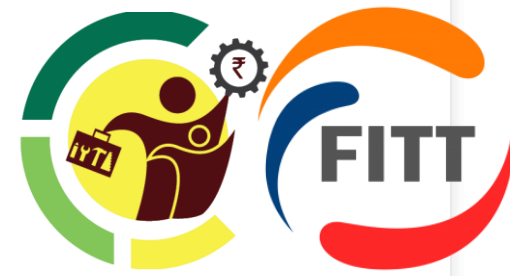


Urban IoT

Introduction to Smart Cities and Urban IoT

Content



- IoT in Urban Planning and Management
 - What is a Smart City?
 - What are IoT Technologies in Smart Cities?
 - IoT application in a Smart City?
- Smart City Case Study
- Discussion on Smart City Challenges and Future

IoT in Urban Planning and Management

Introduction

A smart city is nothing but an umbrella where all **applications** can be integrated and establish communication between each other

What is a Smart City ?

What is a Smart City?

- Massive growth has been seen in the field of information technology and in the migration of people from rural areas to urban areas.
- Digital market has seen large-scale growth i.e. more people are getting equipped with smart or digital devices such as smartphones, actuators, and sensors



Definition of Smart Cities

- Smart Cities leverage data and technology to enhance the quality of life for residents.
- Using sensors and connectivity, cities can optimize resource allocation, improve sustainability, and enhance public services.



What are IoT Technologies in Smart Cities ?

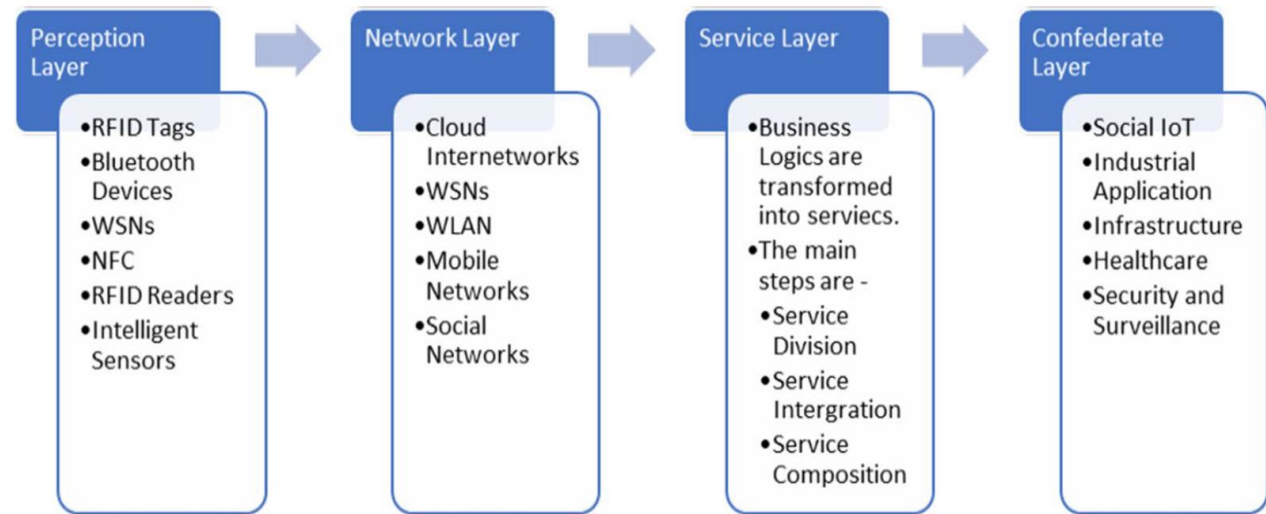
IoT based Interconnection for Smart City

