ARMbedded Electronics Pvt. Ltd.
Higher Technology You Need
Electronics Design & Development
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JAS-ANZ
AN ISO 9001:2008 CERTIFIED COMPANY

# Modules For Six Months Industrial Training
# On

# WIRELESS EMBEDDED SYSTEM DESIGN

## 1st Week

### Introduction to Embedded System

a) Tool → Hardware tool and Software tool
b) Embedded designing, course study
c) Board on which we have to work (MAB 51 / NANO / Universal),
d) Embedded application

### Introduction to Embedded 'C'

a) Programming in Embedded 'C'
b) How to use if-else or if –if conditions?
c) Types of loops in Embedded 'C'
d) How to use Functions?

### 8051 Architecture

a) 8051 Block diagram and description
b) Oscillator circuits,
c) Port Pin description
d) Internal Memory, External Memory
e) Counters and Timers
f) Interrupts

### Introduction to Firmware & Programming tools

a) How to operate KEIL Software
b) How to download code in microcontroller through ECE flash
c) How to use buses and connectors in 8051 application board
d) How to operate the 8051 application board in practical's

**Simulation & Implementation on Hardware with 8051 microcontroller**

**Introduction to LED**

a) Interfacing of 8051 with LED
b) What is LED
c) Working of LED
d) Testing of LED
e) Methods of Interfacing
f) Programming code on LED

**Programs on LED in Embedded 'C' language** a) Program to toggle on LED
b) Program to make all LED ON/OFF
c) Program for alternate glowing of the 8 LEDS
d) Program for reverse alternate glowing of the 8 LEDS
e) Program for left shifting on LEDS
f) Program for right shifting on LEDS
g) Program for Counting 0 to 9 on LEDS
h) Display pattern 0110 , 0011 , 1001 , 1100 , on LEDS
i) Alternate glow of LEDS by using call by value delay
j) Shifting of LEDS by using operators

**Introduction to Push switches/DIP switches**

a) Interfacing of Push switch with Microcontroller
b) Interfacing of DIP switch with Microcontroller
c) Switch circuitry
d) Program how to make ON & OFF LED through Push Switch

**Controlling of LEDs in Different pattern through switches** a) Toggle LED by push switches
b) Controlling of shifting of LEDS by push switches
c) Variations on LED,s by 4 push switches
d) Variations on LED,s by more then 4 push switches

# 2nd Week



**Introduction to seven segment**

a) Interfacing of 8051 with seven segment
b) 7 segment displays
c) Types of 7 segment displays
d) How two interface with microcontroller
e) Programming code on seven segment display

**Programs on seven segment in Embedded 'C' language** a) Count 0 to 9 on all seven- segment display
b) Count 0 to 9 on seven- segment display
c) Count 0 to 99 on seven- segment display
d) Count 0 to 999 on seven- segment display

e) Count 0 to 9999on seven- segment display
f) Count 9999 to 0 on seven- segment display
g) Program to display character on 7 Segment with key switches
h) Display of 0 to 9 on seven segment by call by value delay( 1 sec delay )
i) Display of 0 to99 on seven segment by call by value delay( 250ms sec delay)

**Programs on LCD in Embedded 'C' language through switches** a)
Count 0 to 9 on seven- segment display by push switch
b) Count 0 to 99 on seven- segment display by two push switches
c) Count 0 to 999 on seven- segment display by three push switches
d) Count 0 to 9999on seven- segment display by four push switches
e) Counting on seven- segment display by more then four switches

**Introduction to LCD** a)
About LCD
b) Pin description
c) Command set of LCD
d) Interfacing with 8051
e) Programming of LCD

**Programs on LCD in Embedded 'C' language** a)
Display of a character on LCD
b) Display of a character array on LCD
c) Display of a number on LCD
d) Count 0 to 9 on LCD
e) Count 0 to 99 on LCD
f) Left shifting of string on LCD
g) Right shifting of string on LCD
h) Display data string on both the lines of LCD
i) shifting of data string on both line of LCD
j) Generate a clock format on LCD

**Programs on LCD in Embedded 'C' language through switches** a)
Display of a character on LCD by one switch
b) Display of a character array on LCD by one switch
c) Count 0 to 9 on LCD by one switch
d) Left shifting of data on LCD by switch
e) Right shifting of data on LCD by switch
f) Display data on both the lines of LCD by two switches
g) Program on LCD and controlling it with four switches
h) Generate a clock format on LCD with four switches
i) Generate a stop watch on LCD by switch



# 3rd Week

**Introduction to Relay**

a) Interfacing of Relay with Microcontroller

b) Relay operation
c) Relay application
d) Relay circuit
e) Programming on Relay

**Introduction to Buzzer**

a) Interfacing of Buzzer with Microcontroller
b) Buzzer operation
c) Buzzer circuit
d) Programming on Buzzer

