Embedded Systems

Embedded System is an integrated system that is formed as a combination of computer hardware and software for a specific function. It can be said as a dedicated computer system has been developed for some particular reason. But it is not our traditional computer system or general-purpose computers, these are the Embedded systems that may work independently or attached to a larger system to work on a few specific functions. These embedded systems can work without human intervention or with little human intervention.
Three **main components of Embedded systems** are:
1. Hardware
2. Software
3. Firmware

Some examples of embedded systems:

- Digital watches
- Washing Machine
- Toys
- Televisions
- Digital phones
- Laser Printer
- Cameras
- Industrial machines
- Electronic Calculators
- Automobiles
- Medical Equipment

Application areas of Embedded System:

Mostly Embedded systems are present everywhere. We use it in our everyday life unknowingly as in most cases it is integrated into the larger systems. So, here are some of the application areas of Embedded systems:

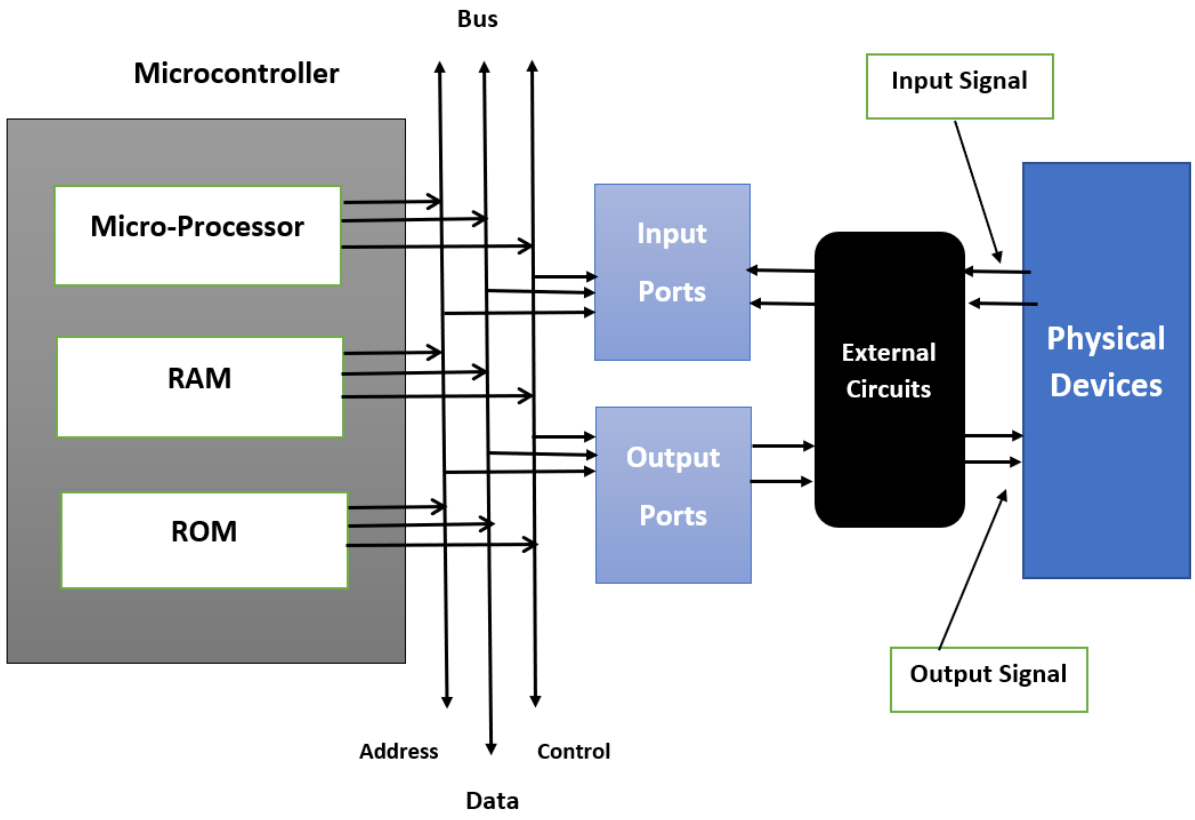
- Home appliances
- Transportation
- Health care
- Business sector & offices
- Defense sector
- Aerospace
- Agricultural Sector

Important Characteristics of an Embedded System:

1. **Performs specific task:** Embedded systems perform some specific function or tasks.
2. **Low Cost:** The price of an embedded system is not so expensive.
3. **Time Specific:** It performs the tasks within a certain time frame.
4. **Low Power:** Embedded Systems don’t require much power to operate.

5. **High Efficiency:** The efficiency level of embedded systems is so high.
6. **Minimal User interface:** These systems require less user interface and are easy to use.
7. **Less Human intervention:** Embedded systems require no human intervention or very less human intervention.
8. **Highly Stable:** Embedded systems do not change frequently mostly fixed maintaining stability.
9. **High Reliability:** Embedded systems are reliable they perform tasks consistently well.
10. **Use microprocessors or microcontrollers:** Embedded systems use microprocessors or microcontrollers to design and use limited memory.
11. **Manufacturable:** The majority of embedded systems are compact and affordable to manufacture. They are based on the size and low complexity of the hardware.

Block Structure Diagram of Embedded System:



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Advantages of Embedded System:

- Small size.
- Enhanced real-time performance.
- Easily customizable for a specific application.

Disadvantages of Embedded System:

- High development cost.
- Time-consuming design process.
- As it is application-specific less market available.

Top Embedded Programming Languages: Embedded systems can be programmed using different programming languages like Embedded C, Embedded C++, Embedded Java, and Embedded Python. However, it entirely depends on the developer to use which programming language for the development of the embedded systems.