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LEARN HOW EDGE AI POWERS YOUR SMARTWATCH

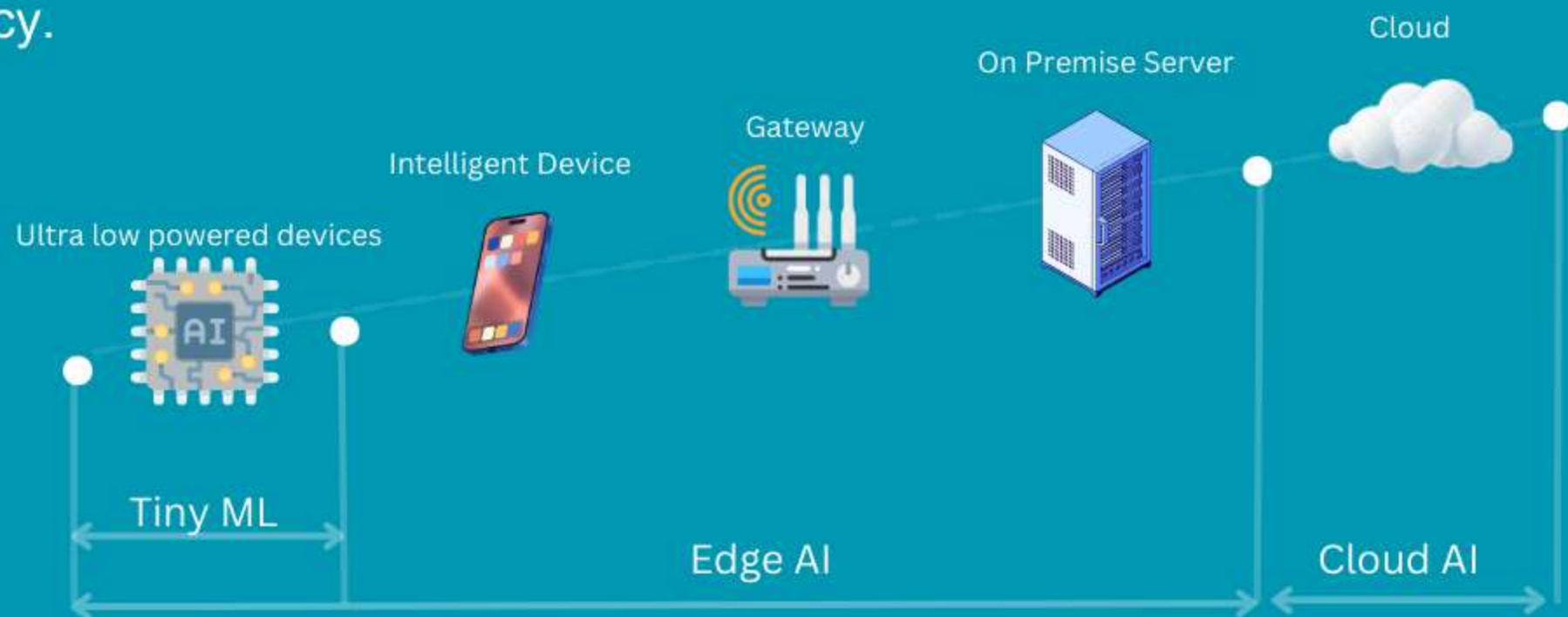
An introduction to Edge AI



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Introduction

Edge AI refers to running AI algorithms directly on devices like smartphones, cameras, and IoT devices rather than relying on cloud-based systems. This allows for faster processing of data thereby reducing latency and increasing privacy.



Why Edge AI?

- **Speed:** Processes data in real-time without sending it to the cloud.
- **Privacy:** Keeps data on-device, enhancing security.
- **Reliability:** Works without internet connectivity.
- **Efficiency:** Reduces bandwidth and energy consumption.

Components of Edge AI

Hardware:



- Graphics Processing Units (GPUs), Tensor Processing Units (TPUs), and Edge Accelerators are ideal for parallel processing tasks and are commonly used in devices needing high computational power, such as smartphones and drones.

Software:



- Optimization techniques such as model quantization, pruning, and compression along with software frameworks like TensorFlow Lite, PyTorch Mobile, and ONNX Runtime are designed to run AI models on edge devices.

Connectivity:



- Edge devices often communicate over local networks like Wi-Fi, and Bluetooth with occasional internet connectivity and edge-to-edge communication to share data, synchronize with cloud services, and make collective decisions.

How Does Edge AI Work?

1. Data Collection:

- Depending on the application, data can be captured using sensors and IoT devices. For example, a smart camera captures video, a wearable device monitors heart rate, and more.

