MODULE 1: Computer Systems Fundamentals

Lecture 1.1
Computer Organization and Computer Architecture

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Lecture 1.1 Objectives

- Enumerate the components of a typical computer system and identify their basic functions

- Cite examples of different types of components of a computer system

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# Computer Organization and Architecture

- Understanding computer systems requires knowledge of computer organization and computer architecture

- Computer organization:

  - How are "physical" components designed and integrated to provide a computer system?

  - Operations, control logic and signals, storage, etc.

- Computer architecture:

  - What is the logical operation of a computer as seen by the (assembly language) programmer?

  - Instruction set, datatypes, addressing, registers, etc.

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Computer Components 1/2
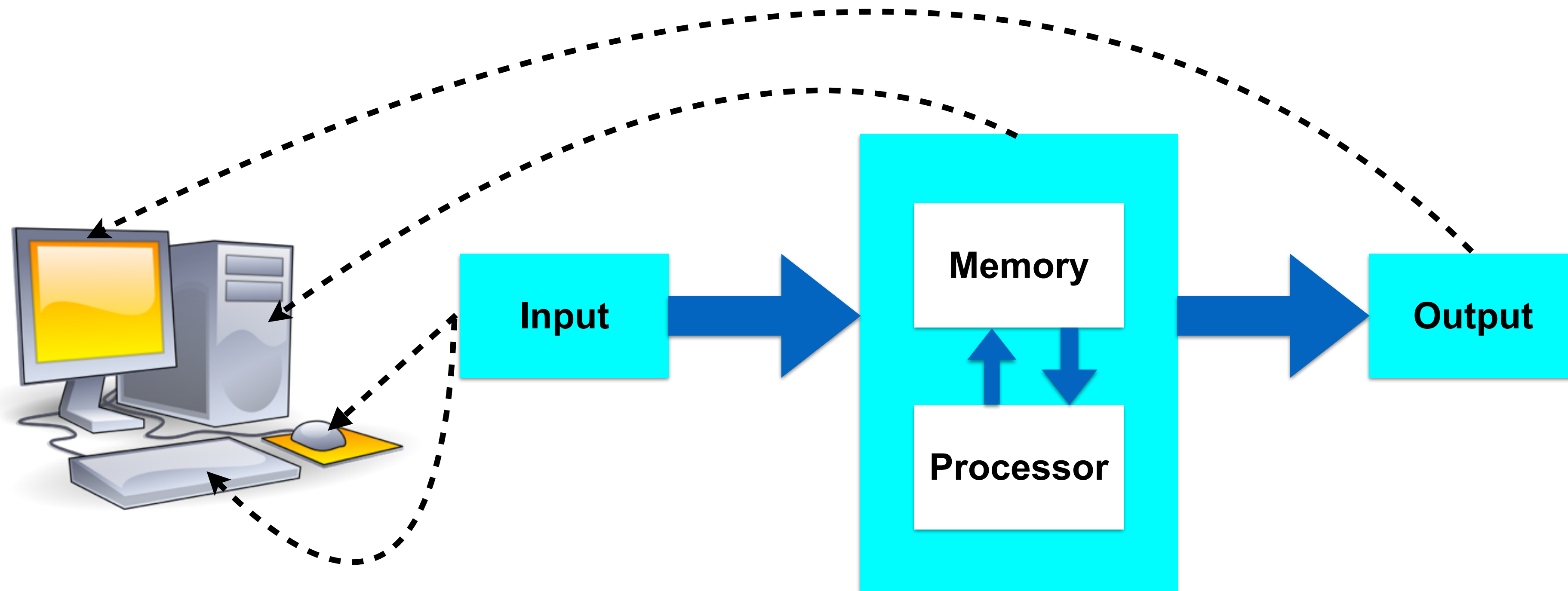
The most basic view of a computer

- Processor: interprets and executes programs

- Memory: stores both data and program

- Input/output (I/O): mechanisms to transfer data to and from external components