**Programs on relay in Embedded 'C' language**

a) Interfacing of Relay with microcontroller and programming in 'c'
b) Switching on/off a relay
c) Switching on/off two relay
d) Switching on/off two relays one by one
e) Switching on/off relays for infinite time
f) Switching on/off a relay using push switch
g) Switching on/off two relays using two switches

**Programs on buzzer in Embedded 'C' language** a) Switching on/off a buzzer
b) Switching on/off a buzzer for infinite time
c) Switching on/off a buzzer using switch
d) Switching on/off a buzzer & Relay both
e) Switching on/off a buzzer
f) Switching on/off a buzzer with LED and other applications

**ROBOTICS**

a) Introduction To Robot
b) Parts and components of Robot (motors, sensors, switches, hardware)

**Introduction to DC motor**

a) Interfacing of Motors with microcontroller
b) DC motor
c) Principle of operation of DC motor
d) Interfacing of DC motor with 8051 microcontroller
e) Programming of a DC motor

**Introduction to stepper motor**

a) Working of a stepper motor
b) Interfacing of stepper motor with 8051 microcontroller
c) Programming of a stepper motor

**Programs on stepper motor in Embedded 'C' language**

a) Programming of stepper motor at different port of microcontroller
b) Control of stepper motor in different angle
c) Control of stepper motor by switches

**Programs on DC motor in Embedded 'C' language** a)
Control of DC motor in different direction
b) Control of DC motor by switches

**Introduction to IR sensors** a)
About IR Tx-Rx
b) Principle of operation of IR sensors
c) Working of IR sensors
d) Interfacing of IR with 8051 microcontroller
e) Programming of a IR sensors

**Programs on IR sensors in Embedded 'C' language**
a) Glowing LED's in different pattern through IR sensors
b) Counting on seven segment in different pattern through IR sensors
c) Display in different pattern on LCD through IR sensors
d) Switching on/off a buzzer through IR sensors
e) Switching on/off a relay through IR sensors
f) Control of DC motor in different direction through IR sensors
g) Control of stepper motor in different angle through IR sensor

# 4th Week

# Wireless Communication

**Introduction to serial Communication**
a) Interfacing of serial communication with microcontroller
b) Types of communications
c) UART in 8051
d) Max circuitry
e) Baud rate in 8051
f) Registers regarding serial communication
g) Steps to work on hyper-terminal

**Introduction To RFID**
a) RFID Reader & RFID Tag
b) To Receive Tag Information on LCD
c) RFID Based Attendance System



# 5th Week

**Introduction To Bluetooth**
a) Bluetooth Modem
b) Bluetooth Based AT Commands
c) Pairing with Android/windows Phone
d) Home Automation Using Android/Windows Smartphones

**Introduction to DTMF**

a) About DTMF technology
b) Principle of operation of DTMF
c) Applications of DTMF technology
d) Programming of DTMF

**Introduction to RF Communication** a)
About RF communication
b) Principal of operation of RF
c) Application of RF
d) Programs for RF Communication

# 6th Week

**Introduction to GSM**

a) GSM Modem
b) GSM Based AT Commands
c) Calling & Sending SMS From GSM Modem
d) Designing of basis phone with dialing/receiving/rejecting with SMS Features

**Introduction to Hex keypad**

a) About hex keypad
b) Hardware Exposure of keypad tools

**Programs on Hex keypad in Embedded 'C' language**

**Introduction to GPS**

a) About GPS Technology
b) Hardware Exposure of GPS tools
c) How to work on GPS MODEM

**Practical Exposure of GPS development tools**

# 7th Week

# Circuit Designing



**Introduction to circuit designing using bread board**

**Introduction to bread board**

**Different Practical's of circuit designing without microcontroller**

a) Circuit designing of IR SENSORS
b) Circuit designing of LDR SENSORS
c) Circuit designing of PHOTODIODE
d) Circuit designing of FIRE SENSORS

a) Circuit designing of LIGHT SENSORS
b) Circuit designing of IR SENSORS
c) Circuit designing of WATER LEVEL INDICATOR

d) Circuit designing of GLOW LAMP USING RELAY

a) Circuit designing of RF TRANSMITTER
b) Circuit designing of RF RECEIVER
c) Circuit designing of MOTOR DRIVER (L293D)
d) Circuit designing of POWER SUPPLY (5V USING 7805)

a) Circuit designing of STREET LIGHT (USING OP-AMP)
b) Circuit designing of LM324 (USING OP-AMP)
c) Circuit designing of MOTOR DRIVER (L293D)
d) Circuit designing of DTMF (MT 8870)

