Street Light Management System Repairs: A Case of the Maintenance and Repair Office, the Kinmen County Government

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Abstract
The Kinmen County has a total of approximately 15,000 street lights. Because of the countless types of street light equipment information, that such information is updated periodically, and that information pertaining to the building and maintenance of street lights in different times is difficult to preserve, control, and access, related departments often spend considerable time to find relevant maps and information prior to sending out their maintenance personnel. Because of the significant number and types of street lights used in the Kinmen County, this study administered a general investigation on the locations, quantities, types, and forms of the street lights to archive relevant basic databases, compile. street light numbers and codes, and establish a street light repair system. The objective was to use such an information system to quickly repair street lights and adopt the system concepts to build complete information standards as well as provide the public and related agencies with a convenient repair and maintenance management system. In addition, the said system can be used to conduct relevant operational planning and statistical analyses.

Keywords: Wireless Communication Technology, LED Lighting

Introduction

Nowadays, with the continual progress of science and technology and the constant development of material and lighting technology, lighting technology has a radpid development from the vacuum tube to fluorescent lamp and LED technology.
Therefore, its application level is wider and wider on mobile device, traffic lights, TV and so on.

LED lighting technology was applied to public lighting systems:

(1) effectively energy-saving lighting management system:after the start of public lighting system at night, the brightness can be changed according to the change of season and weather. And at night, the unnecessary lighting behaviour can also be adjusted in the less-people areas to reduce waste of electric energy.

(2)the analysis mechanism of fault detection: a set of fault detection analysis mechanism is put into public lighting system. When a lamp goes wrong, the system will notify the fault by detecting the voltage / current value, and the maintenance personnel may immediately go to the maintenance station to repair it when they learn that the lamp is out of order.

(3) systematic analysis of the reliability of lighting management systems: event state definition and system analysis of public lighting system meet the expected impacts of events and improve system reliability.

With time passed by, communications technology continues to grow rapidly from wired communications to wireless technologies.Wireless communications technologies range from short distances (RFID) to medium short distances (ZigBee, Bluetooth), communications, and even long distances communication technologies,which includes GPRS, WiFi, 3G, LTE and so on, have been widely used in entertainment, control and consumption and other functions. The transmission content of them can include text messages, voice and multimedia information.The ZigBee device returns LED lighting parameters and control the status of LED lighting , and then sends the sensing information to the clouder server to process and analyze through the 3G/4G router. Setting the parameters for each lamp through wireless communication technology, not only can reduce the function to control more lighting equipment energy consumption, but also promote the high reliability LED lighting equipment by systematic analysis ,the necessity to reduce the human resources field inspection lamp.
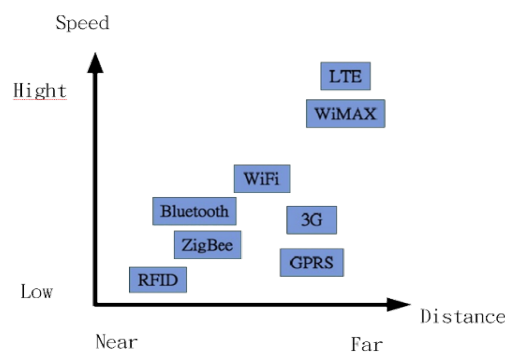

Figure1 . Conceptual Framework

System function

lamp monitoring function part:

1.the wireless communication technology can be used to set the parameters of the lamps and the relevant information about the use of the lamps.