Pillars of smart city
infrastructure

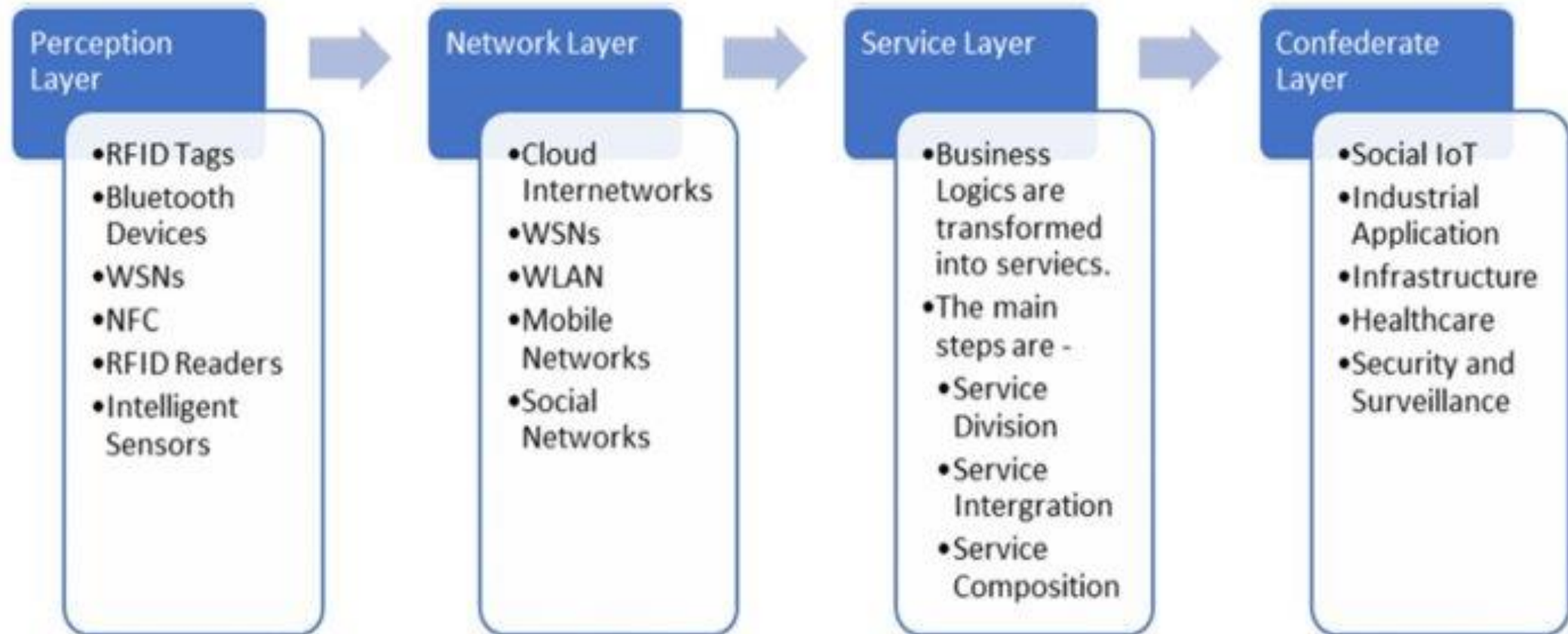


Amenity Architecture for Smart Cities

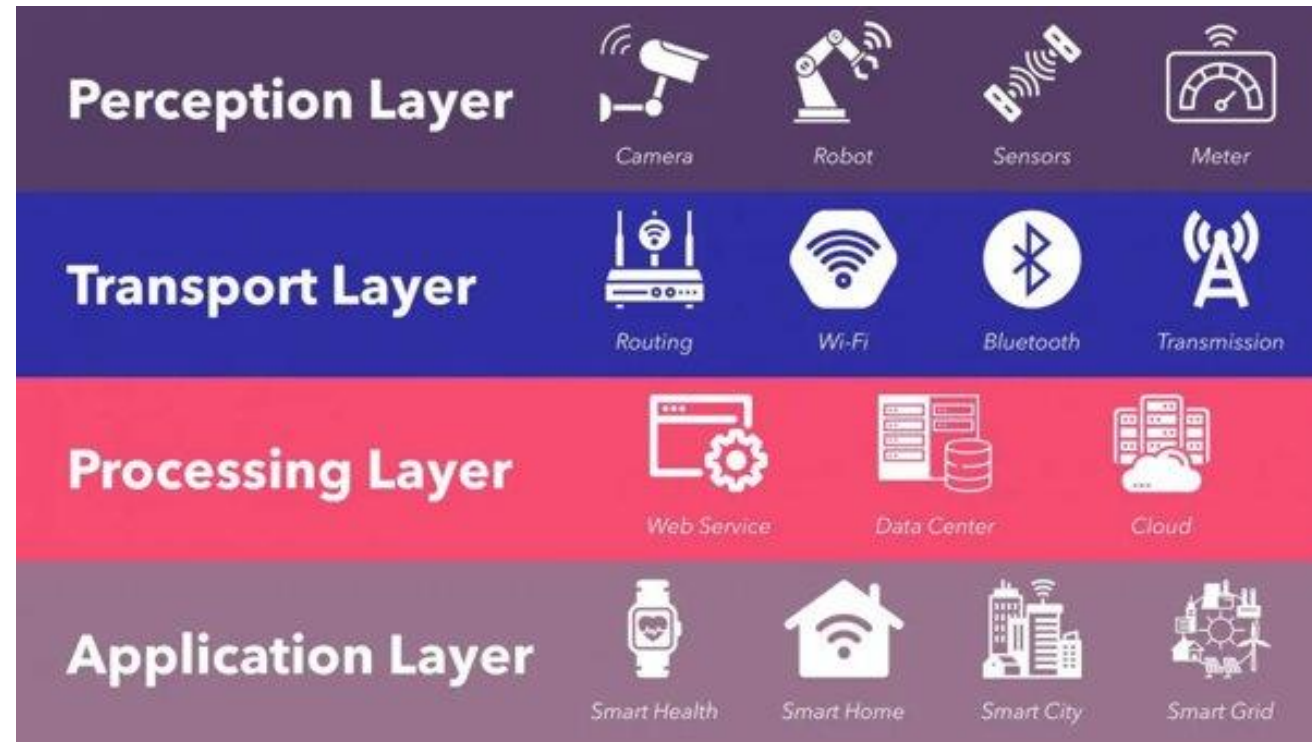
- Bridge between the virtual and physical world.
- The amenity architecture
 - communication,
 - data privacy and security, networking,
 - process management, and
 - business modeling.
- scalable, interpretable, and extensible.



