

# Sustainability & Smart Cities

## Drone-Powered Rainwater Harvesting for Future Smart Cities

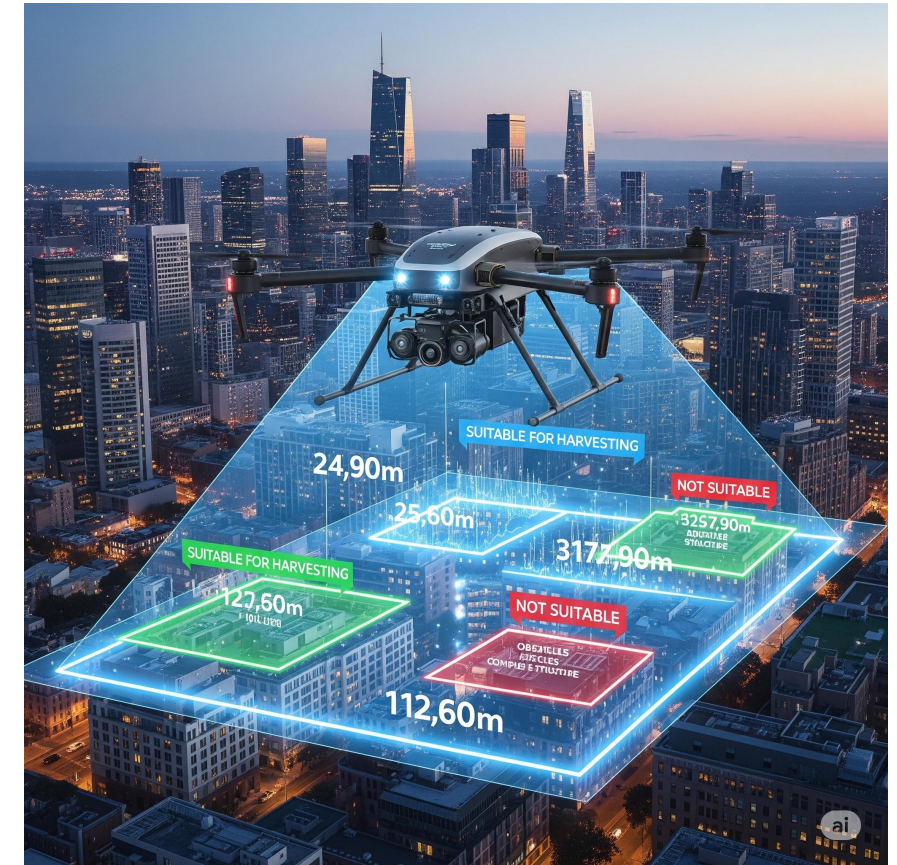
Smart cities are facing a critical challenge due to growing water scarcity and a lack of efficient rainwater harvesting systems. Existing methods are static, costly, and inefficient. As a result, there is an urgent need for a more effective solution.

# Solution

As urban populations increase, smart cities face a critical challenge: water scarcity. The traditional methods of rainwater harvesting are insufficient because they are limited by space, require manual work, and can't effectively check water quality. Due to rapid urbanization and climate change, access to safe and sufficient water is becoming more difficult. To address this, there is a clear and urgent need for innovative solutions that use **AI and IoT** to ensure sustainable and accessible water for the future of smart cities.

# Drone-Powered Rainwater Harvesting for Future Smart Cities

1. **Drone Surveying (AI)** → Drones scan rooftops & open spaces to find the best spots for rainwater harvesting.
2. **IoT Sensors** → Smart sensors in tanks track water levels in real time.
3. **Water Quality Check** → Sensors test pH & turbidity to ensure the water is safe.
4. **AI Analytics** → Predicts rainfall, estimates storage capacity, and detects issues early.
5. **Smart City Dashboard** → Data is shown in Power BI/Azure IoT Central for planners & citizens to monitor and manage water use.



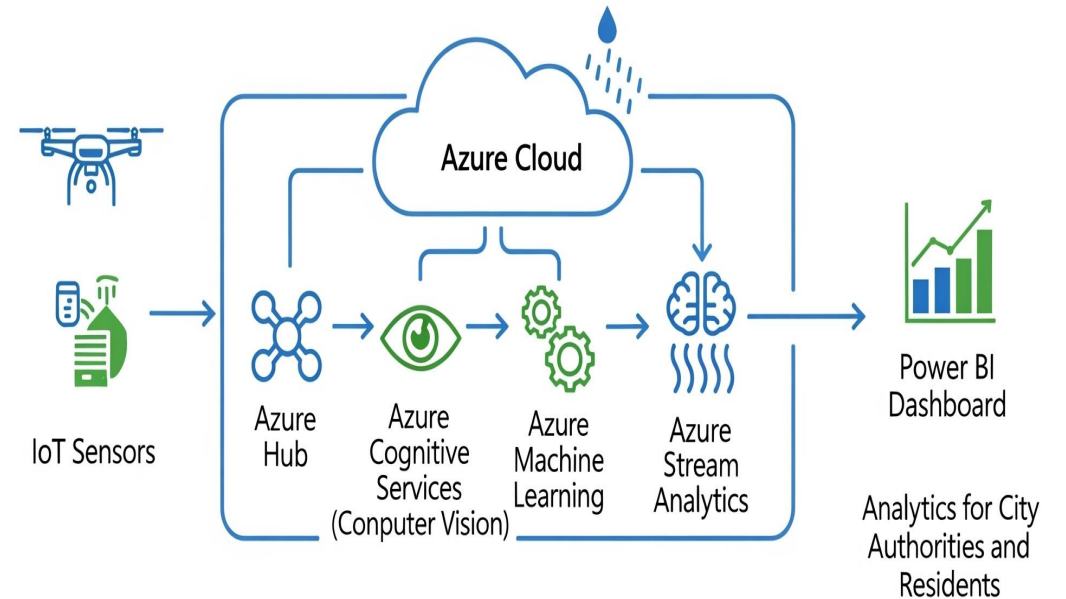
How is Microsoft Azure used?

