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Montevideo's Smart Lighting Leverages LoRaWAN Connectivity

BY CLAIRE SWEDBERG

The solution, involving around 70,000 connected streetlights, improves lighting management at each fixture, while identifying when maintenance is required as soon as a fixture fails.

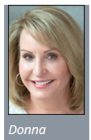
Mar 06, 2022 The city of Montevideo, Uruguay, is rolling out Internet of Things (IoT)-based intelligence to 70,000 streetlights across an area spanning 200 square kilometers (77 square miles). As part of the deployment, the city is in the process of rebooting its entire streetlighting system by switching from traditional lights to LED luminaires and deploying LoRaWAN sensors above each fixture for two-way data communication.

The solution leverages long-range wireless technology with connectivity provided by telecommunication company National Narrowband Network Communications (NNNCo). The technology using sensors and a lighting-management application from Wellness TechGroup with its local partners, Prodie and Effiza, and leveraging Actility's LoRaWAN network server. The deployment is one of the largest rollouts of LoRaWAN technology to date when it comes to smart streetlights, according to Donna Moore, the LoRa Alliance's CEO.

The system is intended to reduce the cost of lighting the city, maintaining those lights, improving environmental sustainability, and providing greater efficiency and safety for pedestrians and motorists. In the long term, Montevideo could expand its smart-city services using the same network to capture data from a variety of other sensors, which could include pollution control, waste management and other public-safety applications.

Montevideo is Uruguay's capital and has a population of 1.3 million people. The city intends to leverage the IoT technology to improve community and road safety, while reducing carbon emissions by up to 80 percent, or 31,500 tons of carbon dioxide emissions reduction yearly. Such savings will result from using lower-power LEDs, as well as from better controlling where illumination is needed and reducing excess lighting. Sydney-based NNNCo serves as the project's network operator, says Rob Zagarella, the company's CEO, while Wellness TechGroup provides its CMS WeLight Manager software, which manages data from its LoRaWAN Actis Nema 7 LPC nodes.

NNNCo and Wellness TechGroup first teamed up to develop smart streetlighting deployments in 2019, using NNNCo's non-proprietary LoRaWAN carrier network and Wellness TechGroup's controllers and WeLight application. The companies deployed a solution for city lighting in suburban London, and the partners gained a contract with the city of Montevideo in 2021. The city "was looking to drive benefits around reducing energy consumption [and its carbon footprint]," Zagarella recalls, "and to improve services to the citizens, as well as boosting safety."



Donna Moore

Traditional streetlighting typically includes controllers at each lamp, leveraging a global-standard interface to control or dim the luminaires. Such controllers are not connected to a network, but are instead programed to adjust lighting levels, as well as turn lights on and off, at predetermined times. They may also include a photoelectric sensor to measure light levels as the Sun goes down or comes up, mechanically switching on and off based on that information.

The city of Montevideo's Technical Unit for Public Lighting (UTAP) sought an intelligent lighting system that operators could control by viewing conditions throughout the city, to determine how lighting could be adjusted to improve safety or reduce costs, and to understand when fixtures required maintenance. The deployment began with two pilots in 2021, involving 53 streetlights using the Actis Plus Nema 7 nodes, along with several gateways. The city tested whether LoRa transmissions met their requirements during the first phase, then integrated the technology with the WeLight application.

There will be up to 80 LoRa gateways to cover the entire area, the companies report, and the streetlamp nodes are now in the process of being deployed. LoRaWAN technology in urban environments typically offers a transmission distance of 3 to 5 kilometers (1.9 to 3.1 miles), though the range can be less in crowded environments. The system provides two-way connectivity, and data can be sent to and from each streetlamp node via integrated LoRaWAN radios. LoRaWAN-enabled controllers transmit data to and from base-station gateways installed around the city. NNNCo's network collects and manages the data from sensors into a platform, from which an application programming interface connects to the Wellness TechGroup streetlight application.

Rob Zagarella

Initially, the streetlights could be programmed to adjust their lighting according to a variety of factors, which can be changed by city managers at any time. For instance, lighting can be adjusted according to environmental conditions, or in a specific neighborhood, or for activities in a given area—for example, a sporting event ending, leading to a larger number of pedestrians. "Dimming and managing streetlights is really one of many use cases," Zagarella states.

The city can view when a lamp might require maintenance. If a light is no longer switching on, for instance, the application can alert managers, then dispatchers can assign a maintenance crew to that area. In that way, the technology eliminates the need for an employee to have to call in and report that there lights are out on a particular street.

In general, Zagarella says, cities face considerable costs involved in sending crews out on a regular basis to check the status of lights, but they can reduce that expense by transitioning from periodic maintenance to just-in-time maintenance, with crews no longer needing to patrol for outages. With the technology, he says, "I'm getting there quicker and I'm improving operational efficiency." There's also a safety element to the solution, he adds. When streetlights can be managed remotely, for instance, the city could increase the level of lighting in an area in which accidents often occur.

In the long term, the technology could be used not only by the city but by businesses or organizations that might want to offer services based on the wireless system. Because LoRaWAN is an open standard, Moore explains, there's an ecosystem around it that enables a wide variety of solutions. The gateways can be used to capture and send data, in order to enable waste-management monitoring, for instance, by tracking when bins are ready for pickup, monitoring the progress collection vehicles make as they remove waste, or analyzing where excess driving could be reduced, or where pickups could be scheduled more efficiently.

Use cases could include anything from pollution detection to traffic management and emergency services, Moore reports. "That's the exciting part, the addition of use cases that can be rolled out—and that we're seeing roll out in cities around the world," she states. "Once the network is in place, the ROI just continues to drive up."

The controller nodes being deployed come with other sensors as well, such as accelerometers that could detect an incident—a car crashing into a pole, for example—which could generate an alert. The city of Montevideo is still in discussions with the technology companies to determine what other functionality they hope to integrate in the near or long term. The rollout is intended to be completed during the third quarter of this year.

Other cities around the world are rolling out similar LoRaWAN solutions, Moore says, but on a smaller scale. With the Uruguay deployment, Zagarella speculates, the technology may be crossing a tipping point. "We are in discussions with other large cities and utilities that are looking to follow a similar pattern," he says.

The LoRa Alliance released its 2021 year-end report in February of this year, which indicates significant growth and deployments of scale, as well as an increased membership, with 100 new members joining the organization in 2021 (see 2021 End-of-Year Report: The Power of LoRaWAN). According to the report, LoRaWAN networks are in operation in almost every country around the globe.

Claire Swedberg has been covering RFID technology for RFID Journal since 2005. She also contributes to magazines on subjects such as electrical installations and alternative energy. She is the author of five historical nonfiction books, and teaches an adult writing class.