

Combined Artificial Intelligence and IoT for Smart Sustainable Cities

Forum on Artificial Intelligence and Internet of Things in the Development of Smart Sustainable Cities

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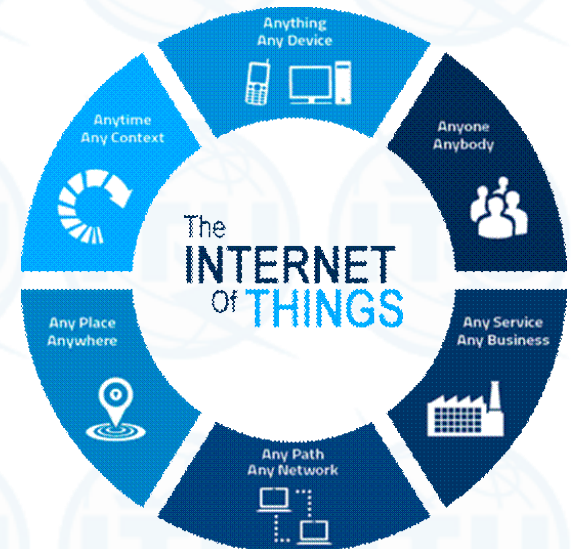
Introduction

- ❖ Cities are hubs for economic growth, job creation, new ideas, technological evolution, communication and networking, information and social transformation
- ❖ Large percent of the population live in cities.



Introduction

❖ A smart sustainable city is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operations and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to *economic, social and environmental aspects*



Specification for a Smart Sustainable City

A Smart Sustainable City leverages the ICT infrastructure in an adaptable, reliable, scalable, accessible, secure, safe and resilient manner in order to:

- ❖ Improve the Quality of Life of its Citizens
- ❖ Ensure tangible economic growth such as higher standards of living and employment opportunities for its citizens.
- ❖ Improve the well-being of its citizens including medical care, welfare, physical safety and education.
- ❖ Establish an environmentally responsible and sustainable approach which ***"meets the needs of today without sacrificing the needs of future generations"***.

Specification for a Smart Sustainable City

A Smart Sustainable City leverages the ICT infrastructure in an adaptable, reliable, scalable, accessible, secure, safe and resilient manner in order to:

- ❖ Streamline physical infrastructure based services such as transportation (mobility), utilities (energy, water), telecommunications and manufacturing sectors.
- ❖ Reinforce prevention and handling functionality for natural and man-made disasters including the ability to address the impacts of climate change.
- ❖ *Provide an effective and well balanced regulatory, compliance and governance mechanisms with appropriate and equitable policies and processes in a standardized manner.*

When a City is not Smart and Sustainable?

Infrastructure grows but is not well-connected, resulting in

- ❖ traffic jams
- ❖ missed buses, trains and flights
- ❖ Lack of coordinated response to disaster
- ❖ sources of information are not available
- ❖ shortages of supply occur
- ❖ Electricity, water and food
- ❖ duplication of resources

*Identify **key areas** that have significant impact on citizens and society and can be influenced by the use of ICT.*