## Azure Services to Use

- ✓ **Azure IoT Hub** : Connects water-level & quality sensors.
- ✓ **Azure Machine Learning** : Analyzes drone-captured images to measure rooftop space & predict rainfall.
- ✓ **Azure Cognitive Services (Computer Vision)** : Detects suitable surfaces for harvesting from drone images.
- ✓ **Azure Stream Analytics** : Real-time monitoring of water tank levels.
- ✓ **Power BI** : Dashboard for city authorities & residents.

## Azure Architecture flow

- Drones and Sensors collect data.
- The data is sent to the Azure IoT Hub.
- Azure Cognitive Services and Azure Machine Learning process the data from the drones to find the best harvesting spots and predict rainfall.
- Azure Stream Analytics processes the real-time sensor data from the tanks.
- All this information is then visualized on a Power BI Dashboard for city planners and residents to use.



**Azure Architecture**



## AI-Powered Rainwater Management & Water Infrastructure



## The Urban Rainwater Powerhouse



## Tech Diagram, Stack & GitHub Repo Link

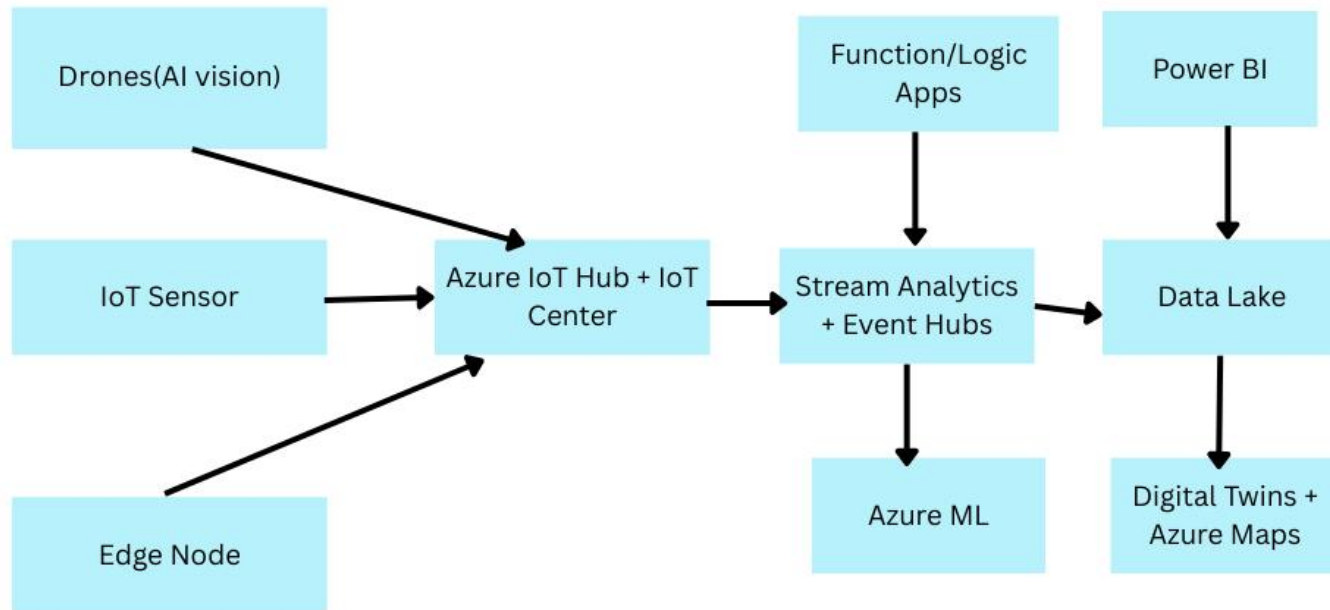


Fig :Smart Rainwater Harvesting System – Azure Architecture

View Project on GitHub: <https://github.com/lshrat8424/bitsculptors>

**Drones (AI Vision):** Identify rooftop/ground space for rainwater harvesting.

**IoT Sensors:** Monitor water level and quality in tanks.

**Edge Node → IoT Hub:** Send data securely to cloud

**Azure IoT Hub + IoT Central :**Connect and manage IoT devices/drones, handling real-time data securely..

**Stream Analytics + Event Hubs:** Process real-time sensor and drone data.

**Azure ML:** Forecast rainfall, detect leaks, optimize water use.

**Functions/Logic Apps:** Trigger alerts and actions.

**Data Lake:** Store and analyze historical data.

**Digital Twins + Azure Maps:** Simulate smart water systems.

**Power BI:** Visual dashboards for authorities and citizens.

**THANK YOU**