Amenity Architecture for Smart Cities

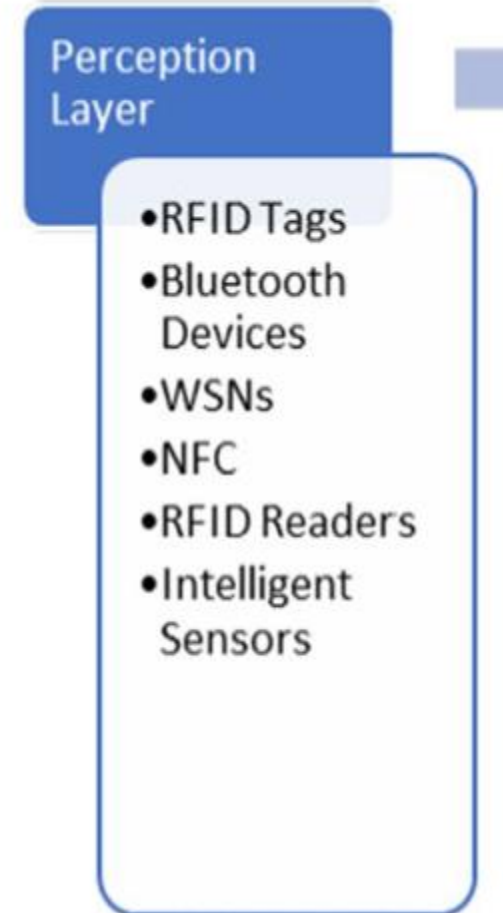


Amenity Architecture for Smart Cities



Amenity Architecture for Smart Cities

- **The perception layer**
- Used to perceive or senses the surroundings by using various devices
- Radio Frequency Identification (RFID) Tags and readers,
- Bluetooth Devices,
- Wireless Sensor Network (WSN),
- NFC (near field communication),
- other Sensors.



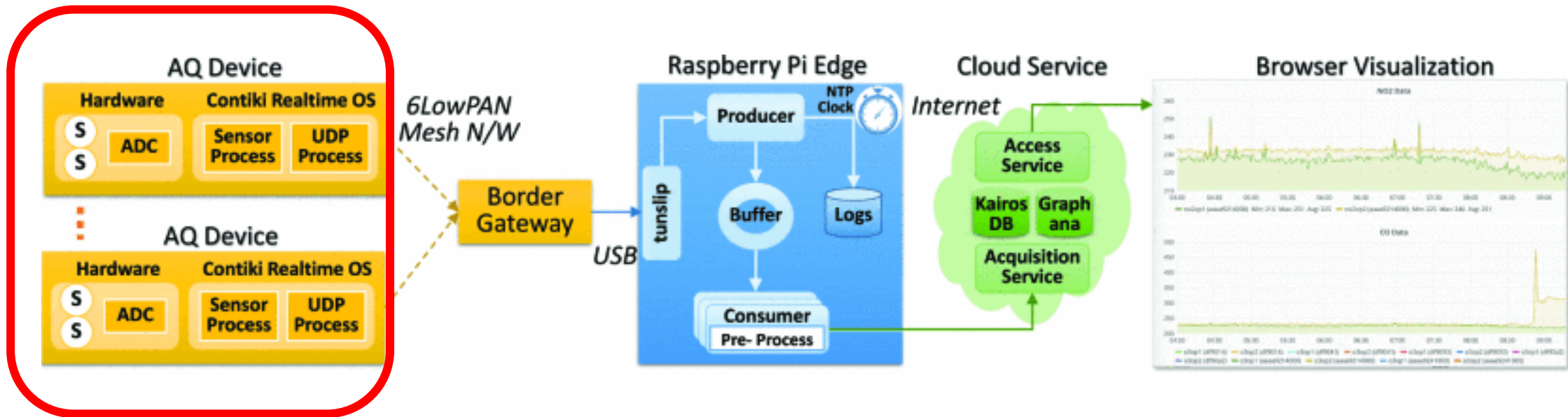
Amenity Architecture

- **The perception layer**
- The elements (things) to be considered -
 - Things Deployment
 - Thing Cost
 - Device Size
 - Heterogeneity
 - Communication Medium
 - Network Support
 - Resources Utilization
 - Energy consumption



Atmos, the air quality monitoring device built by Respire Living Sciences.

