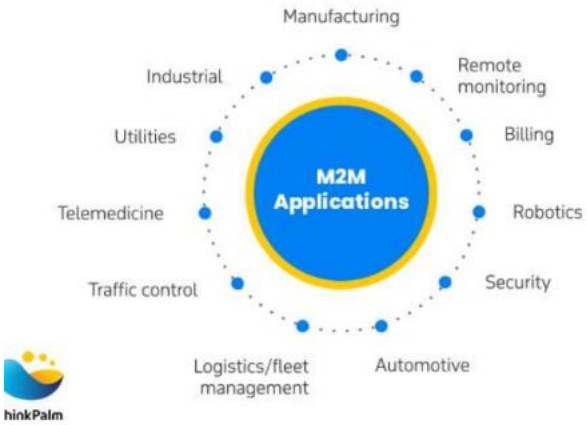
Machine-to-Machine (M2M) in IoT

Machine-to-Machine (M2M) communication, also called M2M/IoT, is a more advanced form of the Internet where many devices connect with each other and communicate without human intervention. M2M and the IoT are two of the technologies that form the basis of the new world. Anything in the physical realm that is of interest to observe and control by people, businesses, or organizations will be connected and will offer services via the Internet. Machine-to-machine is a term for technology that lets machines talk to each other and do things without people helping them. This works with AI and machine learning, which help the machines communicate and make their own choices.

Key features of M2M

- Efficient Energy Use for Enhanced M2M: The M2M system conserves energy, leading to improved performance in M2M applications.
- Seamless Data Exchange in M2M: Network operators utilize organized data packets to ensure smooth information sharing among machines in M2M communication.
- Rapid Event Detection: Through monitoring, the system swiftly identifies events.
- Flexible Data Timing: Data transfers can tolerate minor delays.
- Scheduled Information Sharing: Data is transmitted or received at specific, pre-defined times.
- Location-Based Device Notifications: Devices receive alerts when entering specific areas.
- Steady and Small-Scale Data Transfer: The system maintains a consistent flow of small data packets.



Why is machine-to-machine communication important?

Machine-to-machine communication decreases time, conserves bandwidth, and enables machines to act independently. Moreover, the goal is to minimize human involvement and tasks.

Why is machine-to-machine communication important in IoT?

M2M communication is crucial in IoT because it enables real-time operation and remote interaction of devices. Moreover, it enhances remote control, robotics, security, traffic, logistics, fleet management, and automotive functions.

What is an example of machine-to-machine communication?

An example of machine-to-machine communication is when a smart thermostat adjusts room temperature based on data from your phone's location and weather forecasts. ATMs are also examples of machine-to-machine, as they notify the authorities when they are running low on cash.

What are the types of machine-to-machine communication?

There are primarily two types of machine-to-machine communication technology: wired and wireless (non-wired).

- M2M Application.
    - The application component of the solution is a realization of the highly specific monitor and control process. The application is further integrated into the overall business process system of the enterprise.

Key application areas:

- Telematics for cars and vehicles. Typical applications include navigation, remote vehicle diagnostics pay-as-you-drive insurance schemes, road charging, and stolen vehicle recovery.
- Metering applications include primarily remote meter management and data collection for energy consumption in the electricity utility sector, but also for gas and water consumption.

- Remote monitoring is more generalized monitoring of assets, and includes remote patient monitoring as one prime example.
- Fleet management includes a number of different applications, like data logging, goods and vehicle positioning, and security of valuable or hazardous goods.
- Security applications are mainly those related to home alarms and small business surveillance solutions. The final market segment is Automated Teller Machines (ATM) and Point of Sales (POS) terminals.
- M2M communication requires availability of constant internet connection with reasonable speed.

Benefits or advantages of M2M Communication

- M2M communication is supported by cellular networks either directly or through gateway.
- It is easy to roll out and maintain.
- It is available with fixed and mobile networks both indoors and outdoors.
- It offers higher range, minimum latency, higher throughput and consume less energy.
- It enables communication of smart devices without any human intervention.
- The security and privacy issues in IoT networks are resolved by using M2M communication facility.
- Large protection, data collection and data processing is possible.

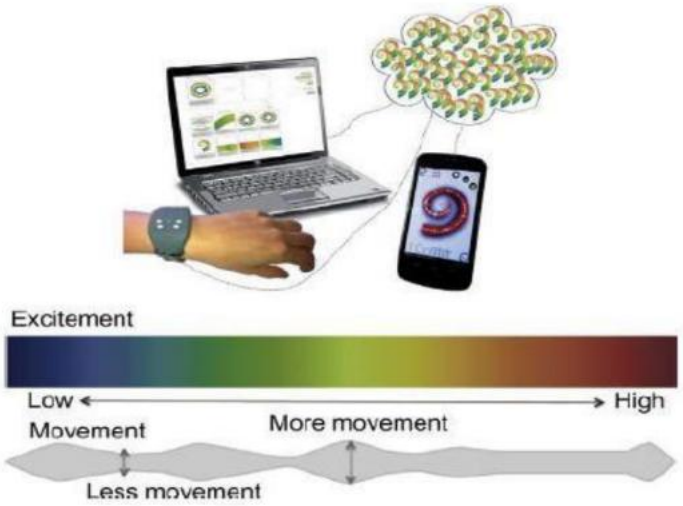
Drawbacks or disadvantages of M2M Communication

- Use of cloud computing in M2M means dependence on others which could limit flexibility and innovation.
- Security and ownership of data is a big concern.
- Interoperability between cloud/M2M IoT devices is a big concern in such networks.
- It is designed and optimized for small number of network devices.

2.1 A use case example

- Studies from the U.S. Department of Health and Human Services have shown that close to 50% of the health risks of the enterprise workforce are stress related, which includes a group of factors such risks as high cholesterol, overweight issues, and high alcohol consumption.
- As stress can be a root cause for many direct negative health condition.
- Measuring human stress can be done using sensors. Two common stress measurements are heart rate and galvanic skin response (GSR), and there are products on the market in the form of bracelets that can do such measurements.

- These sensors can only provide the intensity of the heart rate and GSR, and do not provide an answer to the cause of the intensity.
- The typical M2M solution would be based on getting sensor input from the person by bracelet.
- Using a smartphone as a mobile gateway to send measurements to an application server hosted by a health service provider.
- The application server hosts the necessary functionality to analyze the collected data, and based on experience and domain knowledge, provides an indication of the stress level.
- The stress information can then be made available to the person or a caregiver via smartphone application or a web interface on a computer.
- Stress measurement M2M solution is as follows



Summary of M2M

This is commonly known as Machine to machine communication. It is a concept where two or more than two machines communicate with each other without human interaction using a wired or wireless mechanism. M2M is an technology that helps the devices to connect between devices without using internet. M2M communications offer several applications such as security, tracking and tracing, manufacturing and facility management.

Difference between IoT and M2M :

IoT	M2M
Internet of Things	Machine to Machine
The connection is via Network and using various communication types.	The connection is a point to point
Internet protocols are used such as HTTP, FTP, and Telnet.	Traditional protocols and communication technology techniques are used
Internet connection is required for communication.	Devices are not dependent on the Internet.
It supports cloud communication	It supports point-to-point communication.
Involves the usage of both Hardware and Software.	Mostly hardware-based technology
A large number of devices yet scope is large.	Limited Scope for devices.
Components are: Devices/sensors, connectivity, data processing, user interface	Components are: Device, area networks, gateway, Application server.
Ex. Smart wearables, Big Data and Cloud, etc.	Ex. Sensors, Data and Information, etc.