Transportation

**Utilities (Water,
Electricity and Gas)**

**Health &
Education**

**Safety &
Security**

**Real estate &
Buildings**

**Employment &
Opportunities**









Environment

Governance

Sanitation

**ICT
Infrastructures**

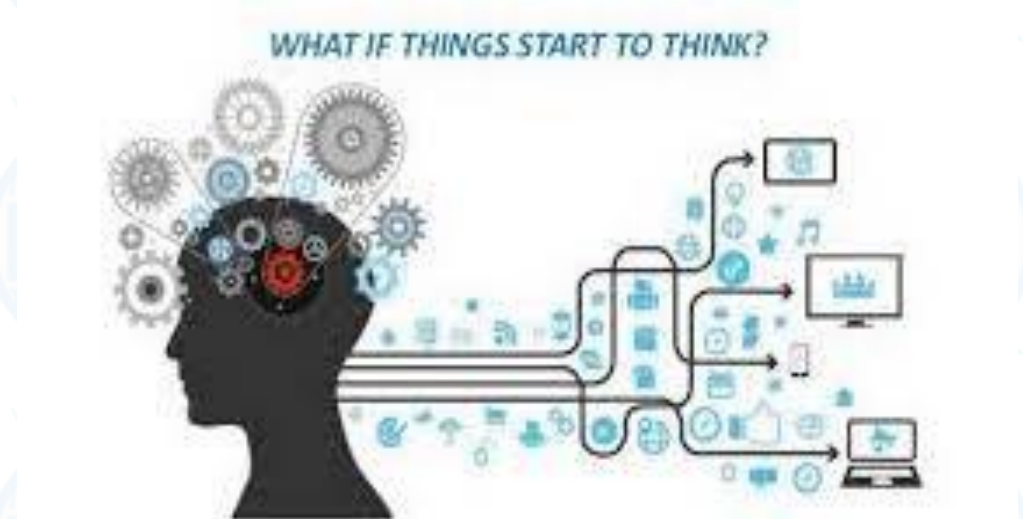
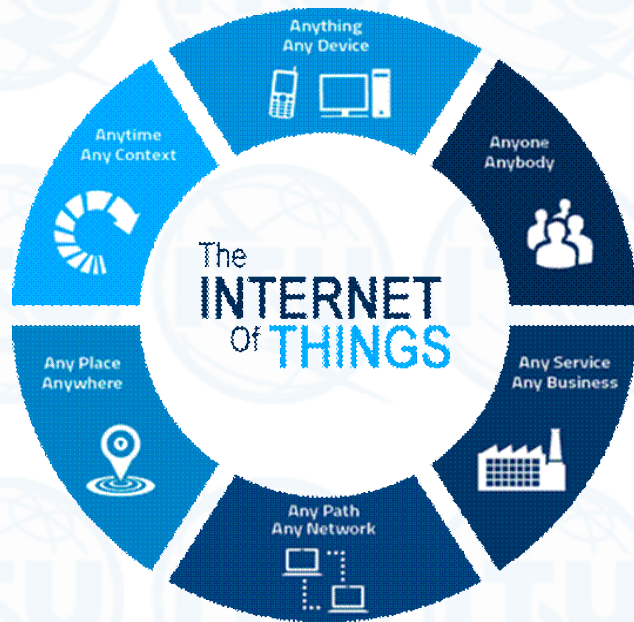
**Manufacturing
Sector**

<p>Transport & Logistics</p>  <p>Fleet management, Goods tracking</p>	<p>Utilities</p>  <p>Smart metering, Smart grid management</p>	<p>Smart cities</p>  <p>Parking sensors, Waste management, etc.</p>	<p>Smart building</p>  <p>Smoke detector, Home automation</p>
<p>Consumers</p>  <p>Wearables Kids/senior tracker</p>	<p>Industrial</p>  <p>Process monitoring & control, Maintenance monitoring</p>	<p>Environment</p>  <p>Food monitoring/alerts, Environmental monitoring</p>	<p>Agriculture</p>  <p>Climate/agriculture monitoring, Livestock tracking</p>

Identify key areas that have significant impact on citizens and society and can be influenced by the use of ICT.

The role of IoT, Artificial Intelligence and ML in Smart Sustainable cities

The combination of high-speed, resilient, low-latency connectivity and technologies such as the IoT, machine learning (ML) and artificial intelligence (AI) will enable the transformation towards sustainable smart cities.



Internet of things

- ❖ Internet of things (IoT) [ITU-T Y.2060]: A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies.
- ❖ Device [ITU-T Y.2060]: With regard to the Internet of things, this is a piece of equipment with the mandatory capabilities of communication and the optional capabilities of sensing, actuation, data capture, data storage and data processing.

What is Artificial Intelligence?