Computer Components 2/2
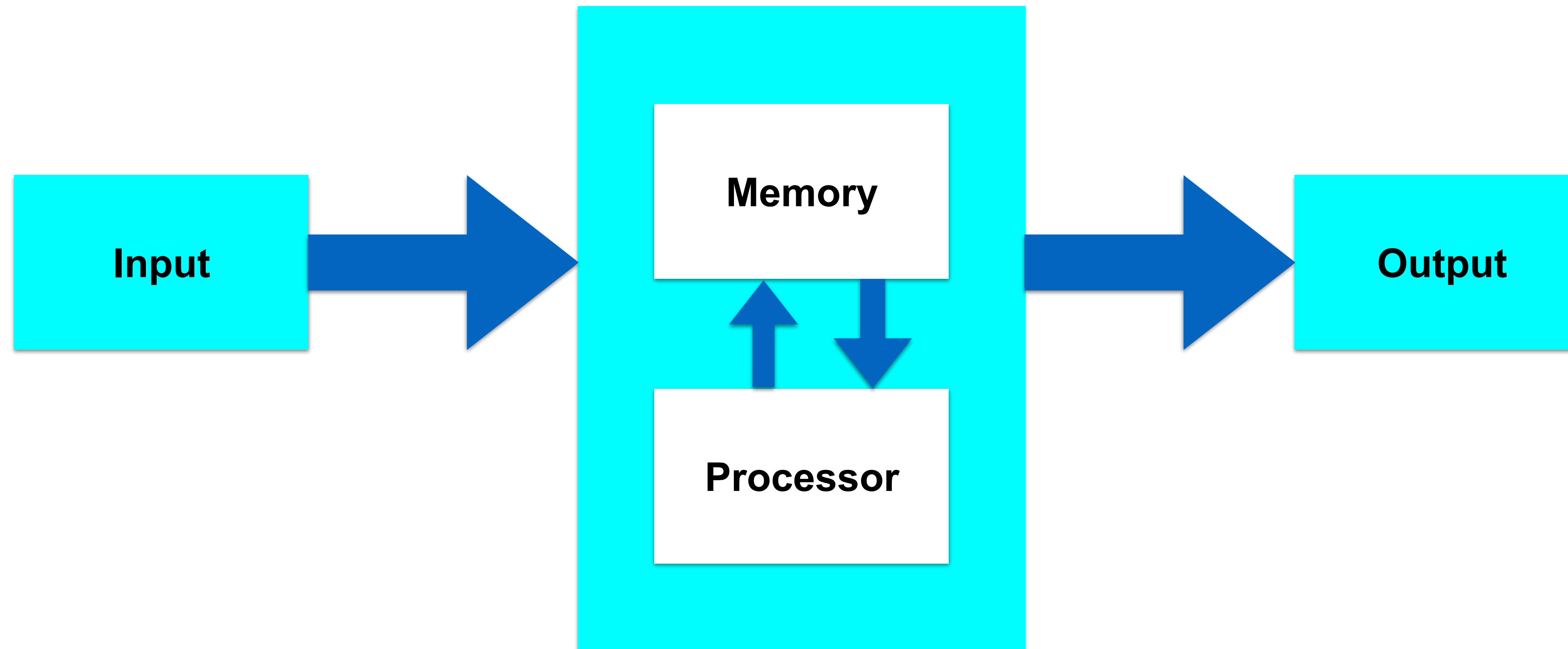
Many "components" may be realized in hardware or software, but with implications for performance and cost

Computer Components—Traditional

The common personal computer provides specific examples of these components

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CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can:

- Enumerate the components of a typical computer system and identify their basic functions

If you have any difficulties, please review the lecture video before continuing.

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Computer Components—Embedded