2. Processing:

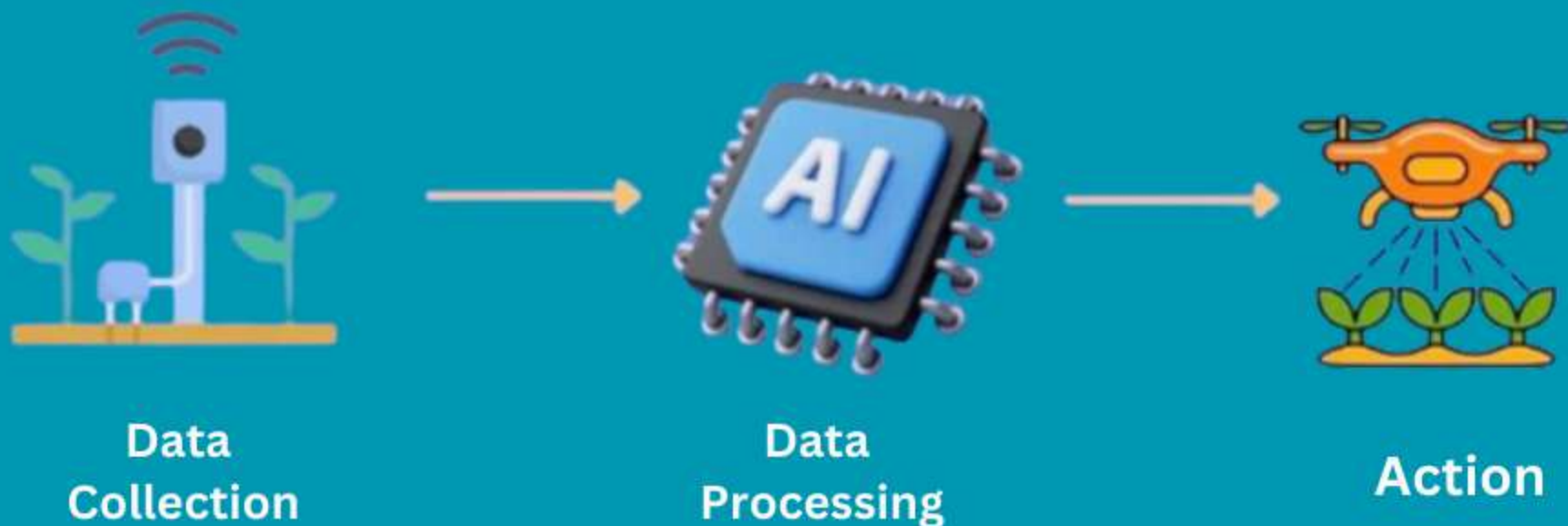
- AI models analyze data directly on the device that is processed in real-time then using specialized hardware, AI models interpret the data. The data is processed locally which reduces the need for constant data transmission to the cloud, saving bandwidth and energy.



How Does Edge AI Work?

3. Action:

- The edge device can trigger actions like sending alerts, adjusting settings, or controlling other devices. For example, a security camera sends a notification when it detects movement, a thermostat adjusts the temperature based on occupancy, and more.



Applications

1. Healthcare:

- Wearable devices monitor health metrics using fitness trackers measuring physical activity, and smartwatches monitoring heart rate patterns, providing real-time health insights.



2. Smart Homes:

- Voice assistants like Siri and Alexa respond to voice commands and control home lighting appliances.



3. Autonomous Vehicles:

- Real-time decisions are made for self-driving cars by interpreting surroundings to navigate safely, detecting obstacles and pedestrians, and making split-second driving decisions.



Challenges



1. Limited Resources:

- Devices have less processing power compared to cloud servers.
- Solutions: Use of specialized hardware like TPUs and optimized models to balance performance and efficiency.

2. Model Optimization:

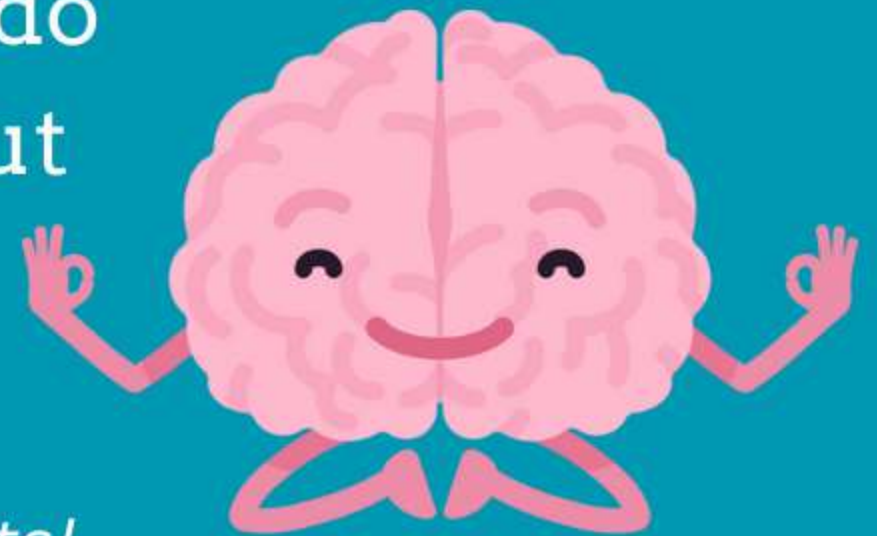
- AI models need to be optimized for performance and efficiency.
- Techniques: Employing techniques like model quantization, pruning, and compression to fit models into resource-constrained devices.

3. Scalability:

- Deploying and managing AI on numerous devices can be complex.
- Management Tools: Utilizing edge AI platforms and management tools to deploy updates, monitor performance, and manage large-scale edge deployments.

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How many everyday devices do you think use Edge AI without you even realizing it?



Join the conversation in the comments!

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