Decision Makers' Connect

DEFEATING POLLUTION WITH THE IoT: Solutions In India

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Smart devices powered by the IoT gives users the opportunity to optimise the very aspects of their operations that may improve the impact on the environment

Indian cities have been struggling to bring pollution levels in check. Recent World Health Organisation reports have revealed that India has the most polluted air in the world—cities like Kanpur, Mumbai, New Delhi and Varanasi, among others, appear on the top of the list. New Delhi has often been in the red alert radar, like last year, when the city's air quality crossed 70 times the safety limit.

Apart from air, there is concern regarding water pollution. India's major rivers—Ganga, Yamuna and Narmada—and most other water bodies are heavily polluted.

While air pollution is mostly contributed by dust from unregulated construction works, emission from vehicles, industries and homes, and so on, water pollution is caused due to unregulated waste dumped into water bodies that may come from households or factories, poor sewage management, non-invigilated washing and bathing by people, etc. We also include soil pollution and we get a clearer picture of where we stand.

To bring these critical environmental issues in control, experts are arming themselves with modern technologies like the Internet of Things (IoT). The IoT takes the role of an enabler, providing clear visibility of real-time environmental conditions to users and allowing them to make necessary changes to improve conditions. Let us look at how the IoT is helping people mitigate environmental problems.

How the IoT reduces pollution

Smart devices powered by the IoT gives users the opportunity to optimise the very aspects

of their operations that may improve the impact on the environment. Ashish Mathur, managing director, Jamshedpur Utility and Services Co. (JUSCO), says, "IoT setups provide a clear dashboard-based compact view of all necessary data to decision makers. With information like PM levels in the air, moisture, humidity, pH of water and so on being available in one place, making strategies to mitigate air pollution becomes easy."

The IoT is embedded in every smart appliance today and, consequently, helps mitigate environmental issues in one way or the other. Amarjeet Singh, chief technology officer, Zenatix Solutions Pvt Ltd, says, "IoT solutions can handle environmental issues directly or indirectly. Solutions like air quality or environment monitoring systems take a direct approach by displaying live conditions of the environment, be it indoors or outdoors.

"As a result, users know what can be done to control the readings, if these are above safety levels. Other solutions bring indirect benefits to the environment, such as technology that reduces energy consumption. If homes, industries and cities can optimise their energy-driven appliances to reduce electricity usage, a massive reduction in carbon footprint, thermal emission and, subsequently, pollution can be achieved."

Industries are one of the largest contributors to environmental pollution. Hence, many big factories are deploying IoT solutions in their premises. Amiya Kumar Samantaray, chief executive officer and founder, Phoenix Robotix Pvt Ltd, says, "Central Pollution Control Board (CPCB) has come up with guidelines for industries and cities to monitor pollution levels online. All data gets collected on a centralised platform, where it is analysed and risk areas are highlighted. With remote access to all analytics, industries are better able to prepare for pollution and, eventually, follow CPCB norms better."
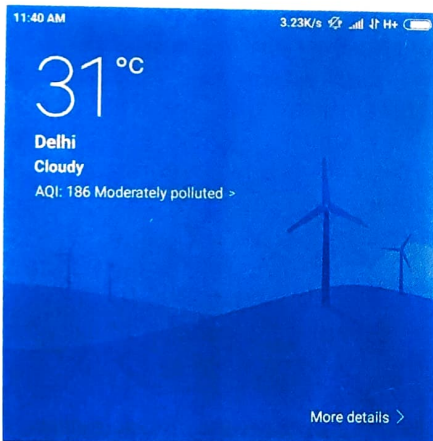

11:40 AM   3.23K/s

31 °C

Delhi
Cloudy
AQI: 186 Moderately polluted >

More details >

Details

WIND
9.3km/h E

REAL FEEL
39.4°C

UV INDEX
0

PRESSURE
1000.0 mb

Fig. 1: Smartphones display the air quality index of regions

Fig. 2: Air quality monitors can help keep real-time tab on pollution levels (Credit: dataline.co.ke)

Application areas

As mentioned earlier, IoT solutions help improve the environment at various levels, namely, households, industries and enterprises, or even at city scale.

Industrial and enterprise solutions. Many solutions are available today to help industries and enterprises fight pollution. For instance, Aurassure, an environmental monitoring platform developed by Phoenix Robotix, can be deployed across premises of a factory or office. Solar-powered sensor devices are wall- or pole-mounted across different corners, to create a perimeter around the campus. Sensors pick up environmental data of the surrounding, including air quality (PM 2.5 and PM 10 readings), carbon gas content, other gases, humidity, soil conditions and pH.

Data is stored on a cloud server, which is analysed to create actionable reports. Accessible through a Web-based interface, the operator can log onto the server and study the analytics. In this way, Aurassure helps many industries control emissions and regulate their impact on the environment.

Samantaray says, "Aurassure has been deployed in front of various city municipalities including Rajkot, Siliguri and Coimbatore. In Orissa, we deployed it with industrial customers like Jindal Steel and Dalmia Cements. All of them are

consistently keeping a tab on pollution levels and taking necessary steps after comparing the readings at regular intervals."

