs. CISC Architecture
2. RISC vs. ARM 32 bit

**1 WEEKS**

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## \* OTHER TIMERS

1. Timer 0 and timer 1
2. Pen Description
3. Register Description
4. Basic of time Handling

**1 WEEKS**

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## \* SERIAL PORT

1. Basics of serial port
2. Types of connectors
3. TTL
4. Interfacing Pc with micro-controller

**1 WEEKS**

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## \* ADC

1. Theory of ADC
2. Types inbuilt ADC
3. Interfacing external device to ADC

**1 WEEK**

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## \* INTRODUCTION ABOUT OTHER MICRO-CONTROLLER

1. STM 32
2. ESP 32
3. Node MCU
4. Raspberry Pi

**1 WEEK**

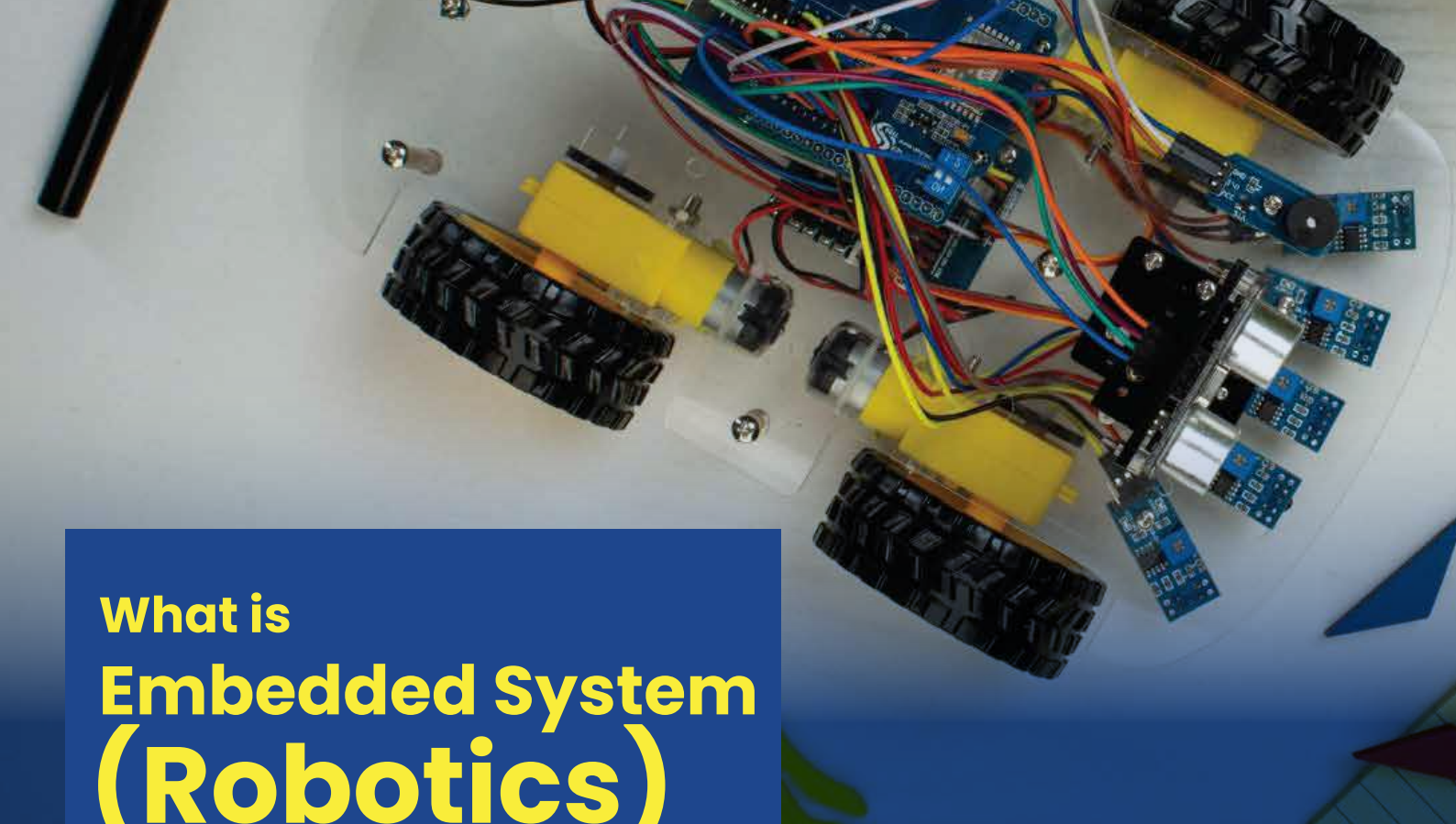
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## \* REAL TIME PROJECT

1. Mobile Control Robot
2. Automatic Dustbin
3. Automatic street light
4. Home Automation
5. Keypad Door lock
6. Motion sensitive Circuit Control
7. Line following Robot
8. Robotic Arms
9. Automatic Notice Board
10. Arduino with 8 x 8 LED Matrix

**1 WEEK**

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## What is Embedded System (Robotics)

An Embedded System is a system that has software embedded into computer-hardware, which makes a system dedicated for a variety of application or specific part of an application or product or part of a larger system.

An embedded system can be a small independent system or a large combinational system. It is a microcontroller-based control system used to perform a specific task of operation.

An embedded system is a combination of three major components:

- **Hardware:** is physically used component that is physically connected with an embedded system. It comprises of micro-controller based integrated circuit, power supply, LCD display etc.
- **Application software:** Application software allows the user to perform varieties of application to be run on an embedded system by changing the code installed in an embedded system.

- **Real Time Operating system (RTOS):** RTOS supervises the way an embedded system work. It act as an interface between hardware and application software which supervises the application software and provide mechanism to let the processor run on the basis of scheduling for controlling the effect of latencies.

### One Example

Remember the functionality of a washing machine. In semi-automatic machines user sets the timer, water level and amount of detergent to use, and rest of the operation is done by machine itself, as per the parameters setup by user.

In fully automatic washing machine, user just put the clothes in the machine and rest all the tasks are done by machine itself.

***Can you guess who is controlling the automatic operations of machine?***

***How a washing machine is intelligent enough to do tasks automatically?***

***What is the brain of a washing machine?***



Yes !! It is an Embedded System. Embedded system is the brain of washing machine (or any automatic machine or device). There is an Embedded system inside a washing machine which get inputs from user, save those inputs in its memory and operate the machine as per the inputs.

### **Isn't it Interesting ?**

It means, if you know how to make an Embedded System then you can automate any task with the help of it.

### **Projects based on embedded Systems**

- Central heating systems
- GPS systems
- Fitness trackers
- Medical devices
- Automotive systems
- Transit and fare collection
- ATMs
- Factory robots
- Electric vehicle charging stations
- Interactive kiosks
- Water level controller
- Password based door lock system
- Water level indicator commonly used in hotels and factory

### **Career Opportunities in Embedded Systems**

- Embedded Software Engineer (firmware)
- System Software Engineer (kernel & RTOS)
- Application Software Engineer (device drivers)
- Software Test Engineer.
- Embedded Hardware Engineer.
- Embedded System Trainer.
- Marketing & Sales Executive.

A hand is using a soldering iron to work on a small, black, two-wheeled robot. The robot has two circular camera lenses for eyes. The background is a wooden surface with various wires and components scattered around. The entire image has a dark blue overlay.

# WE ARE THE FUTURE

EXPLORE



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