Classification based on generation :-

a) first generation :- The early embedded systems were built around 8 bit micro processors like 8085 and 780 and 4 bit micro controllers. Simple hardware circuits with firmware developed in assembly code.

Ex:- Digital telephone keypad, stepper motor control etc--

b) second generation :- These are embedded systems built around 16 bit micro processors and 8 (or) 16 bit micro-controllers. The instruction set for these processors/controllers are much more complex and power full than 1st generation.

Ex:- Data Aquisition systems, SCADA systems e.t.c---

[supervisory control & data Aquisition (SCADA)]

c) Third generation :- These are embedded systems built around 32-bit processors and 16-bit micro controllers for their design. A new concept of application specific and domain specific processors / controllers like digital signal processor (DSP) and Application specific IC's (ASIC's) came into existance. pipelining concepts are introduced making instruction set more complex. processors like Intel, pentium, motorola '68K e.t.c.. gained attention in high performance embedded requirements

Fourth generation :- The advent of system on chips (SOC) reconfigurable processors and multi-core processors increased the speed and miniatured the size of embedded systems in market. System on chip technique implements a total system on chip by integrating different functionalities with a processor core on an IC. They uses high performance RTOs for functioning

Ex:- Smart phones, mobile internet devices (MID's) e.t.c--

Classification based on complexity and performance :-

Small scale embedded system :- These are usually built around low performance and low cost. 8 (or) 16-bit microprocessors / microcontrollers. It may (or) may not contain operating system for its functioning.

Ex :- electronic toy, A battery remote control for TV etc.

Medium-scale embedded system :- Embedded systems which are slightly complex in hard-ware and firmware requirements falls under this category. These are usually built around 16 (or) 32-bit microprocessors (or) controllers It contains an embedded operating system for functioning

large-scale embedded system :- They have high complex hardware and firmware. These are built around 32 (or) 64-bit RISC processors / controllers (or) reconfigurable

System on chip (RSOC) (or) multi-core processors and programmable logic devices. They have RTOS for task scheduling, prioritization and management. (3)

Ex :- Decoding / encoding media, cryptographic function implementation etc..