

# Advance Training on ARM 32 bit Cortex M3

## QUALITIES OF INSTITUTE:

1. Awarded Best Institute in Embedded (2010-11) & (2009-10)
2. ISO 9001:2008 Certified IAO (International Accreditation Organization, USA) Candidacy Status
3. Trained more than 3600 students since 2002
4. Individual PC & training kit for each student for better learning
5. Individual attention to each student
6. Well tested and proven training methodology
7. Fully furnished lab and separate theory class rooms

## COURSE DETAILS

### INTRODUCTION TO STM32

- ARM Cortex-M3 core based architecture
- The main three blocks: platform, core and input / output peripherals

### THE CORTEX-M3 CPU

- Presentation of the core, architecture and programming model
- Icode, Decode and system buses
- Branch prediction mechanism
- Thumb-2 instruction set
- Access to memory-mapped locations, addressing modes
- Conditional execution
- Bit-banding
- Memory map
- C-to-Assembly interface
- Exception mechanism
- System tick timer
- System Control Block
- Linker parameterizing
- Embedded software development with Keil
- Debug facilities

### INFRASTRUCTURE

- AHB/APB Bridges, split transactions, error handling
- Bus Matrix, round-robin arbitration scheme

## OBJECTIVES

- ✓ The course details the hardware implementation of the STM32 microcontroller
- ✓ The course focuses on the Embedded C programming of the Cortex-M3 CPU
- ✓ Practical labs on integrated peripherals are based on I/O function on the Universal USB trainer Kit developed by TICO

## PREREQUISITES

- ✓ A basic understanding of microprocessors and microcontrollers is recommended
- ✓ A basic understanding of digital logic or hardware would be useful but not essential
- ✓ A basic understanding of assembler or C programming would be useful

- Internal 20 KB SRAM
- 128-KB Flash memory
- Program and erase sequences
- External interrupt/event controller, wake-up event management
- System timers : Real Time Clock, Window Watchdog timer
- Backup registers, tamper detection, RTC calibration

### HARDWARE IMPLEMENTATION

- Power supplies, external 3.3V, internal generation of 1.8V, related pins
- Low voltage detectors
- Clocking
- Selection of the boot mode through external pins
- Reset causes
- Start-up sequence, fetch of the first instruction
- Low power modes
- I/O Ports

### Learning Modules (hands on Practical)

- Theoretical aspect of each module
- Practical implementation

### Led Interfacing

- How it works. How LEDS will rotate

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- How to connect with microcontroller
- What is sourcing & sinking?

### Linear Keys

- What is the type of switches?
- Their types & function

### Matrix Keypads

- How they work
- How to interface with microcontroller

### LCD (Liquid Crystal Display)

- What is LCD?
- How to give LCD commands
- How to interface LCD with Micro

### Graphical LCD (64x128 pixels)

- What are the commands for graphical LCD
- How to write code for LCD

### Relays

- What are the different types of Relay?
- How it connect with microcontroller.

### Piezo buzzer (Alarm unit)

How does a buzzer sound?

### Opto Couplers

- What are optocoupler?
- Interfacing Opto-Isolators

### Stepper motor

- How a stepper motor works
- How to drive stepper motor

### DC Motor

- How a dc motor works
- Motor drivers IC

### ADVANCED CONTROL TIMER AND GENERAL PURPOSE TIMER

- 16-bit timers, block diagram, clock selection and prescalers
- What is a timer? How does it works?
- How to make accurate delay using timer. Timer Interrupts
- How to write code for timer?

### External Interrupt

- What is an interrupt? How does it work?
- How to write code?

### Additional Interfaces

- Concept of Real world interfacing devices like electrical home
- Appliance/sensors activators, electromechanical devices

### Sensors:

Temperature Sensor LM 35, Light Intensity sensors, Voltage sensors, Current sensors, IR sensors Photo diode

### ANALOG-TO-DIGITAL CONVERTER

- High impedance-analog input configuration
- ADC features : 12-bit resolution, 0 to 3.6 V range
- One-shot or continuous conversion

### I2C INTERFACE

- I2C protocol basics
- Slave mode vs master mode Transmit and receive sequences

### USART

- Queue operation mode
- Hardware flow control
- Transmit and receive sequences

## 4 - SMART BENEFITS:-

- 1. Multi time boost in Confidence level and understanding of Embedded world.**
- 2. Certification:** A certificate will be awarded to each student. This will be recognized as a Industrial training certificate in engineering colleges.
- 3. Gateway:** This will be a gateway for Embedded Technology
- 4. Improve JOB chances:** A fast emerging technology for Electronics professionals.

*An Investment in Knowledge Pays Best Returns. Benjamin Franklin*

#### Corporate Office:

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