Perception layer - SATVAM: Toward an IoT Cyber-Infrastructure for Low-Cost Urban Air Quality Monitoring



Example of a Device for sensing in the IoT Infrastructure

Amenity Architecture

- **The Network layer**

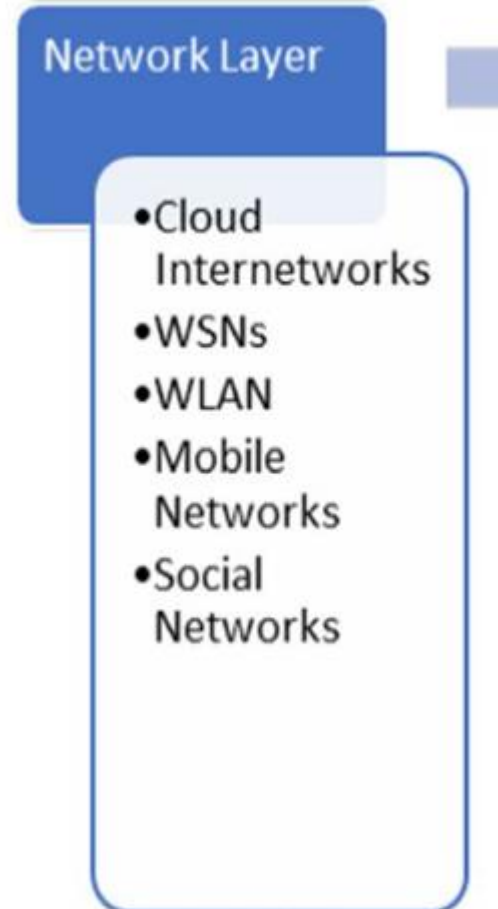
- used to handle all the network-related issues such as
- establishing connections,
- providing the appropriate connection channel,
- data transmission,
- manage security and privacy issues of data in transit

Network Layer

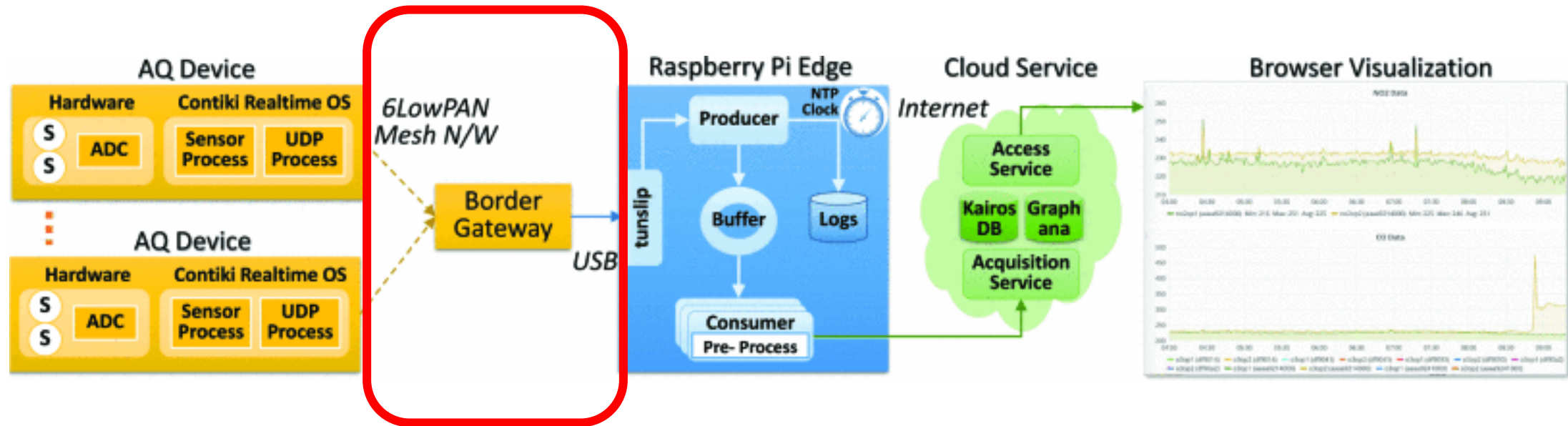
- Cloud
Internetworks
- WSNs
- WLAN
- Mobile
Networks
- Social
Networks

Amenity Architecture

- **The Network layer**
- Some more complex issues that must be addressed in the networking layers are
 - Efficient network for the wireless medium
 - An energy-efficient network is needed.
 - Quality of Services (QoS) is required.
 - Effective techniques for data mining and data searching
 - Efficient and effective processing of data signals
 - Efficient confidentiality and security are required.



Network layer - SATVAM: Toward an IoT Cyber-Infrastructure for Low-Cost Urban Air Quality Monitoring



