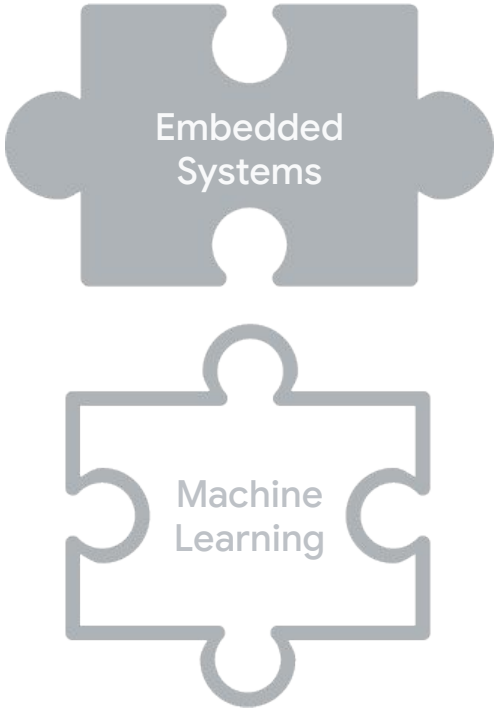
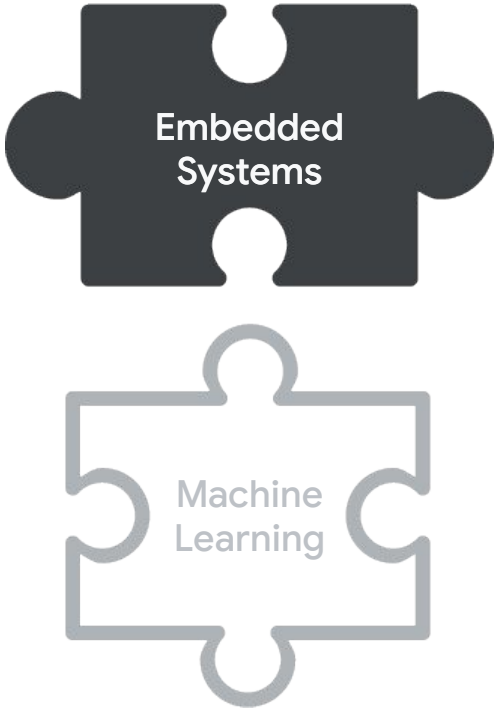
What are the Challenges for TinyML?

Part A



TinyML



TinyML

Building Blocks of Computing Hardware

Hardware

Software

Compute

Memory

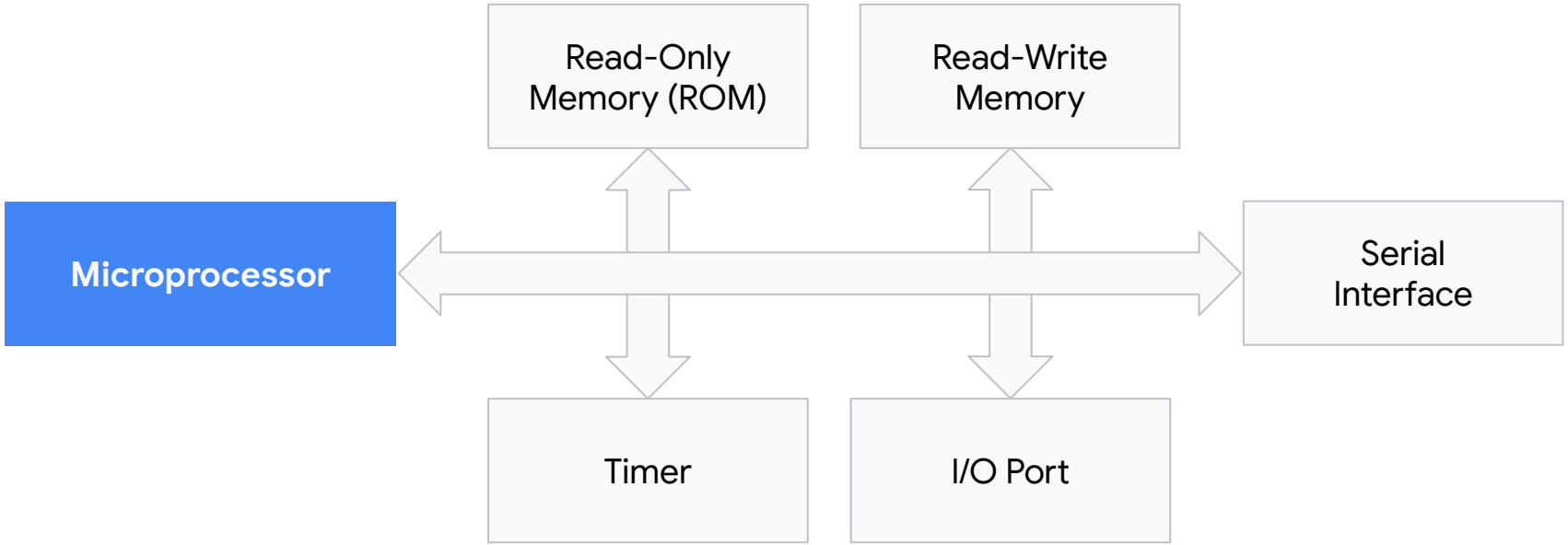
Storage

Microprocessor

v.

