INFOSOFT IT SOLUTIONS

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ARM CORTEX -M MICRO CONTROLLER

Introduction to ARM Cortex-M Architecture

- Overview of ARM architecture and its variants
- Introduction to ARM Cortex-M microcontrollers
- Comparison with other microcontroller architectures

ARM Cortex-M Basics

- ARM Cortex-M processor families (e.g., Cortex-M0, Cortex-M3, Cortex-M4)
- Understanding ARM Cortex-M instruction set architecture (ISA)
- Memory organization and addressing modes

Development Tools and Environment Setup

- Setting up development environment (IDEs, toolchains)
- Introduction to ARM Keil MDK or other development tools
- Configuring and programming ARM Cortex-M microcontrollers

ARM Cortex-M Assembly Language Programming

- Introduction to ARM assembly language
- ARM Cortex-M assembly programming basics (registers, instructions)
- Writing and debugging simple assembly programs

C Programming for ARM Cortex-M

- Basics of C programming for microcontrollers
- Using CMSIS (Cortex Microcontroller Software Interface Standard)
- Writing and debugging C programs for ARM Cortex-M

Peripherals and I/O Interfaces

- Overview of ARM Cortex-M peripherals (GPIO, UART, SPI, I2C, etc.)
- Configuring and programming peripherals
- Interfacing with sensors, actuators, and external devices

Interrupts and Exception Handling

- Understanding interrupts and NVIC (Nested Vectored Interrupt Controller)
- Handling interrupts and exceptions in ARM Cortex-M
- Writing interrupt service routines (ISRs)

ARM Cortex-M Memory Management

- Memory types and regions (SRAM, Flash memory)
- Memory management unit (MMU) vs. Memory Protection Unit (MPU)
- Memory mapping and addressing considerations

Real-time Operating Systems (RTOS) on ARM Cortex-M

- Introduction to RTOS concepts (tasks, scheduling, synchronization)
- Using FreeRTOS or other RTOS with ARM Cortex-M
- Implementing multitasking applications

Low Power Management

- ARM Cortex-M low power modes and features
- Implementing power-efficient designs
- Energy profiling and optimization techniques

Communication Protocols and Networking

- Implementing communication protocols (CAN, Ethernet, USB)
- Networking with ARM Cortex-M microcontrollers
- IoT connectivity considerations

Debugging and Testing Techniques

- Debugging tools and techniques for ARM Cortex-M
- Unit testing and integration testing
- Code optimization and performance profiling

Security Considerations

- Security features in ARM Cortex-M microcontrollers
- Implementing secure firmware updates
- Best practices for securing embedded systems

Advanced Topics and Applications

- Advanced ARM Cortex-M features (DSP, floating-point unit)
- Signal processing applications with ARM Cortex-M
- Case studies and real-world applications