Example of a Device for network in the IoT Infrastructure

Amenity Architecture for Smart Cities

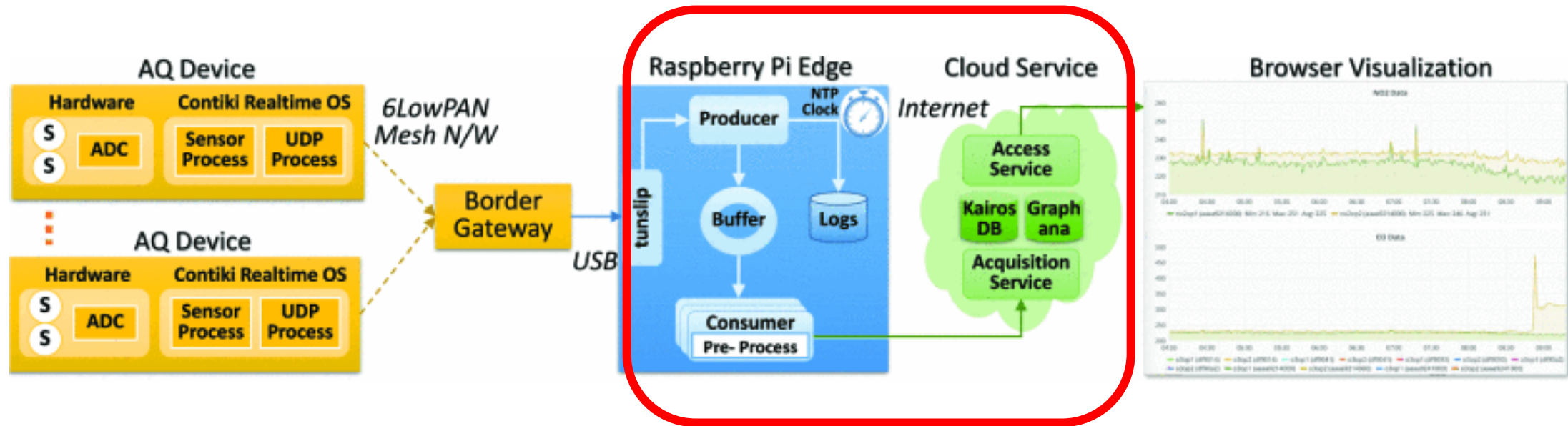
- **The Service layer**

- focuses on services and their related issues, such as
- management of service-related challenges,
- and delivers a smooth drive to the system at both the user and application levels

Service Layer

- Business Logics are transformed into serviecs.
- The main steps are -
 - Service Division
 - Service Intergration
 - Service Composition

Service layer - SATVAM: Toward an IoT Cyber-Infrastructure for Low-Cost Urban Air Quality Monitoring



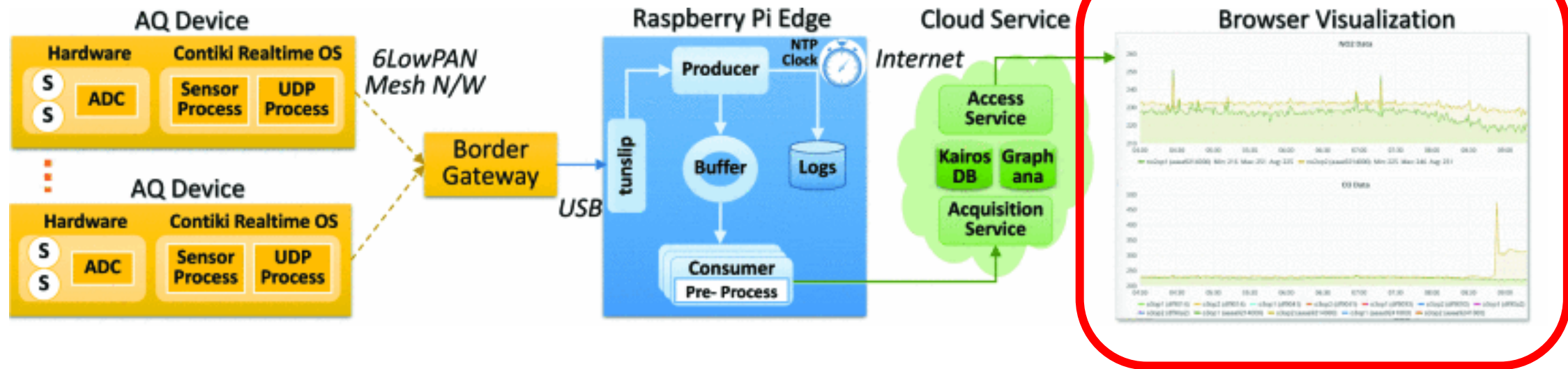
Example of a Device for service in the IoT Infrastructure

Amenity Architecture

- **The Confederate or Application layer**
- used to associate interfaces
- and handle all network compatibility-related issues as well as the proper management of things.



Application layer - SATVAM: Toward an IoT Cyber-Infrastructure for Low-Cost Urban Air Quality Monitoring



Example of a Device for application in the IoT Infrastructure

New Town Kolkata Integrated Command and Control Centre (ICCC)

