1. **Embedded System Basic Requirements**

   An embedded system requires a wide range of operating systems, programming tools, and microprocessors. Each system has to be customized and adjusted to the needs of the hardware that it has to be operated and run on. Embedded systems are also subject to qualify attributes and constraints that apply only to physical systems. It has both hardware and software requirements. Hardware requirements include microcontrollers or microprocessors, memory (RAM, ROM and flash memory), Peripherals (input and output interfaces such as GPIO ports and pins, UART(Universal Asynchronous Receiver-Transmitter) , SPI(Serial Peripheral Interface) , I2C(Inter-Integrated Circuit), Analog to Digital converters, Digital to Analog converters, timers, counters and other specialized peripherals. They also need communication interfaces using protocols such as USB, Ethernet, Wifi, Bluetooth, etc. Power supplies and clock timer systems are also fundamental hardware components. Embedded systems need operating systems depending on the complexity of the application, software interfaces, device drivers, compiler and development tools.

   ARM Processor Architecture

   The Arm architecture is a family of reduced instruction set computing (RISC) architectures for computer processors.The main requirements of an ARM processor are program memory (e.g. flash memory), SRAM, Peripherals, internal bus infrastructure, Clock generator (including Phase Locked Loop), reset generator, and distribution network for these signals, Voltage regulator and power control circuits, other analog components (e.g., ADC, DAC, voltage reference circuits), I/O pads, support circuits for manufacturing tests, etc. Peripherals and control registers for system management are accessible from the memory map. In most cases, the processor does all the work of controlling the peripherals and handles the system management. ARM processors have different modes : user modes, supervisor mode, abort mode, undefined mode and system mode. Registers include General purpose registers, status registers, link registers, stack pointer and program counters. ARM processors use instruction sets which include load and store instructions, Arithmetic logic instructions, data transfer instructions, branch instructions, conditional execution, multiply and multiply accumulate instruction, bit manipulation instructions, and floating point instructions.