sensors

actuators

Memory

Input

Processor

Output
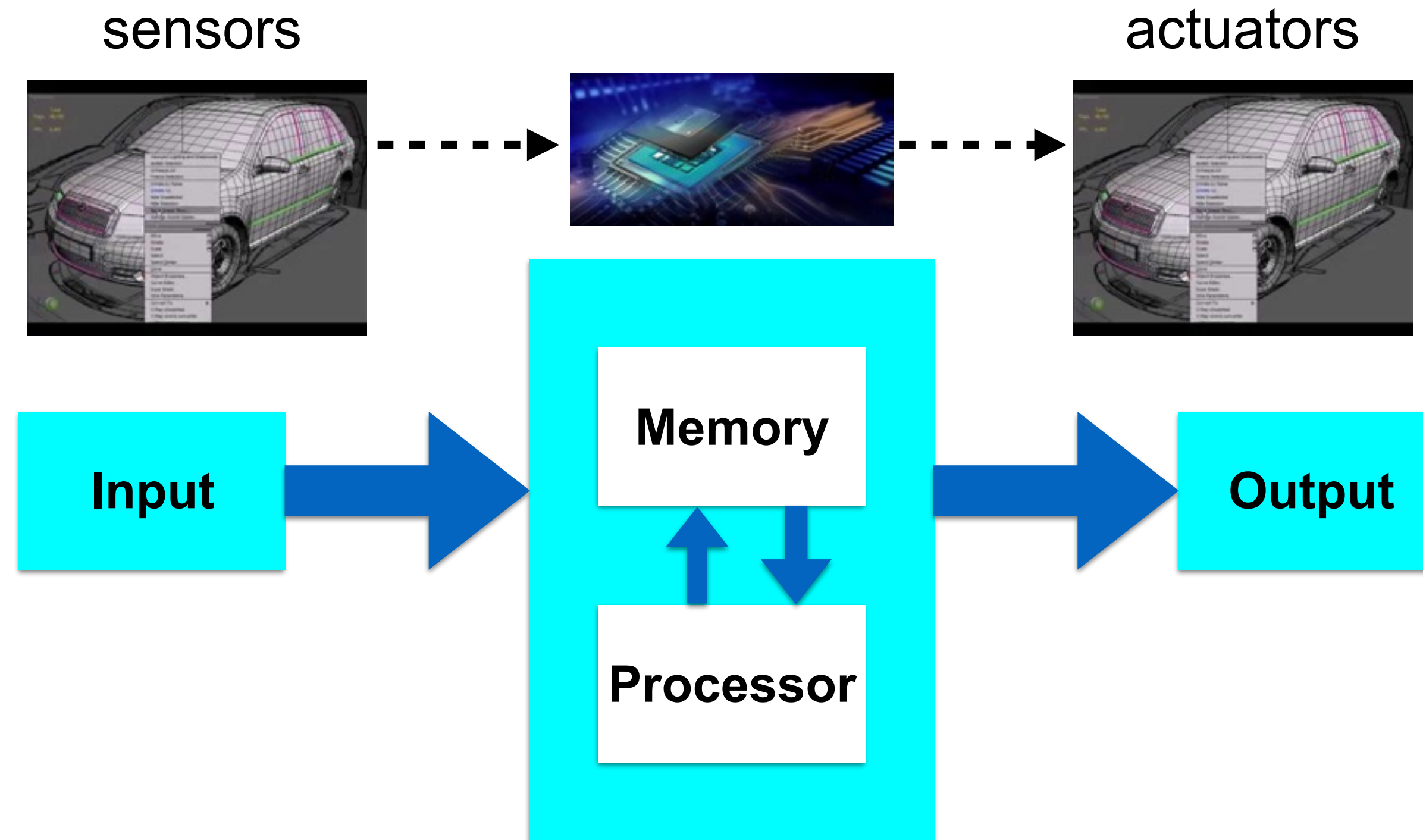
- There are many computers that we think of as other systems or products
- Have the same basic components although they may differ in capabilities, size, power consumption, etc.

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Many Variations: Processors

- Different instruction set architectures

- Different basic data sizes, e.g., 4, 8, 16, 32, 64 bits

- Different clock speeds, e.g.,1MHz,1GHz, etc.

- Other features may vary

Many Variations: Memory

- Main memory (and many variations of these)

  - Dynamic random access memory (DRAM)

  - Static random access memory (SRAM)

  - Read-only memory (ROM)

- Secondary storage–e.g., disk, tape systems

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Many Variations: Input/Output

- Input devices–keyboards, mice, tablets, scanners, sensors, general-purpose digital input/output, etc.

- Output devices–displays, sound cards, printers, network interface cards, actuators, etc.

- Removable storage–CD-ROM, DVD-ROM, memory cards, etc.

- There are also many alternatives to interconnect components

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CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can:

- Cite examples of different types of components of a computer system

If you have any difficulties, please review the lecture video before continuing.

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Summary

- Computer organization considers broad systems issues, while computer architecture considers the logical view of the computer as seen by a programmer

- Three basic components of a computer system are: the processor, memory, and input/output devices

- There are many variations of each type of component

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