USE CASES

Safety & Security

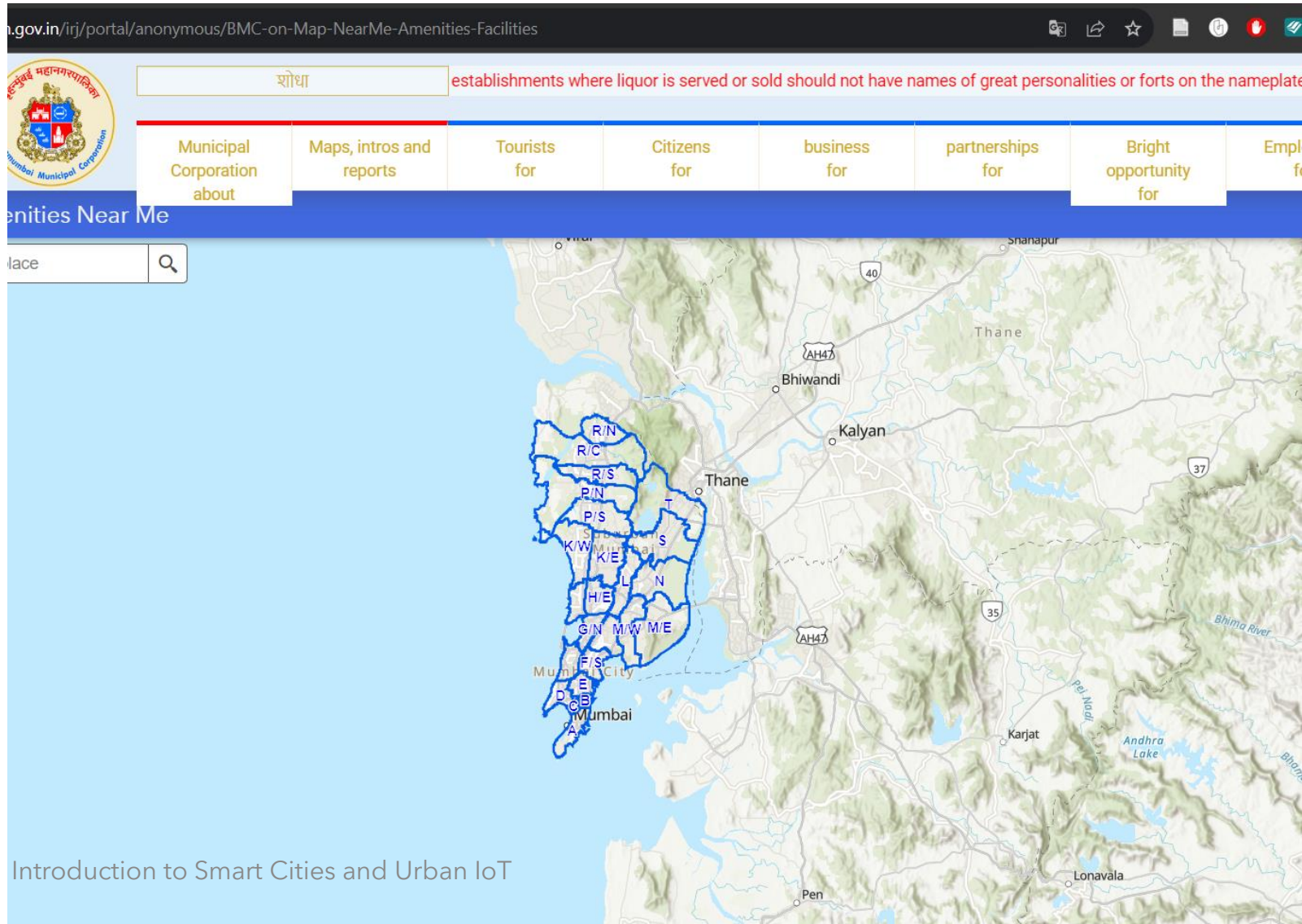
Water Sanitation & Hygiene
(WASH)

[Link](#)



BMC's web map

[Link](#)

