10422030

This lesson covered microcontrollers and single-board computers. Create a table comparing and contrasting them, and note at least 2 reasons why you would use a microcontroller over a single-board computer, and at least 2 reasons why you would use a single-board computer over a microcontroller.

Answer:

1. Create a table comparing microcontrollers to single-board computers

Feature	Microcontroller	Single-board Computer
Purpose	Control specific devices, embedded systems.	Run operating systems, perform complex tasks.
Operating System	Usually none or simple RTOS.	Full operating systems like Linux, Windows IoT.
Communication	Basic interfaces like GPIO, UART, SPI, I2C.	More diverse with USB, Ethernet, HDMI, Wi-Fi, Bluetooth.
Performance	Lower performance, focus on energy efficiency.	Higher performance, can handle multiple tasks.
Memory	Small memory, often integrated on chip.	Larger memory, expandable with cards, hard drives.
Cost	Cheaper.	More expensive.
Size	Compact, highly integrated.	Larger
Power Consumption	Low power consumption.	Higher power consumption.

2. Reasons for using one over the other

Reasons to Use a Microcontroller:

Reasons to Use	a Microcontroller
Energy Efficiency	Microcontrollers consume less power, suitable for battery-powered devices or applications needing continuous operation.
Low Cost	Microcontrollers are generally cheaper, suitable for budget-constrained projects or mass production.
Small Size	Microcontrollers are compact, easy to integrate into small devices or embedded systems.

Specialized Functionality	Microcontrollers are designed for specific tasks, optimizing performance and reducing system complexity.
Applications	Motor control in robots, temperature control in microwaves, LED control in billboards.

Reasons to Use a Single-board Computer:

Reasons to Use	a Single-board Computer
High Performance	Single-board computers have higher processing power, suitable for complex tasks like image/video processing or AI.
Full Operating System	Single-board computers run full operating systems, simplifying application development and leveraging existing libraries/tools.
Diverse Connectivity	Single-board computers offer more diverse interfaces, enabling connections to various peripherals and networks.
Expandability	Single-board computers can expand memory, storage, and features through expansion slots.
Applications	Web servers, security monitoring systems, smart IoT devices, robots with image processing capabilities.