Part 06

EMS

Developing Techniques for Monitoring Battery Operations

Remote Monitoring and the Outdoor UPS

Research and business are rapidly moving toward adopting technologies that create new value and services by taking advantage of the connection of ordinary "things" to the network (e.g., the internet), namely, the Internet of Things (IoT) and its related technologies[1]. In fact, it is now possible, using sensors, to gather the vast amounts of data generated by "things" from all sectors and industries.

GS Yuasa has developed an alternating current uninterruptible power supply (UPS). This UPS comes with a lithium ion battery and can be installed outdoors (●Fig. 1). The UPS determines its location by using the global positioning system (GPS) and can transmit location data. In this article we provide an overview of this outdoor UPS, how this positioning information is acquired, and how the device is remotely monitored.

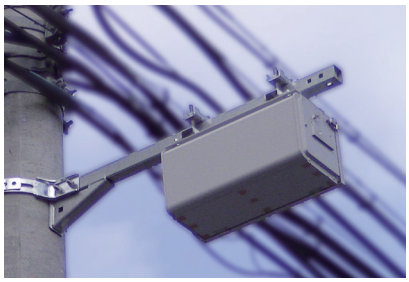
1. Overview

GS Yuasa developed a UPS for cable television (CATV) transmission. This UPS has a li-ion battery instead of a lead-acid battery, and an aluminum enclosure. With this, the unit is lightweight (less than 21 kg) and has a significantly smaller footprint[3]. The UPS unit can be hung from a messenger wire (●Fig. 2) or from an electrical pole (●Fig. 1).

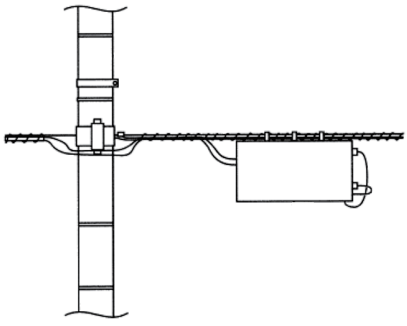
The UPS can supply almost two (2) hours of power backup to a 170VA (135W) load, giving facility managers enough time for an initial response in the case of a power outage or during a disaster. The availability of geolocation and remote monitoring (later described) makes it possible to constantly monitor the status of a given UPS in a given region.

We believe that in addition to CATV transmission lines, this kind of outdoor UPS will be useful as backup power for various kinds of devices, such as video surveillance cameras, digital signage, parking gate mechanisms, IoT access point devices, and the like.

●Fig. 1 Example installation of an outdoor UPS[2]



●Fig. 2 Example installation on a messenger wire[4]



2. Retrieving the UPS Location

UPS for CATV transmission lines are installed at a rate of thousands per region. Some units are installed on dedicated poles away from electrical poles, in high places close to electrical poles, or in low-lying locations. Improper accounting of where the UPS units are installed makes post-installation maintenance extremely difficult. Traditionally, the engineering company or facility manager would manually record where a UPS unit is installed and therefore automatically retrieving location data reduces the amount of work involved. In some cases, UPS units are moved after the installation location is recorded, and so automatically retrieving location data is a way to correctly determine the latest installation location of a given UPS unit.

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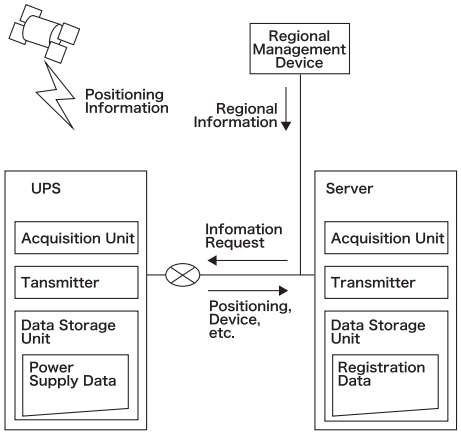
Here, GS Yuasa came up with a way to provide the UPS with GPS functionality (●Fig. 3). A server-side transmitter periodically sends an information retrieval request to the UPS via a communication network. An acquisition unit (in the UPS) periodically retrieves the latitude and longitude of its installed location, and the unit's transmitter sends this positioning information to the server. A server-side acquisition unit also retrieves map information and correlates the positioning information sent from the UPS with the map.

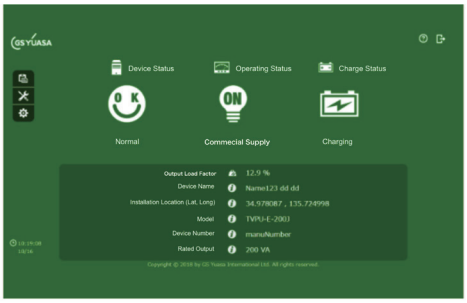
This kind of system automates the process of recording the installation location of a UPS unit. When there is a power outage, the li-ion battery in the UPS supplies the GPS unit with power. It is therefore possible to appropriately manage the installation location for the UPS, since the location information for the UPS is continually updated.

It is also possible to remotely monitor the operation of the UPS via a web browser (●Fig. 4). In addition to monitoring measured values such as the output voltage and output current, it is also possible to remotely control the operation of the UPS or update the software.

●Fig. 3 Retrieving the UPS Location[5]



●Fig. 4 Remote Monitoring Web Interface



3. Determining Movement or Change in the UPS Location

The global positioning system makes detailed global positioning information available; it is therefore possible to use this information to detect movement or changes to the position of the UPS within centimeters, and thus to determine the state of the unit during a disaster. Besides CATV transmission lines, the UPS may be used as backup power during a power outage for the numerous video surveillance cameras and traffic lights within a region. The UPS may be useful in determining the state of each region during a disaster by retrieving the positioning information (movement or change in position) from the UPS units connected to various devices.

In this article, we described a system that retrieves and remotely monitors the positioning information for an outdoor UPS unit, and how the positioning information may be used. At GS Yuasa we will continue to use our expertise in storage battery and power system technologies to offer the products that our society needs.

1. Examination Guidelines for IoT-related Technologies, Japan Patent Office, 2018
2. Japanese Patent Publication No. 2018-170870 (Filed in 2017)
3. GS Yuasa Technical Report Volume 15, No. 2, published 2018
4. Japanese Patent Publication No. 2018-170869 (Filed in 2017)
5. Japanese Patent No. 6528917, WO2018/181666 (Filed in 2017)

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