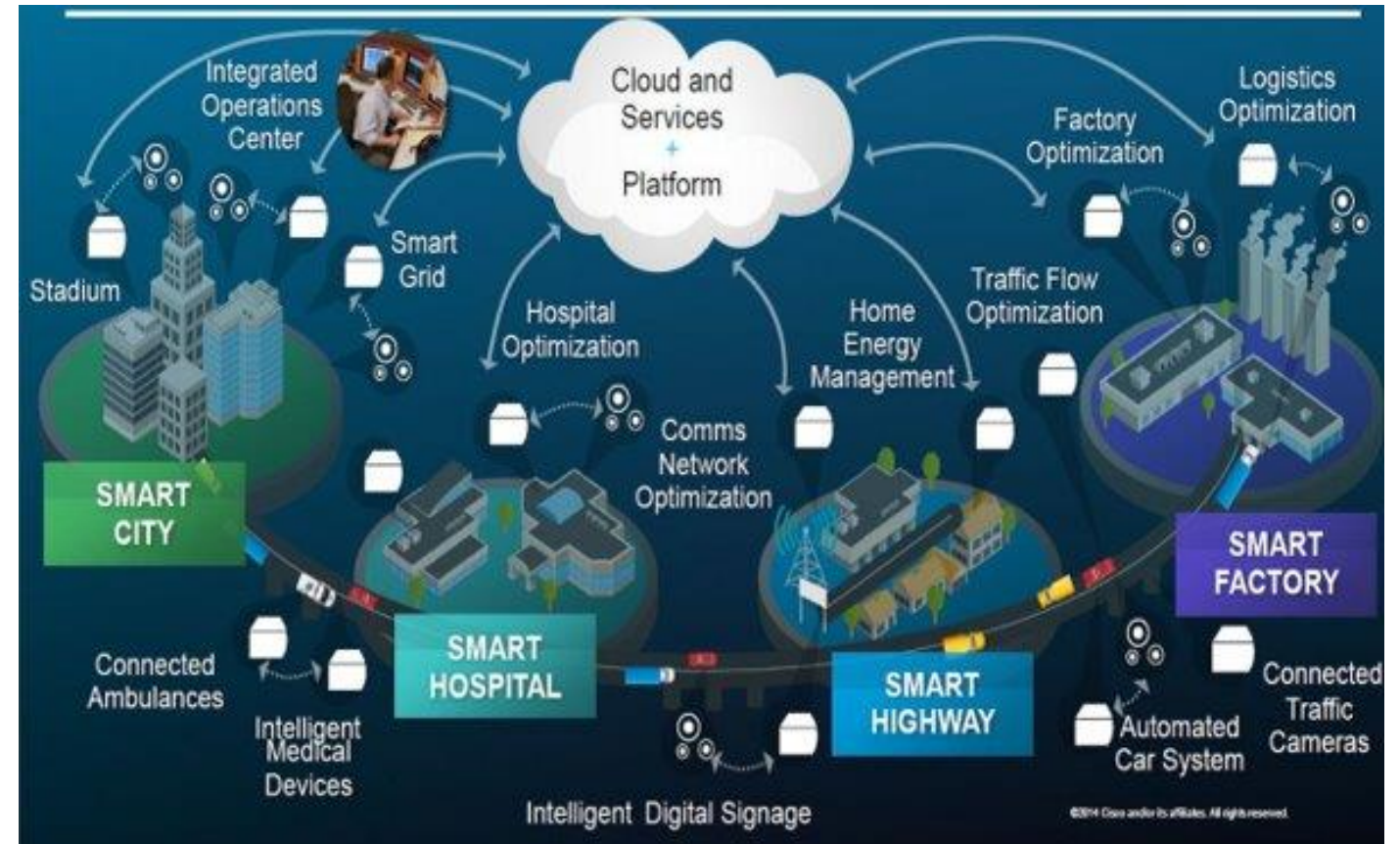


Centro De Operacoes Prefeitura Do Rio data analytics center

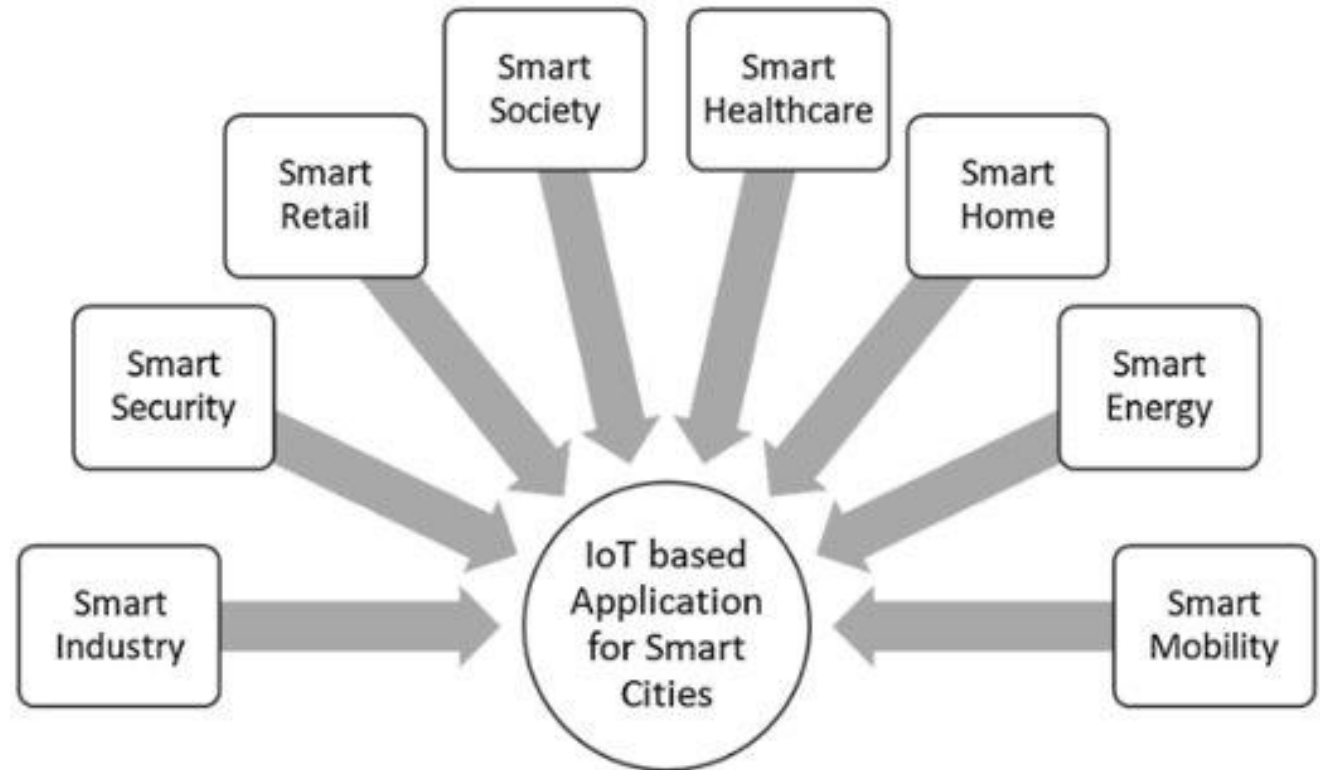


IoT application in a Smart City?

