



AIU - GGSIPU - AADC
in collaboration with
Viksit Bharat @ 2047 Cell, GGSIP University
organizes
Faculty Development Programme (FDP)
On
“Role of Artificial Intelligence in Viksit Bharat @ 2047”



11th March – 15th March , 2024 | Online Mode

Day 2 **12.03.2024, Tuesday**

Session 2: Tech Powered India : IoT on Smart City

Resource Person
Dr. Sanjay Kumar Batish
Head, Computer Centre
Punjab Engineering College,
Chandigarh



www.ipu.ac.in

Recording link:

<https://drive.google.com/file/d/11AU67UXAz0looE-BLQJdiDpUwer4VPsF/view?usp=sharing>

Brief Bio:

Dr. Sanjay Kumar is working as the head of the Computer Center at Punjab Engineering College.

He has 25 years of experience in the industry and education sector:

- 5 years of experience in IT and telecommunications as an Executive Engineer at Punjab Wireless System, Mohali, from 1995 to 1999, focusing on VSAT and Paging.
- 15 years in teaching and research activities in educational institutes. From 1999 to 2006, he worked as a Lecturer at Thapar University, Patiala, in the Computer

Science Engineering Department, specializing in VLSI, Computer Networks, Embedded Systems, and Networking. He also has experience in handling the admissions process.

Currently, he is the Head of the Computer Center and oversees the admission process for Chandigarh Engineering Admission through the Joint Admission Committee. He is also involved in online PG and PhD admission processes and conducts research projects while guiding M.Tech students

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Vikasit Bharat: India's Vision for Development

- The Indian Government has introduced the concept of Vikasit Bharat, an ambitious vision for **India's development by 2047**, the 100th year of independence.
- Vikasit Bharat aims to transform India into a developed nation, with a focus on **economic prosperity, social progress, environmental sustainability, and strong governance**.

The program recognizes the crucial role of **young people** and **public participation** in achieving these goals.

While Vikasit Bharat itself is not a single program, it **integrates existing initiatives** to reach its reaching goals.

As we explore how the **Internet of Things (IoT)** plays a vital role in achieving Vikasit Bharat's vision across various sectors.



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Components of IoT

There are four fundamental components of IoT system, which tell us how IoT works:

1. Sensors/Devices
2. Connectivity
3. Data Processing
4. User Interface

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Sensors

Definition: A device which detects or measures a physical property and records, indicates, or otherwise responds to it.

A **Sensor** detects (senses) changes in the ambient conditions or in the state of another device or system, and forwards or processes this information in a certain manner.

A **Device** can have multiple sensors that can bundle together to do more than just sense things.

For example, our phone is a device that has multiple sensors such as GPS, accelerometer, camera.

Sensor Type	Percentage
Acceleration/Tilt	9%
Vibration	7%
Position/Proximity	9%
Chemical/Gas	13%
Acoustic/Sound	1%
Flow	6%
Ambient Light/Machine vision/Optical	12%
Humidity/Moisture/Water	1%
Motion/Velocity/Displacement	11%
Temperature	6%
Force/Load/Pressure	6%
Leaks/Levels	2%
Electric	2%
Magnetic	8%
RFID/NFC	8%
Ultrasonics/Radar	8%

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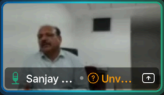
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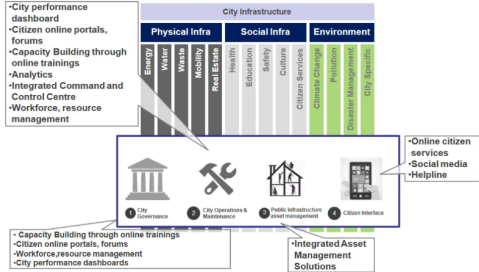


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Governance



The diagram illustrates the components of City Governance and Infrastructure. It is divided into three main sections: City performance dashboard, City Infrastructure, and City Citizen Interface. The City Infrastructure section is further divided into Physical Infra (Energy, Water, Mobility, Real Estate, Health, Education, Safety, Culture, Citizen Services), Social Infra (Public Infrastructure Asset Management), and Environment (Waste Management, Pollution Management, Disaster Management, City Specific). The City Citizen Interface section includes Online citizen services, Social media Helpline, and Integrated Asset Management Solutions. The City performance dashboard includes Capacity Building through online trainings, Analytics, Integrated Command and Control Centre, and Workforce, resource management.

