



# Mirror Technologies

*Reflecting Ideas..*

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DIPLOMA IN EMBEDDED SYSTEM- SYLLABUS

ATMEL 8051 AND AVR MICROCONTROLLER

Duration-3 Months

## Level-1: Basic Electronics

Definition of Electronic -Components Used in an Embedded System -Resistor & Types & Colour Coding -Capacitor & Types ,Diodes (1N4007, 1N5408) & Types -Transistor (BC547, SL100, TIP122) & Types -Integrated Circuits-Switching Circuits -Regulator IC's - Specified IC's (741,555, Uln2003, MCT2E)-Relay & functional diagram-RF-Transceiver.

## Level-2: Fundamental Concept of C

C-Data types-Variables-Constants-Tokens-Operators-Priority of Operators- Conditional Statements- if statement, if else, if else ladder, Nested Ifs-Loops- for – while-do while-Nested loops-break-continue –goto-Case control and switch Vs if else ladder.

## Level-3: Functions

Functions without return type-with return type- no arguments- passing single argument-multiple arguments-Miscellaneous issues –advanced features-call by value-call by reference-pointers- recursion-Memory functions.

## Level-4: Arrays

Declaration and initialization-Arrays in functions-Array of pointers-passing an array element or an entire array to function- Bounds checking-Practical problems with bounds



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checking -introduction of 2D-arrays- Strings-Declaration-Initialization-Pointers and strings-string library functions.

## Level-5: Advanced C

Structures-Declaration-Memory allocation-Structures with pointers-Union-difference between structure and union-Storage Classes-auto, static, register and extern[scope, lifetime, memory problems]-Global Vs Extern-extern keyword- Type Casting -Pre-processor-Macro Expansions-Pre-processor Directives.

## Level-6: Foundation of Embedded System

Definition of Embedded System -Characteristics-Applications-Examples Language used in Embedded System -Assembly Language-Instruction set -Embedded Programming-Embedded Programming using C-Difference between C & Embedded C-Build Process Components -Assembler & Compiler -Microcontroller's Architecture-Diversify microcontrollers-KEIL -Cross Compiler-Universal Compiler.

## Level-7: Microcontroller (89C51 & 89S51 & 89S52)

Difference between CISC & RISC-Difference between Microprocessor and Microcontrollers -Pin diagram of each series -Complete Pin description-Difference between 8031, 8051, 8052-Addressing modes -Instruction sets used in ATMEL-Types of instructions - Timers/Counters with I/O ports -Applications using timers/counters-Sample programs.



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## Level-8: Handling Register types of Mnemonics

Bit manipulations -Arithmetic instructions-Boolean logical instructions-Data transfer instruction -Internal Transfer -External Transfer-RAM, ROM & Hybrid Mnemonics-Special Functions Registers.

## Level-9: Interrupts

Definition for Interrupt -Interrupt types -Handling interrupts -Polling sequences-Interrupt sequences-External interrupts-Internal interrupts-Programming for interrupt based applications-Problems at interrupts-Debugging ISRs-Interrupt Latency.

## Level-10: Peripheral Devices

Different peripheral device -Difference types of display units -7 Segments & its types -Principle of Operation-Common Anode mode-Common Cathode mode -16x2 LCD - Applications-Hardware interfaces-Interfacing Circuits for LCD & LED -Pin diagram of 16x2-working mechanism LCD using Arrays & Pointers.

## Level-11: Analyzing Analog & Digital Signal

Working Principle of ADC-Critical factors in ADC -Method used in ADC -Different types of ADC (Serial and Parallel ADC)-Hardware interfacing of ADC 0809 -PIN Description- Programming for reading the ADC value using port -Working Principle of DAC-DAC Types-PIN Description-DAC interfacing Keyboard Interfacing-Applications using keyboard interfacing.

## Level-12: Communication

Serial Communication -Hardware Description-Logical Level Converter-MAX 232 -design-Serial Port-Programming for serial communication-Implementation with Real time



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application-Parallel communication -Parallel port basics-Pin details-Interfacing with Microcontroller-PC to MC communication.

## Level-13: Application of Motors

Motors used for Robotics controls -Stepper Motor & Stepper driver circuit - Stepper motor Bidirectional controlling of DC motor -Method to change polarity-Sample programs -Different sensors-Applications.

## Level-14: Encoders/Decoders

Introduction of various Encoders & Decoders -Examples HT12E/HT12D Interfacing circuits-Real time implementation using encoder/decoder Programming -Examples -Communication between two systems using RF module -Wireless data transfer using HT640 Encoder-Wireless data transfer using HT648 Decoder .

## Level-15: Overview of Atmega32 Microcontroller

Introduction to Atmel AVR microcontroller -Advantage of Atmel micro controllers -Types and products of Atmel.

## Level-16: LCD, LED and 7 Segment Interfacing

LED interfacing-basic theory of the lcd interfacing- implementation and programming for the LCD display- implementation and programming for the 7 segment display.

## Level-17: ADC and Timer Implementation

ADC interfacing-basic theory of the ADC interfacing- implementation and programming for the ADC and LCD display- Introduction of timer peripheral - implementation and programming for timer peripheral.



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## Level-18: UART Implementation

Definition for various protocols -UART -implementation-Programming for UART communication.

## Level-19: I2C Protocol Implementation

I2C -implementation-Real time application using I2C- Advantages & Disadvantages Applications