'Sensors' for Smart 'Cities'

The trend of urbanization is growing word wide. According to United Nations, Department of Economic and Social Affairs, Population Division (2014)*, more than 6.3B people, 60% of the population will be living in cities by 2050. With more population shifting to urban areas, cities across the globe are dealing with tight budgets and aging infrastructure.

The cities of the future needs to be safer, more sustainable, efficient, comfortable, Interactive and 'smart'.

In smart cities, a network of sensors, cameras, wireless devices, data centres form the key infrastructure, which allows civic authorities to provide essential services in a faster and more efficient manner. Smart cities are also far more environmentally friendly as they use sustainable materials for building facilities and reduce energy consumption. Efficient use of technology helps create an efficient transport management system, improve healthcare facilities and develop a robust communication network to connect all businesses, people and beyond the relationships between central and sub-national levels of governments.

There will be an urban environment that is permanently communicating with the citizens and capable of managing public services in real time to improve their quality of life through traffic management, garbage collection, waste disposal, irrigation systems, assisted parking, alerting the local authority when an incident occurs and allowing the government to stay in touch with the people.

What it takes to make a city 'SMART'?

A smart city capable of becoming both environmentally sustainable and attractive to citizens and businesses requires a new kind of intelligent infrastructure — an innovative and open platform based on smart sensor networks that can help forward-looking cities more predictably integrate a complex suite of services cost-effectively, at pace and at scale. While many smart city technologies including smart electricity grids, smart meters and real-time transportation information are already in pilot programmes. Some of the major components of the Smart city are as follows:

Use of Sensor Technology - A smart city can create an efficient and smart services delivery platform for public and municipal workers by installing sensors in the city and to create platforms that allow the share of information and give it for proper use to the public, city managers, businesses and professionals. The platform can have common data warehouse where different sensor system store their information.

One of the aspects of smart cities is the optimal use of available resources. Sensors can help make optimal use of resources with connectivity to tell us when and where to save. These sensors can control, detect and manage the unnecessary use and make certain adjustments as per the need.

Water Management

At present, the major cities waste up to 50% of water due to pipe leakages. With sensors fitted on each pipes, water leaks can be easily detected and corrected before any heavy loss. Besides this, the irrigation systems in public parks can automatically turn off whenever rain is detected to save water.

Energy Management

Sensors have also enabled the concept of "Advanced Metering Infrastructure (AMI)" underpinning energy management in cities. Cities are considering use of "Smart Meters" embedded with Phase Measurement Unit (PMU) sensors and communication module which facilitates a two-way communication between the consumer and the supplier. For utility service providers, it helps check meter status prior to sending a repair crew in response to a customer call. These checks prevent needless field

Remote control network - An integrated control network with common data transmission infrastructure monitors all the municipal and supply networks of the service companies involved in the project. The goal is to manage and find out about the ordinary consumption, incidents and eventualities in these networks, all of this independently from the municipal services. All the networks have alert devices and monitor consumptions, flows, intrusions, etc., making it possible to act in the event of leaks.

The service network should include supply network, drainage network, rainwater network, public lighting, pneumatic waste collection, climatology, electrical energy and internal home comfort.

The city (Project) should able to provide publicity subsidised homes in a short period of time.

Information & Communication Technology (ICT) - ICT improves the way cities function and communication flow increases the sustainability of cities as it gives people the appropriate information to make well informed decisions. ICT manages cities in a more participative way and facilitates active participation of individuals and local communities as well as provides efficient feedback system and improves internal and external interaction. It creates an urban commons for cities collaborations around the world.

Smart Mobility - It is important to ensure availability of open public data for its analysis and onward distribution to its users for the use by colleagues, friends and public at large for smooth mobility. Further, provisions of alternatives such as multimodal approach and professional working at a smarter place result in the comfortable and easy work environment. Sharing of available resources as well as parking solutions in the city ensures use of resources in a smarter way. This also results into overall improved quality of life. Car running on green gas adds to sustainability and eco-friendly environment which cities should ensure.

Global Initiatives

Rio de Janeiro, Brazil's second largest city and host to Summer Olympics 2016 is a tangible example of what a smart city in future would be like. During the Olympics, millions of tourist would visit this city from across the globe. The logistics of moving so many people around in a few short weeks, while still running the daily operations of a city of such size, would be daunting for any government.

Located in a building that looks like a glass cube, the Centro de Operacoes is a high-tech control room for the entire city, packed with computers, giant screens and hundreds of workers who can monitor everything from water levels in streets after a rainstorm to developing traffic jams.

The goal is to make decisions in real time as events or emergencies occur, mitigating their impact on the daily lives of Rio's residents while making sure the city's budget is used as effectively and efficiently as possible.

crew dispatch to customer sites. For consumers, it can provide the real-time energy usage detail in a way which a user can understand quite easily. Based upon this data, users can change the preferences and make more informed decisions about their usage without waiting for their energy bill at the end of month.

Smart Streetlights

In cities street lights remain ON even when there's no activity in the area (sometime in daylight too!). Additionally, it becomes very difficult for authorities to detect any fault and theft of street lights. With sensors, lights can go dim when they aren't needed and authorities can get a text message almost instantly whenever there is a fault or tampering in street lights.

Waste Management

With sensors fitted in the garbage bins, the municipal authorities can be notified when they are close to being full. The Netherlands became the first ever to produce "Intelligent Bins" that report to the officials via text messages whenever the bins are either full or if there is any damage.

World Urbanization Prospects: The 2014 Revision, Highlights (ST/ESA/SER.A/352)

Centro de Operacoes, Control Room, Janeiro

Transport Management (Smart Parking)

Traffic can be reduced with sensors that detect where the nearest available parking slot is. Motorists get timely information via text messages so they can locate a free parking slot quickly, saving time and fuel. A similar project is being carried out at San Francisco called SFPark - where parking spaces have been installed in 8200 on-street places. This concept would be replicated in several other states in coming days.

Santander, the Spanish city is embedded with more than 12,000 sensors that measure everything from the amount of trash in containers, to the number of parking spaces available, to the size of crowds. Besides helping the government operate as efficiently as possible, it's changing the way Europe thinks about cities.

Since 2010, 12,500 sensors have been placed in and around the city's downtown district. In addition, sensors on vehicles such as police cars and taxicabs measure air pollution levels and traffic conditions. The data from these sensors flows to banks of computers that analyze the real-time information and give city officials the kind of big picture that allows them to adjust the amount of energy they use, the number of trash pickups needed in a given week and how much water to sprinkle on the lawns of city parks.

At the same time, the city is opening up its data so that programmers can create apps that help citizens find bus arrival times or let tourists find out who is performing at concert halls simply by pointing their mobile phones at a bus stop or building.

Real-time Pollution Management

Sensors mounted on poles can monitor the Ambient Air Quality (AAQ) of cities. Citizens can monitor the pollution concentration in each street of the city or they can get automatic alarms when the pollution level rises beyond a certain level.

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