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Cables: DSI provides a high-resolution display interface that is specifically used for sending video data.

→ IOT devices and Deployment Models:→ IOT devices come in various type and are deployed using different models depending on their use case and deployment requirements. Here's an overview of common IOT device types and deployment models:→

(A) Types of IOT devices:→

(1) Sensors → Function:→ Collect and transmit data about the physical environment.
Example:→ Temperature sensors, humidity sensors, pressure sensors and etc.
use Cases:→ Smart homes, Industrial automation, healthcare devices and environmental monitoring.

(2) Actuators → Function:→ Perform actions in response to data or commands received ~~to data or~~ from a central system.
Example:→ Motors, valves, relays and pumps
use Cases:→ Industrial Machines, robotics, smart agriculture, HVAC system.

(3) Smart devices → Function:→ Combine sensors, actuators and connectivity to perform specific tasks.
Example:→ Smart thermostats, smart locks, smat lighting system.

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Use cases :→ Home automation, building management, energy management.

(4) Wearables :→ Function :→ Portable devices that are worn on the body to collect health, fitness or activity data.
Example :→ Smartwatches, fitness trackers, health monitor, and smart glasses.
use Cases :→ Healthcare, fitness tracking, Personal safety.

(5) IOT Gateway :→ Function :→ Serve as an intermediary between IOT devices and the Cloud or Centralized servers, handling data aggregation, processing and Comm.
Example :→ Edge devices, routers and hubs.
· use Cases → Industrial IOT, Smart Cities, large-scale deployment with multiple sensors.

(6) Connected Vehicles :→ Function :→ Vehicles that use IOT technology to connect with other devices, infrastructure, and services for enhanced functionality.
Example :→ Autonomous cars, fleet management system, and Connected Transport System.
use Cases :→ Transportations logistics, automotive industry, smart cities.

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(B) IOT deployment models :->

(i) Device-to Device (D2D) Model -> Device Communicate directly with each other without the need for a Centralized server. This Comm is often based on Protocol like Bluetooth, Zigbee or Z-Wave.

use Case -> Smart home system, peer to peer comm. and local Control system.

Advantage -> low latency, suitable for local interaction, reduced dependence on the Internet.

limitation -> limited Scalability, range.

(ii) Device to Cloud (D2C) Model -> IOT device Connect directly to the cloud to send and receive data. Data processing and storage and handled in the cloud.

use -> Consumer IOT devices, remote monitoring system, data analytices.

Advantage -> High Scalability, Centralized data storage, easy integration with analytics platform.

limitation -> latency issues, potential security.

(iii) Device-to-Gateway (D2G) Modii -> Device Connect to an IOT Gateway which aggregates data before sending it to the cloud or performing local processing. The gateway can also provide local intelligence.

use -> Industrial IOT, health care devices, smart Agriculture.

Advantages → Reduced latency, local data processing, enhanced security.

Limitations → Gateway can become a single point of failure, higher infrastructure costs.

(iv) Edge Computing Model → Data processing occurs at the edge of the network, close to the source of data, instead of relying on centralized cloud servers. Edge devices handle computation locally.

use cases → Real-time analytics, autonomous vehicles, industrial automation.

Advantages → lower latency, real-time decision-making, reduced data transfer costs, enhanced data security.

Limitation → Limitation computing power compared to cloud, complexity in managing.

(v) Fog Computing Model → An extension of edge computing that adds a layer of intermediate processing b/w the edge devices and the cloud. It involves data processing at multiple levels.

use cases → Smart Cities, large-scale IOT network, and systems requiring hierarchical data processing.

Advantages → Improved scalability, better & better management and reduced latency.

Limitation → Increased complexity in implementation, higher infrastructure requirements.

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(vi) Hybrid Model → Combines Multiple deployment models to leverage the strengths of each approaches, using both cloud and edge Computing depending on the specific requirements.

use Case → Complex IOT environments like Smart Cities, industrial IOT and healthCare system.

Advantages → Flexibility, optimized performance, adaptability to different use cases.

limitation → High Complexity in managing different layers.