

PROFESSIONAL COURSE IN RENESAS R8c TINY/13

COURSE DETAILS

1. Introduction to Embedded Technology

- v Brief overview of digital electronic
- v History of microcontroller development
- v Microcontroller vs. microprocessor
- v Different types of microcontrollers

2. The Renesas Advantage

The Renesas Architecture

Ø **Hardware Details**

- v Pin diagram
- v Port details

Ø **Port Organization**

- v I/O Ports
- v Port structure and operation
- v I/O Configuration
- v Port loading & interfacing

Ø **Memory Organization**

- v code memory
- v Internal RAM
- v External RAM
- v Bit memory

Ø **R8c Tiny Registers**

- v Basic registers
- v Registers
- v Special function registers {SFR}
- v The accumulator
- v B Register
- v Data pointer register
- v Program counter
- v Stack pointer

Ø **On Chip Peripherals**

- v Analog to Digital Converters
- v Timers/Counters
- v UART

Ø **Type of Interrupts**

- v Reset
- v External Interrupts
- v Interrupt destinations
- v Software generated Interrupts
- v Interrupt enable register
- v Interrupt control & priority
- v Timer flag Interrupt

- v Serial port interrupt

3. PROGRAMMING THE R8c Tiny/13

Ø INTRODUCTION TO PROGRAMMING LANGUAGES

- v Machine Language

- v Assembly Language

- v High Level Language

- v Why Assembly Language

- v C++ Programming

Ø Programming Tools and Techniques

- v Understanding Assembly Languages Syntax

- v Designing the program

- v Flow charts

- v Introduction to editors, assembler and simulator

Ø Addressing Modes

- v Immediate addressing

- v Register addressing

- v Direct addressing

- v Indirect addressing

4. INTRODUCTION TO INSTRUCTION SET

- v Arithmetic instructions

- v Logical instructions

- v Data transfer instructions

- v Jump and call instruction

- v Interrupt and interrupt handling routines

Ø Program flow

- v conditional branching

- v Direct jump

- v Direct calls

- v Return from subroutine

5. EMBEDDED C PROGRAMMING

- v Embedded C -Embedded cross compilers

- v Memory models

- v Data Types

- v Structures

- v Unions and Arrays

- v Important of pointers in Embedded C

- v Programming with Cross compiler tool

Ø Embedded Programming in HEW IDE:

- v Features of HEW IDE and Embedded Software development

- v Advanced Programming with C Software

6. Interfacing with real world devices

Ø DRIVING LEDs

- v Making different pattern with LED's

- v Rotation of LED(left & right)

v Binary counter

Ø INTERFACING OF KEYS

v Interfacing linear keypad

v Driving LED's with keys

v On/Off switch operation

Ø INTERFACING MATRIX KEYBOARD

v On/Off switch operation

v Integrating all LED's modules in one & controlling them with keys

DRIVING SEVEN SEGMENT DISPLAY

Ø Common Anode Display

v Fixed display of digits

v Entering parameters & driving display with matrix keypad

Ø INTERFACING 8 BIT LCD (16X2)

v Fixed one line static data communication between two microcontrollers

Ø INTERFACING THE ADC (analog to digital converter)

v conversion of analog signal into digital signal using ADC and see its effect by varying signal

Ø INTERFACING THE PWM (digital to analog converter)

v Conversion of digital signal into analog signal using DAC

Ø DATA EEPROM INTERFACING

v To write data and read the same from the EEPROM(24C01)

Ø DRIVING RELAY

v Relay driving using integrated circuits

Ø INTERFACING OPTO-ISOLATORS

v Getting control logic at a different voltage level

Ø STEPPER MOTOR

v Driving stepper motor

Ø Timers

v How timers count

v Measuring time

v How long do timers take to count

Ø Timers SFRs

v PCON

v TCON

v TMOD

v Mode 0-13 bit timer

v Mode 0-16 bit timer

v Mode 2-auto reload timer

v Mode 3-split timer

v Initializing a timer

v Reading a timer value

v Detecting a timer overflow

v Timing the length of an event

- v Timers as event counters
- v Using interrupts, synchronized with delay of one seconds

Ø COUNTER

- v To count the occurrences of a particular event

Ø Serial port operation

- v setting the serial port mode
- v setting baud rate
- v writing to the serial port
- v reading from the serial port

Ø SERIAL COMMUNICATION (RS-232 standard)

- v Establishing serial data communication between two microcontroller

6 REAL TIME PROJECT WORKS

- v To measure the temperature & display it on LCD
- v Only outperforming students in programming can avail this benefit

Ø FREQUENCY COUNTER

- v To count the frequency of an event & display it on LCD

With all this to offer, this is an opportunity of lifetime for you, so what are you waiting for, come and be the part of 120 Billion Dollars

Embedded Industry

An Investment in Knowledge Pays Best Returns. Benjamin Franklin

Corporate Office:

TICO INSTITUTE OF EMBEDDED TECHNOLOGY

B-1/628 3rd floor

Metro Pillar No.570

Main Najafgarh Road

Janakpuri, New Delhi-110 058

Ph. No. - 011-25571050, 9899795696.

Email - info@tico-india.com

Web: www.tico-india.com