LONMARK® INTERNATIONAL

CASE STUDY

Guancheng District, China

Guancheng Applies the Internet of Things Model to a Citywide Street Lighting Retrofit

The accelerating urbanization endows cities with unprecedented privilege in economy, politics and technologies, making them become the center of the globe. In the meantime, cities are faced with numerous challenges, such as environmental pollution, traffic congestion, energy shortage, housing shortage, unemployment, diseases, etc.

How to efficiently tackle these issues brought by urbanization to achieve sustainable development in the new environment has become an important focus of urban planning and construction. It is under such environment, “Smart City” appears as a possible solution to solve the issues and a tendency for future city development. The construction of Smart City will substantially stimulate local economic development, as well as promoting the fast development of other industries, like GPS, Internet of Things, Intelligent Traffic, Smart Grid, Cloud, and software industry, etc. “Smart City” in China has entered a brand new era, currently being popularized in 154 cities across the country.

“Smart City”- based intelligent outdoor lighting has become the most ideal platform to realize “Smart City” with its wide coverage, strong extensibility and good stability. As the biggest “Internet of Things Intelligent Street lighting Solution” provider, Guangdong Rongwen retrofitted the street lighting system of the district of Guancheng in Dongguan, China as part of a larger initiative of creating intelligent, efficient and low-carbon city management solution. Leading the upgrade, the Dongguan Guancheng Utility Service Center was tasked with replacing nearly 12,500 street and alley lights while integrating an intelligent control system that communicates with the greater city management system.

With the assistance of Guangdong Rongwen Energy Science and Technology Group Co., Ltd. (Rongwen), the Utility Service Center will apply the “Internet of Things” model—where all hardware, software and services are identified, integrated and efficiently managed—to modernize a community that will realize energy savings of up to 70 percent while increasing public safety and security.

The Challenge

The existing high-pressure sodium (HPS) street lighting infrastructure throughout Guancheng posed several challenges due to a complicated installation environment and a short four months allowed for job completion.

Meanwhile, the current power line communications suffered from interference, and the cost of maintenance and repair of the street lamps was time consuming and costly. In order to contribute to the larger-scale integration planned for the entire district, the retrofit would demand a communication network using technologies that ensured stability, reliability and longevity.

Furthermore, construction-related challenges such as many alleys, cumbersome wiring and buried lights among tall trees would add time-consuming interferences to the retrofit.

The Solution

As the Master Systems Integrator, Rongwen provides the Utility Service Center with turnkey services including project design, products procurement, financing, construction, installation and commissioning, training, energy-saving monitoring and verification. For Rongwen, the Internet of Things concept is a key tenet of their organization, emphasizing what integration and intelligence affords efficient, low-carbon cities.

"Many towns in Dongguan have applied the Internet of Things concept to street lighting systems. The system is capable of failure alarms, intelligent dimming and energy consumption, and it's also a platform to realize other smart city applications such as air quality sensory system, road environment monitoring and surveillance," Wang Junyang, Director of System R&D, Rongwen, said. "The LED streetlight management system used in Dongguan has marked a significant step in promoting Smart City in China."

Using an Energy Performance Contracting model, the Utility Service Center financed the project over a ten-year contract term where the purchaser pays the contractor 90% of the energy-saving bills each month. Monthly utility bill savings each month are used to offset the cost of the retrofit.

At the onset, a reasonable construction schedule was set, one that took into account the existing landscaping and construction challenges. The LonWorks® open protocol platform was selected as the enabling technology for system integration and communication based on the technology's maturity in the marketplace, ease of use, support, and wide availability of lighting profiles.

The complete retrofit involves retrofitting 3,957 streetlights in main roads and 8,541 alley lights by replacing the old HPS streetlights with intelligent and highly efficient Chip-on-Board (COB) LED streetlights and alley lights from Guangdong LED Benchmarking System Recommended Directory. By using LONWORKS integrated, intelligent 120 lumen LED lights, the luminance is 30 percent higher than what is required in the Standard for Lighting Design of Urban Road, the industry standard of the People's Republic of China.

Once installed, each LED street light is located, identified and connected to the street light network. An i.LON SmartServer then sends data to the management center through a public wireless network. Users can remotely monitor and manage the complete network all the way down to individual lights.

To optimize communication strength and insulate any interference, wave trappers were installed throughout the district where they are monitored and controlled as part of the street light network.

The Results

Installing the wireless, LonWorks-based power line communication network enabled rapid project implementation with minor environmental impact. All communication is done through the power line, and the Utility Services Center has seen a 20 percent decrease in overall installation costs.

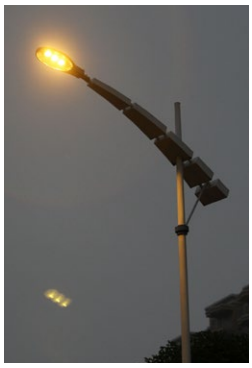
Users now remotely monitor and manage the entire street lighting network through management software powered by Streetlight.Vision. This front-end software enables users to access and control any device in the street including streetlight cabinets, light points, and smart meters through a simple-to-use graphic user interface. Remote management with the ability to receive and respond to alarms and notifications has significantly simplified routine maintenance and reduced its cost by 30 percent.

The LonWorks COB LED solution generates a lower color temperature (3000K) to create a healthier lighting environment with higher uniformity, thus increasing safety and security for the Guancheng residents and reducing energy use by up to 70 percent.

"I couldn't believe what I saw. People criticize regular LEDs, and one of the reasons is the high color temperature. But this COB LED has taken care of that problem," Director Mo from Guancheng Streetlights Department, said. "Besides that, the luminance of the LED streetlights used in this project is higher than the standard."

The estimated annual benefit of 12,500 COB LED street lights:

- Reduced energy use by up to 70%
- Lowered installation costs by 20%
- Reduced maintenance costs by 40%
- Improved lighting quality
- Improved safety
- City beautification
- Enabled remote notification of alarms or alert situations



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