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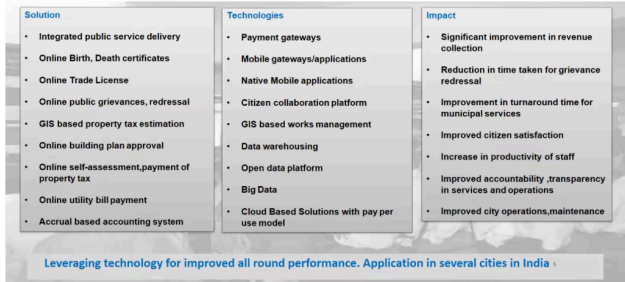


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Governance



The diagram illustrates the Governance Solutions, Technologies, and Impact. It is divided into three main sections: Solution, Technologies, and Impact. The Solution section includes Integrated public service delivery, Online Birth, Death certificates, Online Trade License, Online public grievances, redressal, GIS based property tax estimation, Online building plan approval, Online self-assessment, payment of property tax, Online utility bill payment, and Accrual based accounting system. The Technologies section includes Payment gateways, Mobile gateways/applications, Native Mobile applications, Citizen collaboration platform, GIS based works management, Data warehousing, Open data platform, Big Data, and Cloud Based Solutions with pay per use model. The Impact section includes Significant improvement in revenue collection, Reduction in time taken for grievance redressal, Improved citizen satisfaction, Increase in productivity of staff, Improved accountability, transparency in services and operations, and Improved city operations, maintenance.

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Environmental Sustainability

- ▶ Vikasit Bharat emphasizes environmental sustainability for a greener future.
- ▶ This can be achieved by:
 - **Monitoring air and water quality** in real-time for informed decision-making.
 - **Smart irrigation systems** for water conservation in agriculture.
 - **Optimizing energy consumption** through smart grids and building automation.
 - **Encouraging sustainable practices** through connected devices and data analysis.

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Role of IoT in Environmental Monitoring

- ▶ The applications of IoT in environmental monitoring are broad:
 1. Environmental Protection
 2. Extreme Weather Monitoring
 3. Water Safety
 4. Species Protection
 5. Commercial Farming
- ▶ In these applications, sensors detect and measure every type of environmental changes.

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Energy

- ▶ **Smart Energy:** Using intelligent devices and data analysis based on IoT technologies.
- ▶ The **smart grid** optimizes asset allocations in real time, integrates highly distributed renewable energy sources, and predicts equipment failures before they cause outages. The optimization qualities of IoT in manufacturing also apply to **energy consumption**.
- ▶ IoT allows a wide variety of **energy control and monitoring functions**, with applications in devices, commercial and residential energy use, and the energy source.



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Smart Manufacturing

- ▶ **Industrial Internet of Things (IIoT)** is a way to digital transformation in manufacturing.
- ▶ Industrial IoT employs a **network of sensors** to collect critical production data and uses cloud software to turn this data into valuable insights about the **efficiency** of the manufacturing operations.
- ▶ Manufacturing technology currently in use exploits standard technology along with modern distribution and analytics.
- ▶ IoT introduces **deeper integration and more powerful analytics**.
- ▶ This opens the world of manufacturing in a way never seen before, as organizations become **fully developed for product delivery** rather than a global network of suppliers, makers, and distributors loosely tied together.



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Transportation

- ▶ An **intelligent transportation system** is an advanced application which aims to provide innovative services relating to different modes of transport and traffic management and enable users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.
- ▶ At every layer of transportation, IoT provides **improved communication, control, and data distribution**.
- ▶ These applications include **personal vehicles, commercial vehicles, trains, UAVs, and other equipment**.
- ▶ It extends throughout the entire system of all transportation elements such as **traffic control, parking, fuel consumption, and more**.



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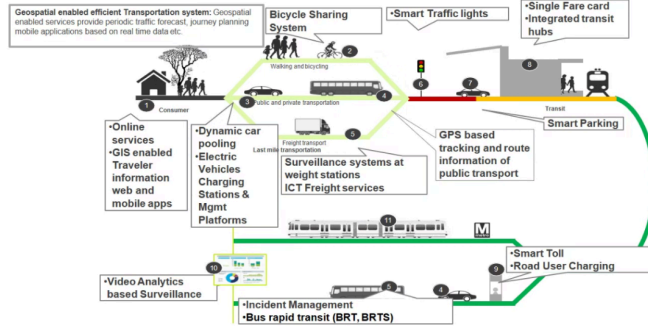
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Smart City Transport Model



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Healthcare

- IoT enables healthcare professionals to be more watchful and **connect with the patients proactively**.
- Data collected from IoT devices can help physicians **identify the best treatment** process for patients and reach the expected outcomes.
- A connected healthcare ecosystem will make it **easy for patients to access and track their health information** and allow for seamless communication with their providers.
- IoT plays a significant role in enabling doctors to **monitor patients remotely** and in a timely manner.



