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Robotics and Internet of Things (IoT)

Topic 2:

Application areas of Internet of Things and robotics

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Topic 2 Application of Internet of Things and robotics

Content of this topic:

1. Application areas, trends, case studies
2. Technical feasibility
3. market feasibility
4. financial feasibility.
5. Ethical and social implications of IoT and Robotics

2.1 Application areas, trends, case studies

Robotic & IoT versus human

	Human 	Robot / IOT 
strengths	ability to react and interpret ability to improvise ability to learn recourse to experience High flexibility, ability to customization sensory ability association ability	High positioning and repetition accuracy High movement speed High strength and endurance Great coverage High computing power High availability Ability to multitask
weaknesses	fatigue behavior Limited strength and endurance No real multitasking limited availability Affected by short-term memory	No recourse to experience No ability to interpret No ability to improvise Relatively inflexible

2.1 Application of Internet of Things and robotics

Manufacturing

IoT and Robotics are used in different fields of applications in manufacturing:

- Connected machines
- Connected logistics
- Connected devices

- Robotics in manufacturing
- Robotics in logistics and transport
- Robotic in assistance

2.1 Application of Internet of Things and robotics

Smart Homes

Monitoring, management and control of:

- Heating
- Light
- water
- windows
- Kitchen appliance
- Washing machine/dryer
- ...

2.1 Application of Internet of Things and robotics

Agriculture

Monitoring, management and control of:

- Soil preparation
- Seeding and Planting
- Weeding
- Harvesting
- Transportation
- Processing of the crops
- ...

2.1 Application of Internet of Things and robotics

Agriculture

A farming Bot of the automation manufacturer KUKA is specialized in automated apple harvesting.

- The machine moves through the orchard using sensors and cameras
- to identify ripe apples based on their color and size
- The arm is gentle enough not to damage the apple or the tree but firm enough to securely grasp the apple

2.1 Application of Internet of Things and robotics

Education:

IoT transforms education: With an IoT-connected smartboard in the classroom, students and teachers can

- use a finger or a special pen to draw
- move elements around on the smartboard, like numbers or shapes
- pull up relevant videos or websites
- objects are connected to the internet
- things and information are connected

2.2 Feasibility Internet of Things (IoT) and Robotics

What is feasible and desirable from technological, economic, and social perspective?

1. Technical feasibility
2. Financial feasibility
3. Market feasibility
4. Social feasibility

2.2 Feasibility Internet of Things (IoT) and Robotics

Technical feasibility

- Hardware, physical body and components …
- Software programming, protocols, …
- Power, energy source, …
- Communication with other Systems
- Human Interaction

2.2 Feasibility Internet of Things (IoT) and Robotics

Financial feasibility – Costs

- Initial Purchase Price: purchase & customising:
  type, size, functionality, and capability influence costs.
- Installation and Integration Costs: integration into existing systems, infrastructure changes
- Maintenance and Repair Costs: complexity impact
- Operational Costs: powering, supplies or consumables
- Training Costs for employees training in supervising,

2.2 Feasibility Internet of Things (IoT) and Robotics

Financial feasibility – Benefits

- Productivity Increase: faster or more accurately perfomance increases productivity
- Labor Cost Savings: 24/7 potentially reducing labor costs and health and safety issues.
- Lifespan of the Robot: Longer lifespan increases financial feasibility.
- Resale Value: can enhance its financial feasibility.

2.3 Ethical and social implications of IoT and Robotics.

Risks and disadvantages of IoT and Robotics

- Social disadvantages
- Technical and security related disadvantages
- Ethical challenges

2.3 Ethical and social implications of IoT and Robotics.

Principles of ethics for robots and IoT

- Respect for autonomy
- Beneficence
- Privacy and Security
- Justice and fairness
- Responsibility and Transparency
- Sustainability

2.3 Ethical and social implications of IoT and Robotics.

The first robot rules by Isaac Asimov:

Law One: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Law Two: A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

Law Three: A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

1.3 Historical evolution of Robotics and Internet of Things

Evolution of Robotics in the 21st century

- Humanoid robots
- Working in homes, in hospitals, in factories or in our space
- Honda's "ASIMO" humanoid robot can walk, run and climb

1.3 Historical evolution of Robotics and Internet of Things

Evolution of Robotics in the 21st century

- Popular robot vacuum cleaner
- Engineered by iRobot

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Thank you for attention