Characteristics of Embedded systems

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- Embedded system must be designed in such a way that it should fulfill various characteristics so that user will get delightful, reliable, safe operation at lower cost in less space, low power consumption, low weight and decent look
- Characteristics

1. Processor power
2. Memory
3. operating system
4. Reliability
5. NRE Cost
6. Unit Cost
7. Size

8. Power
9. Performance
10. Flexibility
11. Time to prototype
12. Time to market
13. Correctness
14. Safety

Processor power

- It should be enough to process the desired task
- 8, 16, 23, 64 bit controller can be selected as per requirement
- Processing power speed increases with clock
- DSP chips can be used for enhancing audio video processing

Memory

- Memory type should be properly selected as per need
- RAM, ROM, EEPROM, EPROM, Flash ROM, SDRAM,Harddisk
- Memory size in KB, MB, GB should be properly selected as per need

Operating system

- OS should occupy less area in memory
- Type of OS: Tiny OS, Embedded OS, Real-time OS, Mobile OS
- Free or licensed
- operating system must be reliable and able to run with tight constraints on memory, size, time and processing power

Reliability

- System must perform as per expectation all the time without errors
- It should have capability to recover in case if error occurs
- Software and hardware should be tested thoroughly with care to ensure reliability

NRE Cost (Non- Recurring Engineering cost)

- It is the cost involving design and development of first fully working prototype
- It includes research and development

Unit Cost

- It is the cost of an item when manufactured on large scale
- It excludes NRE Cost

Size

- It should be as small as possible so that it will occupy less space

Flexibility

- Though embedded system is a dedicated system, it should have flexibility to modify the functionality without investing more in NRE cost
- Software should be flexible to update the functionality in newer version

Time to prototype

- Time required to involving design and development of first fully working prototype
- It includes research and development
- It should be minimum as technology is rapidly changing and various similar products are launched daily

Time to market

- Time required for designing, manufacturing the system till the product is sold to market.
- It should be minimum
- If it is too long, other competitors may launch product in the mean time and profit margin may reduce. As technology is rapidly changing, various similar products are launched daily

Maintainability

- Provision should be made for Maintainability of the system in case of malfunction of device hardware. Disassembly and assembly options should be easily available
- In compact systems this feature is not available or difficult to maintain
- Sometime the systems are use and throw

Correctness

- System should work with specified accuracy all the time
- System should be thoroughly checked through various quality control tests under all surroundings for all parameters

Safety

- System should not cause harm to the user or other during operation or during failure
- System should not radiate any electromagnetic waves which will cause harm to the user or interfere with other electronic instruments