Embedded System (ARM CORTEX) Hands-On Training Workshop (2Days)

Embedded System (ARM Cortex) provides simple solution to complexes, Flexibility, easier programming in industrial handling that's why it get more popular than traditional methods. It is combination of software and hardware & more flexible in nature and can adopt future requirements easily. Now a day's almost all field of industry run with Embedded System, ex: Rocket science, Medical electronics.

Requirements for Zonal Center

- ✓ Seminar hall/classroom having the enough capacity to conduct hands-on-session for all participants.
- ✓ Projector/ Screen along with black/white board for teaching and presentation purposes.
- ✓ One small stereo jack cord connects to laptop for its sound system.
- ✓ This Zonal center can only be arranged for a minimum of 30 students.

Certificate Distribution

- ✓ Certificate of Participation from Active Galaxy to each participant
- ✓ Final winner will be specially awarded by Active Galaxy.
- ✓ Certificate of Coordination from Active Galaxy for all of the coordinators

Benefits to the participants

- ✓ Learn & Interact with renowned Industry Experts.
- ✓ It will help to develop their career life.
- ✓ Complete learning about basic electronics works (How stuff works).
- ✓ Hands on ARM CORTEX experience.

Benefits of association with us

- ✓ College Name and Logo including website link will be published on our official website.
- ✓ We will help to develop R&D lab in your college/university.

Course structure

Overview

Embedded System (ARM CORTEX) introduction & Software installation

Introduction to Embedded System (ARM CORTEX)

- Introduction to Embedded System (ARM Cortex)
- Applications & Scope of Embedded System (ARM Cortex) in various industries
- Embedded System Vs Non-Embedded System

Introduction to ARM Cortex platform

- An Overview of ARM Cortex platform
- ARM Board Description

Introduction to Microprocessor

- This session would deal with the basics of Microprocessor. The focus will be on the ARM Microprocessor, which is one of the most powerful and widely used 32 bit Microprocessors.
- Overview of Microprocessor / Microcontroller
- What is Microprocessor?
- Microprocessor architecture and Interfacing
- Introduction to Microprocessors & the ARM Platform
- How can we use Microprocessor in our circuits

Introduction to Programming Language

- Programming Languages- Assembly Vs Embedded 'C'
- Microprocessor Programming using Embedded 'C'
- Basics of development board, IDE, Debugger, Flash programming

Introduction to software tool chain

- Software Installation
- Getting started with the Keil5 IDE to start writing your first program
- Writing your First 'Embedded C' Program
- Software installation (Individual Laptop/batch)

IDE tool = Arduino IDE

Simulation tool = Proteus PCB Design & Simulation software

System Requirement form participants

- ✓ Windows 7 OS, Min 2GB RAM, Min 120GB hard disk space
- ✓ Any latest version processor & Min 16GB pen drive

Day -1 (Session -I)

Learning of GPIO interface with simulation

- ➕ *Experiment 1 : Single GPIO access*
  - ➕ Single port register access - Single LED toggle
- ➕ *Experiment 2 : Multiple GPIO access*
  - ➕ Full port register access   - Bar graph LED toggle
- ➕ *Experiment 3 : 7-Segment LED display interface*
  - ➕ Single port register access method - 7-Segment display
- ➕ *Experiment 4 : 7-Segment LED display interface*
  - ➕ Full port register access method (Hexadecimal method)
- ➕ *Experiment 5 :Button interface*
  - ➕ Digital input sensing – Push button interface
  - ➕ Pull-Up logic & Pull-Down logic
- ➕ *Experiment 6 : Test task*
  - ➕ Combination of Digital input and output
- ➕ *Experiment 7: 16*2 LCD interface*
  - ➕ 4bit data mode & Scrolling display
- ➕ *Experiment 8: 16*2 LCD interface task*
  - ➕ Increment counter & Decrement counter

Day -1 (Session -II)

- ➕ *Experiment 1 : ADC on LCD*
  - ➕ Variable resistor (analog input reading)
  - ➕ 10Bit ADC calculation and resolution talk
- ➕ *Experiment 2 : Sensor interface*
  - ➕ Current sensor interface
  - ➕ Sensor calibration & Sensor sensitivity calculation
- ➕ *Experiment 3 : Test task*
  - ➕ Combination of ADC and LCD task
- ➕ *Experiment 4 : HW/SW Serial port initialize*
  - ➕ 9600 baud rate, 8-Bit data, No parity, 1-stop bit configuration
- ➕ *Experiment 5 : Serial communication method*
  - ➕ Synchronous Serial Programming
  - ➕ Asynchronous Serial Programming
  - ➕ UART Tx & Rx interrupt

+ *Experiment 6 : ADC on serial port*

   + Sensor data on serial port

+ *Experiment 7:Hand shacking serial port*

   + Serial port request and acknowledgement method

+ *Experiment 8: Test task*

   + Sensor HUB design task

Day -2 (Session -I)

+ *Experiment 1 : DC motor control*

   + DC motor ON/OFF

+ *Experiment 2 : DC motor direction control*

   + DC motor forward

   + DC motor Reverse

+ *Experiment 3 : DC motor speed control*

   + PWM pulse generation

   + Duct cycle calculation

   + DC motor speed control

+ *Experiment 4 :Buzzer control*

   + Digital Buzzer ON/OFF

+ *Experiment 5 : Push button interface*

   + Single button interface

+ *Experiment 6 : Matrix keyboard interface*

   + Advantages

   + Disadvantages

+ *Experiment 7 : Password matching*

   + OTP generation

   + OTP verifying and access control

+ *Experiment 8:Switch interrupt*

   + Switch read Polling method

   + Switch read interrupt method

Day -3 (Session -II)

🔸 Task competition

- ✓ On spot logical task in embedded program
- ✓ Time level completing task
- ✓ Performance evaluation

Workshop training kit includes

S.No	Component name	Qty
1	ARM CORTEX	1
2	USB to TTL	1
3	Male to Male jumpers	20
4	16*2 LCD	1
5	10K variable pot	1
6	DC gear motor	1
7	L293D motor driver	1
8	Buzzer	1
9	+12V 2A adapter	1
10	Power supply components	Set
11	Wires	As per requirement.
12	File	1
13	Notepad	1
14	Pen	1
15	Kit box & manual	1