**Different Practical's of circuit designing using microcontroller** a) Circuit designing of LED
b) Circuit designing of SEVEN SEGMENT
c) Circuit designing of LCD
d) Circuit designing of RELAY
e) Circuit designing of BUZZER

# 8th Week

# PCB Designing

a) Introduction to PCB Design.
b) Types of PCB's.
c) Methods of PCB designing.
d) Introduction to SMT (Surface Mount Technology)
e) Raw materials in PCB designing.
f) Designing.
g) Manufacturing Process.
h) Making the substrate.
i) Drilling and planting process.
J) Creating the printed circuit pattern on substrate.
k) Screen printing.
l) Mounting the component.
m) Some basic steps of PCB designing.
n) Multilayer PCB designing.
a) Introduction to PCB designing tools.
b) Designing with ORCAD.
c) Different steps including using ORCAD.
d) Schematic designing on Capture CIS tool.
e) Layout designing.

**Introduction to Capture CIS Tool**

**Different Practical's of PCB design using Capture CIS Tool** a) Schematic designing of LED.

b) Schematic designing of Push on switches.

c) Schematic designing of LCD 16x2.

a) Schematic designing of UC 8051.

b) Schematic designing of SEVEN SEGMENT.

c) Schematic designing of RF Transmitter

d) Schematic designing of RF Receiver

e) Schematic designing of IR using LM324.

f) Schematic designing of MOTOR & BUZZER.

g) Schematic designing of HEX KEYPAD.

**Different Practical's of PCB design using Engineering Edition Layout Tool**

**Single Sided PCB Design**

a) Schematic + Layout designing of LED.

a) Schematic + Layout designing of LCD.

c) Schematic + Layout designing of SEVEN SEGMENT.

g) Schematic + Layout designing of MOTOR & BUZZER.

h) Schematic + Layout designing of HEX KEYPAD.

# 9th Week

**AVR Architecture**

a) AVR Block diagram and description

b) Oscillator circuits,

c) Port Pin description

d) Internal Memory, External Memory

e) Counters and Timers

f) Interrupts

**Introduction to Firmware & Programming tools**

# 10th ,11th & 12th Week



**Simulation & Implementation on Hardware with AVR microcontroller**

a) Interfacing with LED

b) Interfacing with 7 segment

c) Interfacing with LCD

d) Interfacing with Relay

e) Interfacing with Buzzer

f) Interfacing with Motor

g) Interfacing with Sensor/ADC

# 13th & 14th Week

**Simulation & Implementation on Hardware with AVR microcontroller**

a) Interfacing with Serial Comm.
b) Interfacing with DTMF/RF
c) Interfacing with RFID
d) Interfacing with Hex keypad
e) Interfacing with GSM
f) Interfacing with Bluetooth
g) Interfacing with GPS

# 15th Week

**PIC Architecture**

a) PIC Block diagram and description
b) Oscillator circuits,
c) Port Pin description
d) Internal Memory, External Memory
e) Counters and Timers
f) Interrupts

**Introduction to Firmware & Programming tools**

# 16th ,17th & 18th Week

**Simulation & Implementation on Hardware with PIC microcontroller**

a) Interfacing with LED
b) Interfacing with 7 segment
c) Interfacing with LCD
d) Interfacing with Relay
e) Interfacing with Buzzer
f) Interfacing with Motor
g) Interfacing with Sensor/ADC

# 19th & 20th Week



**Simulation & Implementation on Hardware with PIC microcontroller**

a) Interfacing with Serial Comm.
b) Interfacing with DTMF/RF
c) Interfacing with RFID
d) Interfacing with Hex keypad
e) Interfacing with GSM
f) Interfacing with Bluetooth
g) Interfacing with GPS

# 21th Week

**ARM Architecture**

g) ARM Block diagram and description
h) Oscillator circuits,
i) Port Pin description
j) Internal Memory, External Memory
k) Counters and Timers
l) Interrupts

**Introduction to Firmware & Programming tools**

# 22th ,23th & 24th Week

**Simulation & Implementation on Hardware with PIC microcontroller**

h) Interfacing with LED
i) Interfacing with 7 segment
j) Interfacing with LCD
k) Interfacing with Relay
l) Interfacing with Buzzer
m) Interfacing with Motor
n) Interfacing with Sensor/ADC

# 25th & 26th Week

**Simulation & Implementation on Hardware with PIC microcontroller**

h) Interfacing with Serial Comm.
i) Interfacing with DTMF/RF
j) Interfacing with RFID
k) Interfacing with Hex keypad
l) Interfacing with GSM
m) Interfacing with Bluetooth
n) Interfacing with GPS

**NOTE:-**



➢ **Live Major Projects**