Another example is Wattman platform by Zenatix, which helps geographically-distributed retail and enterprise chains to maintain their appliances and optimise energy consumption. A centralised control system shows real-time electricity usage of all connected appliances—if any appliance is drawing higher energy than it should or is approaching a breakdown, the operator is notified to take preventive measures. This IoT-based building management system aimed towards enterprises has been deployed across various Mother Dairy outlets. It can save at least 30 per cent electricity and considerable carbon emissions.

City-level solutions. Smart cities

Fig. 3: Sensor-based water monitoring system in smart cities (Credit: Libelium)

are aimed towards environment conservation holistically. Sensorised technologies are deployed across various pollution hotspots like garbage disposal zones, sewage drains, water bodies and busy roads, to actively monitor and mitigate these plans. At city level, a reliable communication network is required, to allow the sensors to communicate with each other.

Mathur explains, "To bring forth a sustainable smart infrastructure to Jamshedpur city, the first step was to bring the whole region under LoRaWAN connectivity. Next, we took different steps to control the various aspects of the environment and created a central visibility platform for all setups from a control office.

"We introduced sensors to sewage drain covers. When sewage becomes almost filled to the brink, the sensors notify the operator at the control to deploy a cleaning team before sewage water overflows. We tested and deployed sensorised bins to notify us in real time when bins across the city get filled, and clean these within time.

"We also introduced sensors to Jamshedpur's lakes and waterbodies. These read the composition of the water, notify us of any kind of contamination and help us ensure that aquatic flora and fauna are healthy.

"Jamshedpur also utilises smart grids to ensure optimal electricity generation and distribution. Smart meters help us keep a tab on the supply of utilities like electricity and water to reduce wastage."

In addition to these, smart streetlight control, smart parking and traffic management also factor in a healthy and sustainable urban environment.

Consumer solutions. IoT devices that can help reduce environmental problems from households are aplenty. Smart plugs enable users optimise their usage of electric appliances, especially air-conditioners, geysers and, at times, refrigerators, which generate a high amount of carbon gases and consume a lot of energy.
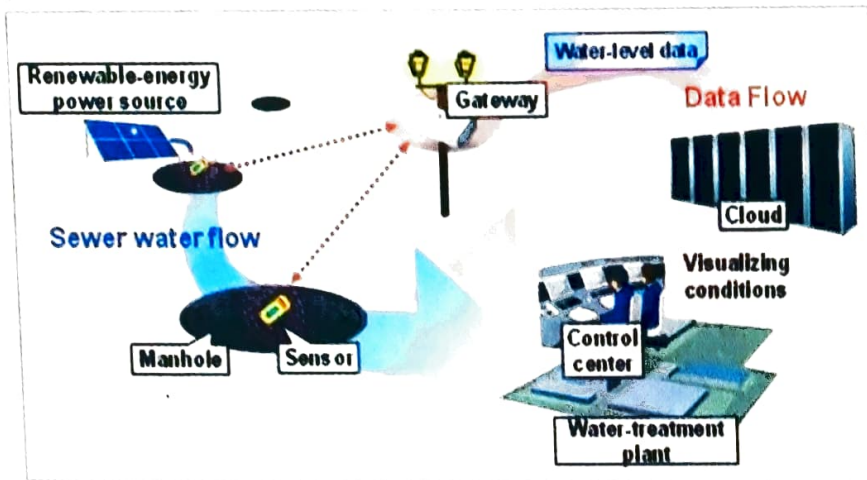
Smart air purifiers mod-

Fig. 4: How the IoT monitors sewage flow (Credit: Fujitsu.com)

ulate indoor air and keep a tab on indoor conditions.

In-car IoT devices help reduce fuel wastage—a major source of high carbon emission in urban areas.

Automated water taps and water pumps help reduce water wastage.

Challenges today and the way forward

There are many factors that play into the consistent lack of environmental well-being, a major reason being lack of awareness among citizens. Collections of wastes outside waste collection bins, overflowing sewages, malpractice in water bodies, unregulated use of fuel-based vehicles, unmonitored solid and fluid emissions from factories and much more, collectively result in these situations. While educating the citizens is crucial, enterprises and administrative bodies should start taking the onus to drive the motion—fortunately, they are.

Samantaray says, "In India, you do not find many monitoring stations. However, cities are gradually coming up with such stations by carefully planning the same to measure all quality parameters of the environment."

He explains, "IoT devices themselves cannot reduce pollution all the time. These provide critical data based on which awareness must be spread and steps taken. Teaching people the benefits of renewable energy solutions like solar solutions, aggressively promoting plantation and afforestation, creating an ecosystem for electric vehicles and so on can help promote a healthy environment."

Singh concurs, "We are at an early age of deploying technology for environmental benefits. A lot is yet to be done in terms of deploying air and water monitoring at large scale, smart mobility and so on. We are just touching the tip of the iceberg."

All cities and regions need to address these problems at local levels, believes Mathur. State governments and the central government must play dedicated roles in the process.

Samantaray says that, with a large number of startups coming up with innovative solutions, data and devices can turn out to be a big opportunity in this aspect. The government has also come on board to bring in devices and apply norms, which people have started adopting slowly. "Hopefully, in two to five years, these technologies will be adopted at the fullest." he concludes. ■