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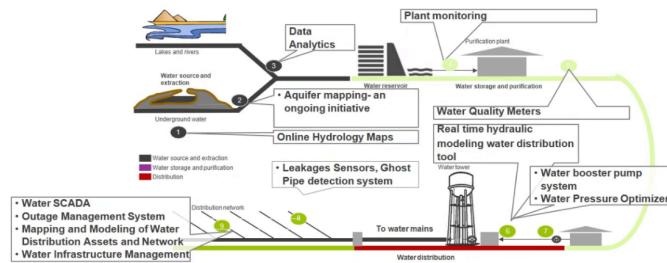


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Smart Water Supply Model



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Waste Management



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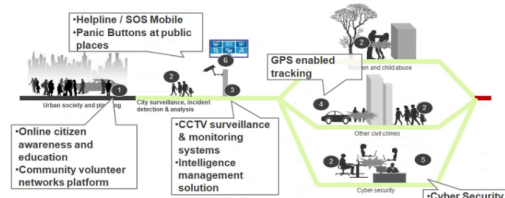


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Citizen Safety



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Education and Skill Development in Vikasit Bharat

- ▶ Vikasit Bharat recognizes the importance of a skilled workforce for a thriving economy.
- ▶ IoT can revolutionize education and skill development by:
 - Providing **interactive and personalized learning experiences** through IoT-enabled tools.
 - **Simulating real-world scenarios** for practical skill development in various sectors.
 - Offering **remote learning opportunities** for geographically isolated populations.

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Vikasit Bharat: Challenges and Opportunities

- Challenges associated with implementing large-scale IoT solutions in Vikasit Bharat:
 - Developing **robust infrastructure** for **seamless connectivity**.
 - Ensuring data **security** and **privacy**.
 - Bridging the digital divide and promoting **digital literacy**.

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Challenges of IoT

- Lack of mature IoT technologies and business processes.
- **Limited guidance** for life cycle **maintenance** and **management** of IoT devices.
- **Limited best practices** available for IoT developers.
- There is a **lack of standards** for **authentication** and **authorization** of IoT edge devices.



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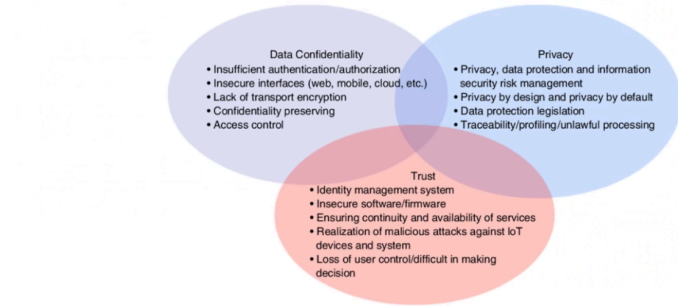
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IoT Security Issues

► **IoT security** is the act of securing Internet of Things devices and the networks they're connected to. Various Issues are:



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phyphox
physical phone experiments

Raw Sensors

Acceleration (without g)
Get raw data from the so called linear accelerom...

Acceleration with g
Get raw data from the accelerometer. This senso...

Gyroscope (rotation rate)
Get raw data from the gyroscope.

Light
Get raw data from the light sensor.

Location (GPS)
Get raw position data from satellite navigation.

Magnetometer
Get raw data from the magnetometer.

Pressure
Get raw data from the barometer.

Acoustics

Audio Amplitude
Get the amplitude of sounds.

Audio Autocorrelation
Measure the frequency of a single tone.

Audio Scope
Show recorded audio data.

Audio Spectrum
Display the frequency spectrum of an audio signal.

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← Light

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GRAPH SIMPLE

Illuminance

The graph shows illuminance (Ev in lx) on the y-axis (0 to 100) versus time (t in s) on the x-axis (0 to 8). The curve starts at approximately 100 lx at t=0, remains relatively stable until about t=2s, then drops sharply to near 0 lx by t=4s, and remains at 0 lx until t=8s.

Note: On some devices the light sensor is only updated when there is a coarse change of illuminance.

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