Microcontroller

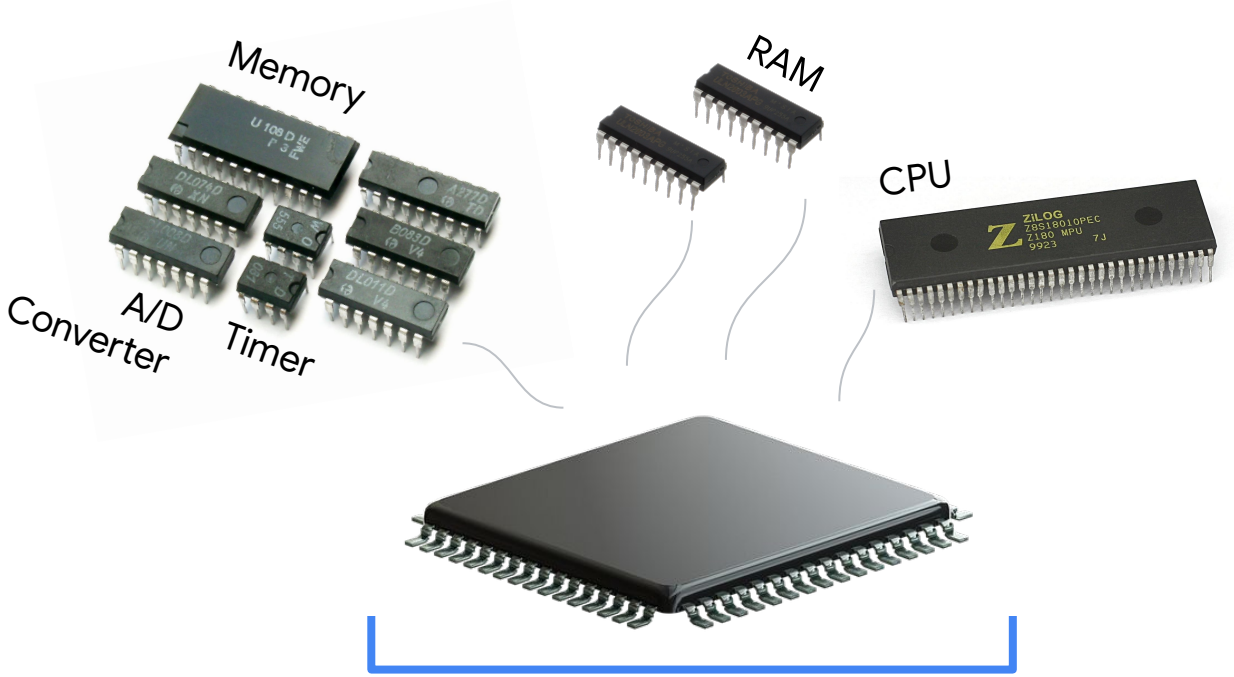
Microprocessor: only **one part** of the puzzle



Microcontroller

CPU	Read-Only Memory (ROM)	Read-Write Memory
Timer	I/O Port	Serial Interface

Microcontroller: a **complete package**



Microprocessor

- Heart of a **computer system**
- Just the processor, memory and storage are **external**
- Mainly used in **general purpose systems** like laptops, desktops and servers
- **Offers flexibility** in design
- System size is **big**

Microcontroller

- Heart of an **embedded system**
- Memory and storage are all **internal** to the system
- Mainly used in **specialized, fixed function systems** like phones, MP3 players, etc.
- **Limited flexibility** in design
- System size is **tiny**

Orders of Magnitude Difference

	Microprocessor	>	Microcontroller
Platform			
Compute	1GHz–4GHz	**~10X**	1MHz–400MHz
Memory	512MB–64GB	**~10000X**	2KB–512KB
Storage	64GB–4TB	**~100000X**	32KB–2MB
Power	30W–100W	**~1000X**	150µW–23.5mW

Implications

- How complicated is the running task?
- How much memory does it need to have?
- How long does the job have to perform?

Microcontroller

1MHz-400MHz
2KB - 512KB
32KB - 2MB
150μW–23.5mW