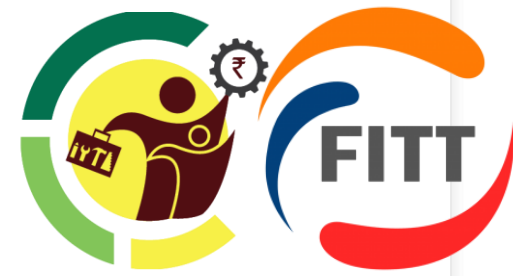
Components of IoT for Smart City



Application of IoT for Smart City



IoT for Smart City



- Reduce the cost and risk required to create and evolve IoT services.
- Connect multiple heterogeneous systems in a city.
- Decrease the time required to implement and deploy IoT services which are part of smart city initiatives.
- Deliver secure and scalable service access and open new opportunities for the city.
- Create value (e.g., better services) from smart connected data and devices.

Smart Industry / Factory

- Focusing on efficiency and effectiveness to meet customer needs and build strong relationships
- Service-oriented economy through networking transactions.
- Interconnection between diverse industries, including assembly, manufacturing, and production lines, is essential for achieving better products and more effective services globally.



Smart Security

- The core idea behind developing IoT-based smart security is to create applications that align with the paradigms of smart cities.
- Security is essential at every level of smart city infrastructure, spanning from data processing and transmission channels to network connections, data transfers, and the storage of device data in cloud databases.



Smart Retail

- Enhancing Social Economy with IoT-Based Smart Retail
- Impact of E-Marketing on Local Businesses
- Crucial Role of Retail Trade in the Economy



Smart Society

- addressing social causes and developing applications to handle essential issues.
- smart home, metering, lighting, security, parking, and waste disposal, are integrated to play a crucial role in establishing smart city infrastructure.
- Environmental Monitoring
- Waste Management



Smart Healthcare

- Vital IoT-Based Smart Healthcare one of the essential applications for personal well-being
- connections to hospitals, doctors, family members, and ambulances.



Smart Home

- Widespread Adoption and Simplicity
- Integration of Various IoT-Based Applications
- Smart Bathrooms, Kitchens and Rooms with Sensor Management



Smart Energy

- Widespread Adoption and Simplicity
- Integration of Various IoT-Based Applications
- Smart Bathrooms, Kitchens and Rooms with Sensor Management



Smart Mobility

- Devices to remain connected to the network due to their continuous generation of data in real-time



Smart City Case Studies

Waste Vision: Improved Waste Separation and Optimized Logistics

- Using smart sensors Waste Vision can offer autonomous features that include:
- Fill level sensors that measure how full a container is to help ensure timely but also efficient waste collection
- Drum sensors that measure whether there is a blockage in a container
- Radar sensors that detect if there is litter next to a connected trashcan
- Alarms if a service door is being used for unauthorized access
- Fill level lighting to encourage citizens to use the connected trashcans correctly and reduce overflows.



Water Leak Detection using IoT

- The water alarm can detect minor leaks long before they become a huge problem. And if a pipe should burst, the water can be shut off by automatically.
- Over time, it will be possible to identify risk factors at an early stage and carry out preventive measures before damage has occurred.
- The backbone is two hardware components—a water sensor and a water fault switch
- They continuously collect and send data from the surroundings. Of course, everything is monitored via an app that tells you if abnormal water activity is detected.



Air Quality monitoring

- Smart environment using the various sensor to measure the air quality of the various areas based on that the smart planation to enhance the air quality
- Citizen Awareness
- Better city administration
- Identify Hotspots



Air Quality monitoring by Arunachal Pradesh State Pollution Control Board(APSPCB)

- The APSPCB keeps track of the air quality in two places, Namsai and Kharsang. And display the acquired data on an LED display for the public to view.
- sensors for gathering accurate data on the various parameter levels. The data collected by the monitor can be transferred via GSM and other various modes to the APSPCB.



IoT cycleway monitoring solution

- <https://adroit.nz/camera-traffic-cycle-monitoring-solutions/>
- IoT video sensors as part of a cycle traffic monitoring project. The project for a local city council saw the installation of camera equipment specifically designed to detect vehicles to assist in traffic management and cycle lane assessment.
- These cameras will feed data back via the Adroit platform to provide accurate, real-time data initially on cycle lane use, and further down the track will have the option to provide a complete range of pedestrian, cycle and vehicle information.



Thank You