

INDIVIDUAL TASK-2

My Daily Data Inventory: Track the types and sources of data you interact with daily (e.g. mobile) apps, websites, sensors) and classify them as a Structured, Semi-Structures, or Unstructured

1. Introduction

In today's digital world, **sensors** play a vital role in collecting data from the physical environment. Sensors are embedded in **smartphones, wearable devices, vehicles, smart homes, and healthcare systems**. These sensors continuously monitor physical conditions such as **temperature, location, motion, sound, and heart rate**.

Studying sensor-generated data is important because it forms the backbone of **Internet of Things (IoT), real-time systems, data analytics, and artificial intelligence applications**.

The data collected from sensors is classified into:

- **Structured Data**
- **Semi-Structured Data**
- **Unstructured Data**

2. Overview of Sensors Used in Daily Life



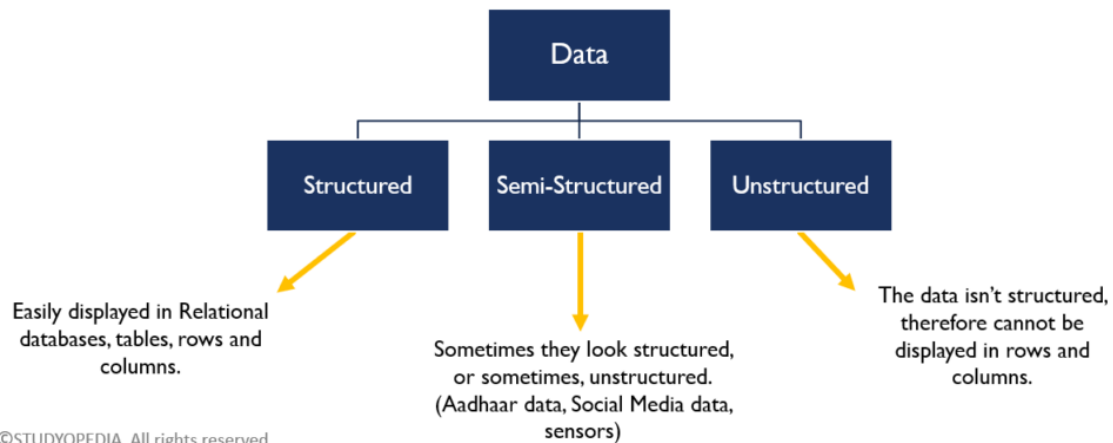
2.1 Common Sensors Around Us

- GPS sensor (location tracking)
- Accelerometer (motion detection)
- Gyroscope (orientation)
- Temperature sensor
- Heart rate sensor

- Camera sensor
- Microphone sensor

Each of these sensors generates **continuous streams of data**, which must be stored and processed efficiently.

3. Types of Data Generated by Sensors



3.1 Structured Data

Structured sensor data is **numerical and well-organized**. It is stored in databases with predefined formats.

Examples:

- GPS coordinates (latitude, longitude)
- Temperature readings (°C)
- Step count per day
- Heart rate values (BPM)
- Humidity levels

Characteristics:

- Easy to store in relational databases
- Fast querying and analysis
- Used for statistical analysis and predictions

3.2 Semi-Structured Data

Semi-structured sensor data includes **metadata** along with sensor values. It does not strictly follow a table structure.

Examples:

- Smartwatch activity logs
- IoT device communication packets
- Sensor data stored in JSON/XML
- Device status reports

Characteristics:

- Flexible structure
- Easy to exchange between systems
- Common in cloud-based IoT platforms

3.3 Unstructured Data

Unstructured sensor data includes **audio, video, and raw signals**.

Examples:

- Voice recordings from microphone
- CCTV video footage
- Images captured by phone camera
- Smart assistant voice commands

Characteristics:

- Difficult to process directly
- Requires AI/ML techniques
- High storage requirement

4. Daily Data Inventory Table (Sensors Domain)

Temperature Sensor	Temperature reading	Structured	Fixed format	
Fitness Band	Sensor Source	Collected Data	Data Type	
Smartwatch Logs	GPS Sensor (Mobile)	Latitude, longitude	Structured	
IoT Device Logs	Device ID, time, value	Semi-Structured	JSON/XML format	
Microphone Sensor	Voice recordings	Unstructured	Audio data	
Camera Sensor	Images, videos	Unstructured	Media files	
Smart Assistant	Voice commands	Unstructured	Raw sound signals	

5. Sensor Data Flow Architecture



5.1 Data Flow Steps

1. **Data Collection** – Sensors capture physical signals
2. **Data Transmission** – Data sent via Bluetooth/Wi-Fi
3. **Data Storage** – Stored in databases or cloud servers
4. **Data Processing** – Filtering, aggregation, analysis
5. **Data Visualization** – Graphs, dashboards, alerts

6. Applications of Sensor Data

6.1 Healthcare

- Heart rate monitoring
- Fitness tracking
- Early disease detection

6.2 Smart Cities

- Traffic monitoring
- Pollution tracking
- Smart street lighting

6.3 Smart Homes

- Temperature control
- Security surveillance
- Energy management

6.4 Transportation

- Vehicle tracking
- Accident detection
- Navigation systems

7. Challenges in Sensor Data Management

- Large volume of continuous data
- Real-time processing requirements
- Data security and privacy
- Storage and scalability issues
- Noise and inaccurate sensor readings

8. Conclusion

In the **Sensors (IoT) domain**, daily interaction with smart devices generates large amounts of data in different formats. This data can be classified as:

- **Structured Data** – numerical sensor readings
- **Semi-Structured Data** – logs and metadata
- **Unstructured Data** – audio and video data

Maintaining a **daily data inventory of sensor data** helps a **B.Tech student** understand real-world data collection, classification, and processing, which is essential for advanced technologies such as **IoT, Artificial Intelligence, Smart Systems, and Data Analytics**