2.monitoring system must have browser, web pages, Web, base to provide Chinese operations, man-machine interface for use, operators through the Internet remote monitoring, access to field meter data and management.
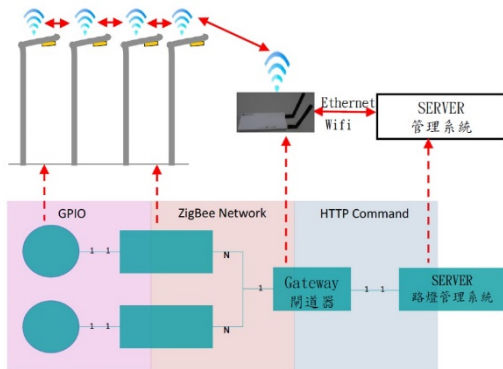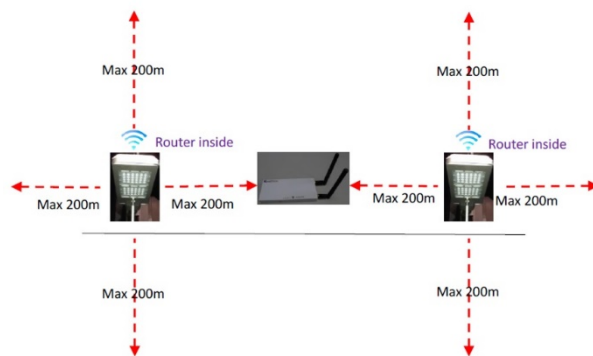

Figure2．System Function

Figure3. Zigbee Transmission Range

The ideal of the maximum transmission distance of ZIGBEE data transmission diagram is 200 meters. However, he is very susceptible to interference, is best able to set point open, stable connection.

Research hypothesis

This study takes the people in Kinmen as an example and makes the following hypotheses:

H1: there is a positive correlation between the number of Kinmen people and their willingness to use.
H2 and H3: digital information, its use interface and rewards have moderating effects on the use intention.
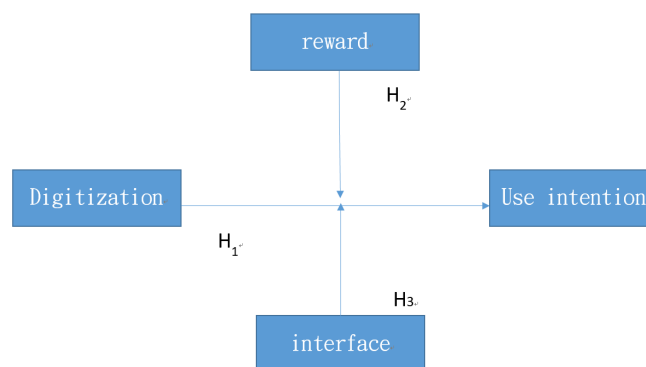

Figure4.Research Architecture

Research methods:

The subjects were people in Kinmen.

In order to make the sampling samples more evenly distributed and to improve their estimation accuracy, the subsequent analysis of each layer of messages is carried out.

The proportion of stratified convenience sampling, fill in answer to provide online questionnaire site for the respondents, the questionnaire is expected to recover 500 copies

Research framework

This is the architecture of my research.
Is it possible to use system digitization to influence users' wishes and to use incentives and interfaces as interference variables?

Conclusion(Expected Results**)**

System performance: the system by digital data, the query / action network via online management, packet using system function (packet) for transmitting and receiving judgment lamp without failure, greatly reduce the human cost of inspection.

Statistics: the number of maintenance, the use of electricity, the use of materials such as cross contrast analysis, to identify the light body material is bad or other aspects of the line defects, improve the proper rate.

When the public feels more convenient and simplifies the failure repair system and additional rewards, it is more willing to inform them voluntarily.

The advice of future research orientation

In the future, if you can set up temperature and light sensors on your lighting equipment, and even routers to increase the clock circuit, you should enhance the efficiency of cloud lighting management system for more complete monitoring. On the basis of LED lighting equipment of high working temperature, reducing the output current to reduce the occurrence of LED color problem caused by overheating of lighting equipment.
The nearby illumination of LED lighting equipment can automatically control the brightness of lighting equipment by environmental sensitization, which makes the system more automated
Combining with the police, fire and other units of the notification system, the disaster can be transmitted by street light coordinates to receive and rescue easily.

References

Chen, Y., & Liu, Z. (2009, April). Distributed intelligent city street lamp monitoring and control system based on wireless communication chip nRF401. In Networks Security, Wireless Communications and Trusted Computing, 2009. NSWCTC'09. International Conference on (Vol. 2, pp. 278-281). IEEE.

WANG, TUNG-TUNG, & KUO, WEN-CHENG. (2009). Design of streetlight wireless network control system based on ZigBee technology. Journal of Tianjin Polytechnic University, 28 (1), 84-88.

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