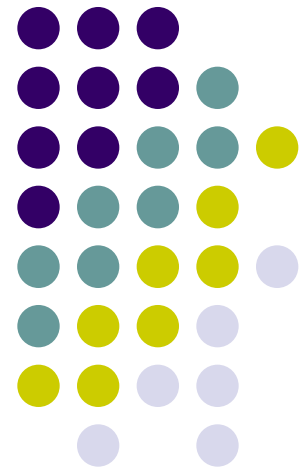


ME 482 – Rapid Product Development and Manufacturing

Chapter 4

Rapid Product Development (RPD) - Part II



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- **The Internet of Things (IoT)** is a system of *interrelated computing devices, mechanical and digital machines, objects, animals or people* that are provided with unique identifiers and **the ability to transfer data over a network** without requiring human-to-human or human-to-computer interaction.
- When something is connected to the internet, that means that **it can send or receive information, or both**. This ability to send and/or receive information makes things smart, and **smarter is better**.
- Consider smartphones. You can listen to any song on the internet, but not because your phone has every song stored on it. It's because every song in the world is stored somewhere else (*the cloud*), and your phone can request a song, and receive information to stream it.
- **To be smart**, a thing doesn't need to have super storage or a supercomputer inside of it. **All the things has to be connected to super storage or to a supercomputer**.



In the Internet of Things, all the things can be put into two categories:

- **Sensors** (*collecting and sending Information*): Sensors can measure temperature, motion, moisture, air quality, light, and almost anything else you can think of. Sensors, when paired with an internet connection, allow us to collect information from the environment which, in turn, helps make better decisions.
- **The device which has the capability to connect with the internet** (*All devices which are connected to internet and receiving and/or acting on information*): computers, tablet pc, smartphones, remote controllers, functional softwares, mechanisms, etc.

When both these functionalities are combined together an IoT device is formed. Earlier only simple watches were only used to see the time and date, but now *the smart IoT watches allow a user to see heartbeat rate, calorie count, steps walked etc.*

Internet of Things (IoT) Applications



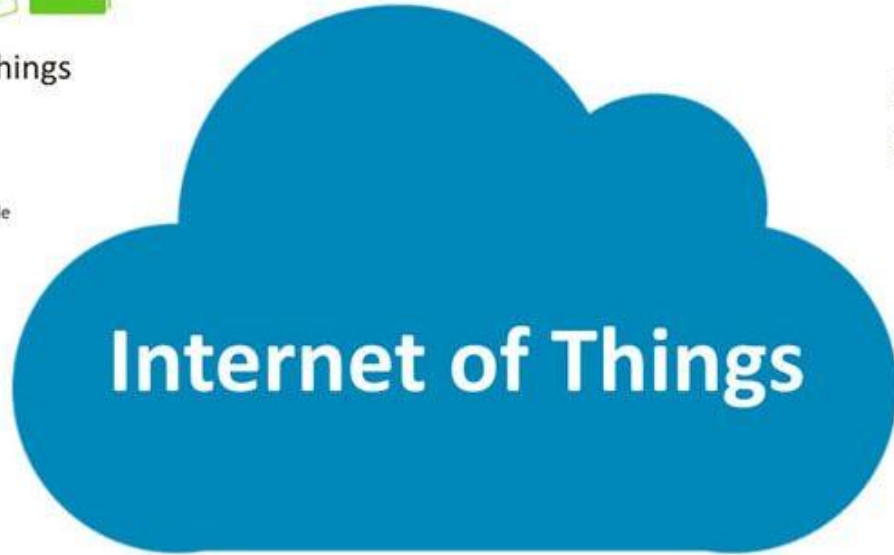
Everyday things



Agriculture automation



Embedded mobile



Internet of Things

Everyday things get connected



for smarter tomorrow



M2M wireless sensor network



Energy consumption



Building management



Security & Surveillance



Vehicle, asset, person & pet monitoring & controlling



Smart homes & cities



Telemedicine & Healthcare

Internet of Things (IoT) Advantages



- IoT encourages the interaction between devices called as a **machine to machine interaction**.
- It provides **good automation and control**.
- Integrated with more technical information, so it is **better to operate**.
- IoT possesses **strong monitoring feature**.
- IoT helps to **save more money** by reducing manual task and time.
- Automating daily life tasks makes **good monitoring of devices**.
- Increased **efficiency** and **time-saving**.
- With good features make **a better quality of life**.

Internet of Things (IoT) Disadvantages



- Internet of Things devices **does not have any international compatibility standard.**
- They may become **highly complex resulting in failure.**
- Internet of Things devices may get **affected by privacy and security breach.**
- It can cause **reduced safety for users.**
- Reduction in the employment of manual tasks thus **resulting in job reductions.**
- Internet of Things device **may take control of life** in due course of time with increasing AI technology.



- **IoT-based RPD systems** can be developed through the integration of **workflow management, resource planning, marketing and supply chain management** technologies.
- A typical IoT-based RPD life cycle includes **understanding customer requirements, product definition, product design, analyses and test/simulation, process planning, manufacture and delivering the product.**
- Improving the agility and responsiveness of manufacturing enterprises and enhancing the ability of rapidly combining the strengths of manufacturers and suppliers can be achieved by **IoT-based RPD systems.**



- **IoT-based collaborative design:** Collaborative design is **the process of designing a product through concurrent cooperation among engineers** from different functional areas in a manufacturing company, *e.g., design, process planning, manufacture, assembly, testing, quality and purchasing as well as participants from suppliers and customers.*
- **IoT-based design for X (DFX):** Using the internet to provide DFX services can support **rapid and collaborative product development**. DFX can be used to **reduce the time and cost of redesign, assembly and manufacturing.**
- **IoT-based decision support and concurrent engineering (CE):** The internet-based systems that can help decision-making at various stages of the product development process are vital for RPD. Internet technology enables us **to develop virtually any type of decision support system**, *e.g., PDM (product data management) systems, EDM (electronic document management) systems and visualisation and virtual tools.*



- **IoT-based Manufacturing Scheduling, Planning and Control:** As the manufacturing environment in a company often involves a variety of machining systems, monitoring facilities, control equipment, and information resources, **an efficient and easy-to-use client–server manufacturing scheduling, planning and control system is vital for global enterprises.** Such a system will facilitate scheduling job tasks among different machining systems, and **provide fast data or information exchange between subsystems and/or terminals and rapid changes from the network to a CNC machine.** Thus, various manufacturing systems/facilities distributed at different companies can be organically organised and shared under their agreements.
- **Artificial Intelligence (AI) and Knowledge:** The increasing complexity of products and processes **requires earlier decision making.** Due to this, knowledge and knowledge modelling of design, process planning, quality, etc. and AI for supporting decision-making have become an important approach of RPD.

Proposed IoT-Based RPD System