THOUGHT

**Systems that
think
like humans**

**Systems that
think
rationally**

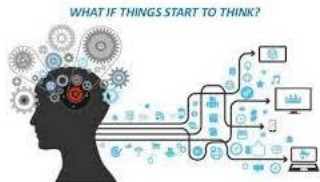
BEHAVIOUR

**Systems that
act
like humans**

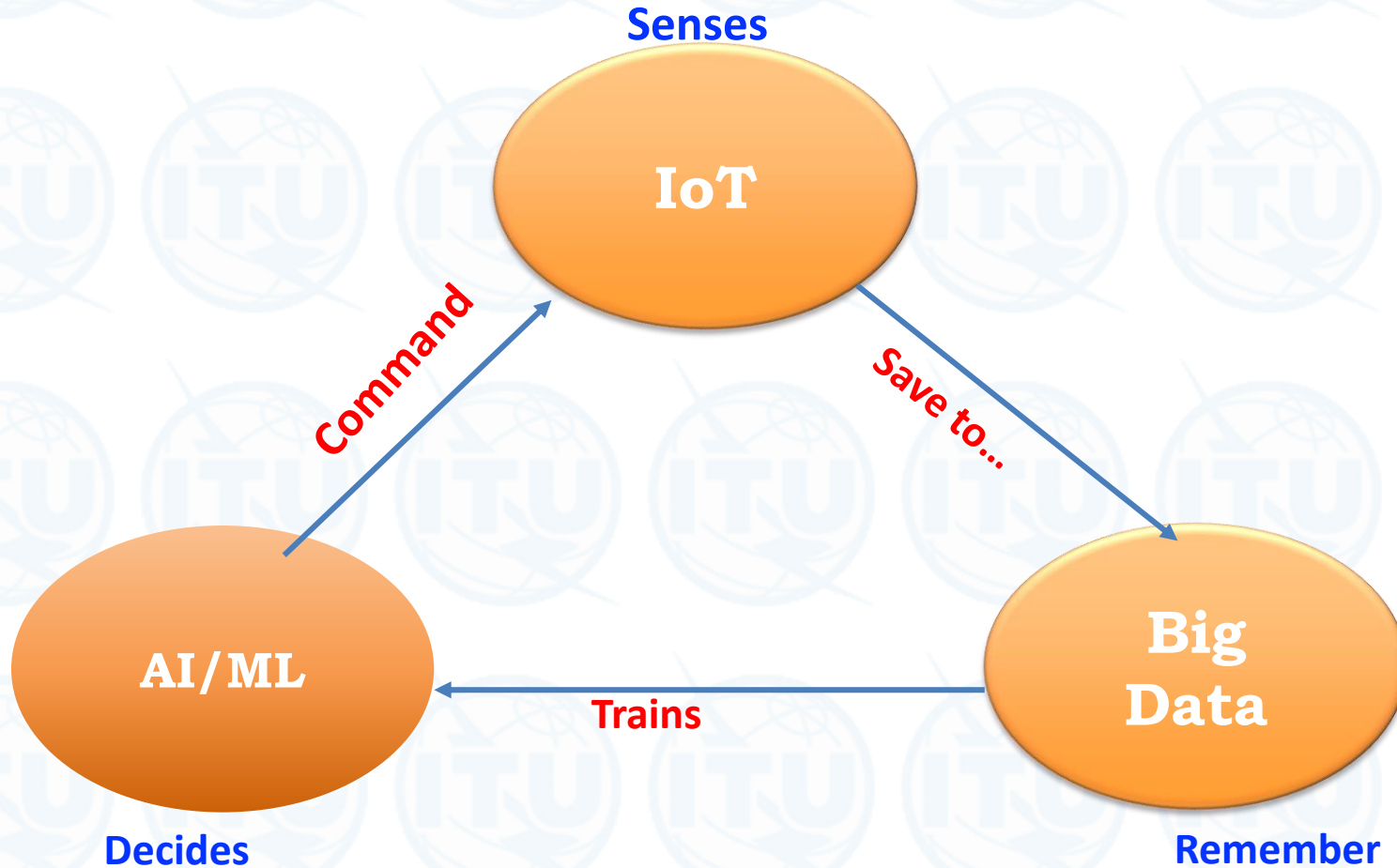
**Systems that
act
rationally**

HUMAN

RATIONAL



Why IoT and AI need each other?



The use of IoT, AI/ML and Big Data analytics play an important role in making the city efficient.

Why IoT and AI Need to Work As A Tandem



Connected Vehicles

Transportation is adopting IOT



Transportation Efficiency

Connected vehicles and smart roadways provide real-time traffic, transit, and parking data for maximum efficiency and minimum congestion.



Lower Operating Costs

Operating data and diagnostics drive preventive maintenance to decrease costs and improve warranty + service processes.



Improved Safety

Vehicles "talking to each other" enable cooperative, crash avoidance safety applications.



Why IoT and AI need each other?

Issue of Cyber security

- ❖ New technologies bring benefits and challenges
- ❖ New technologies are changing the cyber landscape
- ❖ While, industry must be prepared to take advantage of the opportunities presented by machine learning, AI and the IoT, it is of vital importance that security by design and privacy by design be considered in the cyber world of today and tomorrow.
- ❖ Artificial intelligence cybersecurity must be both Preventative and Proactive
- ❖ To prevent a global catastrophe, experts from different fields must focus on hacking prevention.

CONCLUSION

- ❖ Technologies such as Artificial Intelligence (AI) and Internet of Things (IoT) have a potential to transform cities into Sustainable Smart Cities.
- ❖ This results in new opportunities for collaboration in the fields of mobility, healthcare, industry, and the development of a digital infrastructure.
- ❖ The real concern is how the IoT and AI will be able to defend itself from threats.
- ❖ The development and adoption of secure standards for artificial intelligence security is of utmost importance.