

# Smart Hybrid Streetlight Monitoring and Controlling System

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**Abstract:** Due to the recent eco-friendly energy policy of the government, street lamps based on existing electric power lines have been replaced by street lights using solar heat or wind. However, LED lamps with generators require monitoring and control because they can't generate power or operate when there is a problem with the device.

## 1. Background and Purpose

(1) Our system solves the problem of power shortage and lack of streetlight by providing solar energy streetlight for the safety and convenience life of residents who are difficult to receive electric power line-based streetlights such as primitive underdeveloped cities and island areas in the Amazon region.

(2) In the case of existing solar energy street lamps, it was impossible to confirm whether the street lamp internal device was reached 'limit' - due to the absence of the monitoring system.

(3) Our system can solve the problem about unnecessary power consumption of existing solar energy street lamps due to the inefficient output - what is involved the residual power and number of sunless days.

## 2. Concept and Idea

### 2.1 Smart Hybrid Street Light

(1) Smart Hybrid Street Light means a street light device composed of solar modules, rechargeable batteries, LED, controllers, Wi-Fi modules (hereinafter referred to as street lights).

(2) Self-generated electricity through solar charging module, generated power is stored in battery.

(3) LED module can adjust brightness (dimming) and receive power from battery.

(4) Wi-Fi module enables data transmission and reception with server.

(5) The controller measures the voltage and current value of the inside of the streetlight and each module, and the operation of the streetlight can be controlled using the data received through the Wi-Fi module.

### 2.2 Monitoring and control systems

(1) When monitoring and control system is applied, it can check the operation status and the status value of the street light in real time through monitoring. And remote control can be performed as needed, thus enabling effective generation and save the power compared to residual power.

(2) It is possible to provide important indicators for street lamp operation such as addition and removal of street lights through - weekly, monthly, and annual statistical information on generated power and power consumption.

(3) Unlike existing solar energy street lighting monitoring system, this can be controlled and accessed by individual unit. Also possible to monitor and control street lamps in groups.

## 3. Design and Functions

### Smart Hybrid Street Light:

(1) Status information such as the residual power of the street light, battery voltage and current, current and voltage.

of LED, battery charge status and so on are renewed in 1 minute and displayed on the screen.

(2) Real-time light on/off, lighting control through time

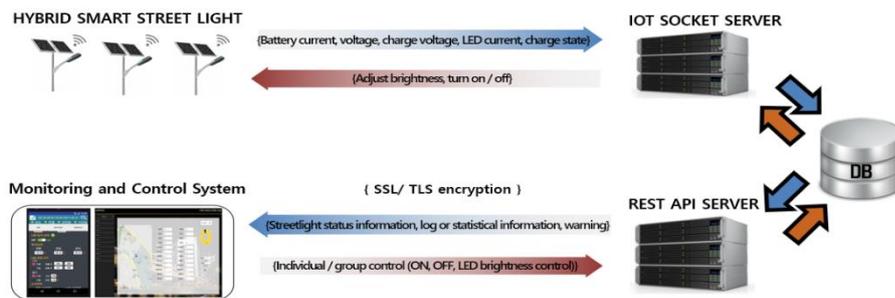


Fig.1 Real-time monitoring and control system.

setting.

- (3) Multiple street lights can be managed as a group.
- (4) Individual and group control for each streetlight.
- (5) It is possible to check log information (control history and abnormal situation) each group and individual lamp.
- (6) Provide total statistical history information (weekly, monthly, annual power or power consumption).
- (7) Monitoring and controlling systems offer Web and App applications.



Fig.2 Monitoring and Controlling System Appearance.

- (8) Provide real-time notification of street lights

(communication fault, low power, low voltage) information.



Fig.3 Hybrid Smart Streetlight Appearance.

#### 4. Problems and Future Work

This system uses a wireless network to transmit and receive data to and from the server. Therefore, if the wireless network is not provided, remote controlling and monitoring are impossible. This problem will be improved by replacing with additional research and devices which capable of wireless communication.