

Embedded system course content (3 months)

(2 Hrs class = 1 Hr theory + 1 Hr Practice session)

1. Basics of AVR architecture

- a. Atmega16 architecture and pin diagram.
- b. Programmable I/O PORTS.
- c. Internal & external oscillators.
- d. RESET options.
- e. Others microcontroller of AVR.
- f. Interview questions

2. Code sequence

- a. Code sequence for microcontrollers programming.
- b. PORT initialization & its significance.
- c. Example of PORT initialization.
- d. PORT declaration & its significance.
- e. Example of PORT declaration.
- f. Exercise.

3. Introduction of embedded software

- a. Code vision AVR/ AVR studio.
- b. Proteus simulation software.
- c. Other supporting softwares.

4. LED programming

- a. Basics of LED based circuits.
- b. LED based programs with detailed analysis.
- c. Patterns on LED.
- d. Counters programming on LED.

5. Switch based programming

- a. Basics of switch based circuits
- b. Switch & LED based programs and their possible combinations.
- c. Logic gates (AND, OR etc) verification codes.
- d. Different patterns on LED using switch.

6. DC motor programming

- a. Discussion of amplifier circuit for DC MOTOR.
- b. DC motor based programming.
- c. Discussion of precautions required while coding for DC MOTOR.
- d. Programs based on combinations of switch, DC motor & LED.

- e. Coding of DC motor for robots.
- f. Coding of DC drives for DC motor.

7. Seven segment programming

- a. Seven segment library creation.
- b. Counter on seven segment.
- c. Switch controlled 7 segments for Air conditioners and TV.
- d. Instrumentation of DC drive using seven segment (timer circuit).
- e. Code for automatic washing machine using seven segment,
- f. Codes based on seven segments in combination with other peripherals.
- g. Coding for Multiple 7 seven segment,
- h. Multiplexing of 7 seven segment,
- i. Interview questions.

8. LCD programming

- a. Discussion of Hardware of LCD module with pin diagram.
- b. Modes in LCD.
- c. Discussion of LCD library.
- d. Switch controlled 7 segments for Air conditioners and TV.
- e. Instrumentation of DC drive using LCD (timer circuit).
- f. Code for automatic washing machine using LCD.
- g. Other live Projects based on LCD in industries.
- h. Function development for LCD. Interview questions.

9. Hardware interrupts (INT0/1/2)

- a. Basics of interrupt.
- b. Discussion of interrupt registers.
- c. Projects & Applications.
- d. Interview questions.

10. Timer/counter

- a. Basics of Timer/Counter.
- b. Discussion of timer/counter registers.



- c. PWM generation & its industrial application.
- d. Timer interrupts.
- e. Real time clock programming.
- f. Exercises & Sensors programming based on timers.
- g. Interview questions.

b. All above codes on Atmega8 microcontroller.

c. **Practical session on hardware.**

PROJECTS CURRENTLY USED IN INDUSTRIES & LIVE PROJECTS.

11. UART (universal asynchronous receiver transmitter) protocol

- a. Basics of UART.
- b. UART frame format.
- c. Discussion of UART registers.
- d. UART library.
- e. Projects & applications of UART in industries.
- f. Interview questions.

12. ADC (analog to digital convertor)

- a. Basics of ADC.
- b. Discussion of ADC registers.
- c. ADC library.
- d. Sensor development.
- e. Projects & applications of ADC in industries.
- f. Interview questions.

13. SPI (serial peripheral interface) protocol

- a. Basics of SPI.
- b. Discussion of SPI registers.
- c. SPI library.
- d. Projects & applications of SPI in industries.
- e. Interview questions.

14. I2C or TWI (Twin wire interface) protocol

- a. Basics of I2C.
- b. Discussion of I2C registers.
- c. I2C library.
- d. Projects & applications of I2C in industries.
- e. Interview questions.

15. Atmega8 microcontroller

- a. Atmega8 architecture and pin diagram.