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IOT BASED SMART STREET SYSTEM BY USING ARDUINO

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ABSTRACT:

Both safety and energy conservation are very important advantages of smart cities. Namely, the city street lamp is correlated with both safety and energy conservation. Therefore, street lamp is an indispensable part of the smart cities. However, current street lamps have lack of smart characteristics, which increases both danger and energy consumption. In order to address these problems, a smart street lamp (SSL) based on fog computing for smarter cities is proposed in this paper. The advantages of the proposed SSL are: 1) fine management, because every street lamp can be operated independently using IOT technology. 2) dynamic brightness adjustment , all street lamps can be adjusted dynamically. 3) autonomous alarm on abnormal states, each street lamp can report the abnormal status independently, such as broken, stolen, and so on. The experimental results showed that proposed SSL can improve energy efficiency and reduce danger.

I. INTRODUCTION:

Presently, the street lamps mainly adopt manual management or light perception control, which both have certain disadvantages: 1) Long maintenance period. Both manual management and light perception control adopt manual patrol to check broken street lamps. Therefore, the maintenance period is too long, especially for the suburban street lamps, it can be even longer than few months. However, the danger increases just after the street lamps are broken, thus there could happen more traffic accidents, more robbery and stealing. 2) Hard fine grain control. It is obvious the manual management is not smart enough, and it can be difficulty controlled in real time. Moreover, in order to simplify manual management, one switch is used to control many street lamps simultaneously. For the light perception control, the flexibility is almost limited. Remote and real time controls are not part of current management systems. 3) High energy consumption. Current street lamps have only two states, off and on. Moreover, they cannot adjust their brightness. Therefore, they consume unnecessary energy. Sometimes, the street lamps can be dim to reduce energy consumption. 4) Easy stolen. There is no effective method to prevent stealing of street lamps. There are a large number of street lamps so it is particularly impossible to control all of them all the time. In order to avoid stealing, the effective way is to make street lamps have self-supervise ability. In order to optimize the above-mentioned disadvantages to establish the smart cities, a new generation of street lamps has to improve lamp performance by introducing the following features: 1) Reduce maintenance period. Maintenance period is one of the most important parameters in smart cities. Therefore, the maintenance period must be reduced as much as possible. There must be a mechanism to check broken lamps in real time. 2) Satisfy fine grain control. Fine grain control includes few parts: first, every street lamp needs a unique identification to distinguish each other; second, every street lamp should be controlled independently; third, all street lamps should be controlled all the time; fourth, every street lamp has to be able to adjust its brightness according to current demands. 3) Decrease energy consumption. The brighter the street lamp lights up, the more energy is consumed. However, by using a dynamical light intensity adjustment according to current demands, energy consumption will decrease. 4) Autonomous alarm to avoid stealing. Every street lamp needs to have a self-protection ability. When it is stolen, it should autonomously send the alarm. In this way, the street lamp stealing can be avoided.

II. LITERATURE SURVEY:

Some intelligent street lamps have been proposed based on many communication technologies, such as

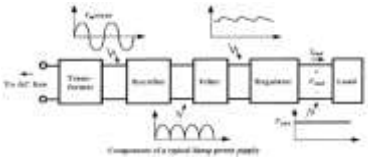
ZigBee [3], LPWA [6], GSM [5], and so on [22, 23]. moreover, there are many other communication technologies, such as Bluetooth [2], UMTS/LTE [4], Wi-Fi [1], and so on. Each of these communication technologies has its own characteristic. The Low-Power Wide-Area Network (LPWAN) or Low Power Wide-Area (LPWA) is a type of wireless communications for wide-area networks. Therefore, the LPWA is designed to provide long-range communication with a low transmission rate of 0.3 kb/s up to 50 kb/s per channel. The LPWAN has the potential to revolutionize the Internet of Things by providing a reliable and low-cost solution for communication between embedded devices. Lora WAN [20] is one of the most successful technologies in the LPWAN space. A Lora WAN gateway, covering a range of tens of kilometers and able to serve up to thousands of end devices, must be carefully dimensioned to meet the requirements of each use case. Thus, the combination of the number of end devices, the selected SFs, and the number of channels will determine if the LoRaWAN ALOHA-based access and the maximum duty cycle regulation fit each use case. However, the deterministic monitoring and real-time operation cannot be guaranteed with the current Lora WAN state of the art. The Universal Mobile Telecommunications System (UMTS) is the third generation mobile cellular system based on the GSM standard.

III. HARDWARE REQUIREMENTS:

1. POWER SUPPLY
2. ARDUINO UNO
3. ESP8266
4. NEO-6M
5. LCD DISPLAY
6. LDR
7. RELAY
8.BUZZER
8.VIBRATION SENSOR

POWERSUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can by broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.

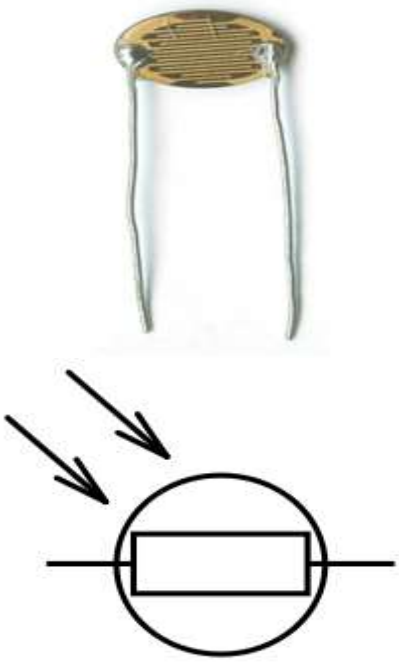


ARDUINO UNO:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

LDR:

A photo resistor or light dependent resistor (LDR) is a resistor whose resistance decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. It can also be referred to as a photoconductor or CdS device, from "cadmium sulfide," which is the material from which the device is made and that actually exhibits the variation in resistance with light level. Note that CdS is not a semiconductor in the usual sense of the word (not doped silicon).



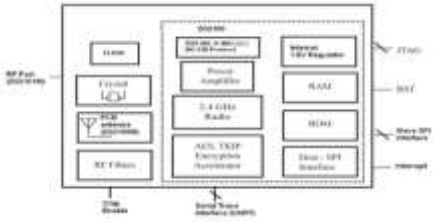
A photoresistor is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

VIBRATION SENSOR:

Vibration sensor module alarm Motion sensor module vibration switch SW-420 module based on the vibration sensor SW-420 and Comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can adjust using an onboard potentiometer. When this no vibration, this module output logic LOW the signal indicates LED light, and vice versa.If the module does not vibrate, the vibration switch was closed on state, the output of low output, the green indicator light. The product vibrates, vibration switches momentary disconnect, the output is driven high, the green light does not shine.The output can be directly connected to the microcontroller, which to detect high and low level, so as to detect whether the environment exists vibration, play a role in the alarm.

ESP8266:

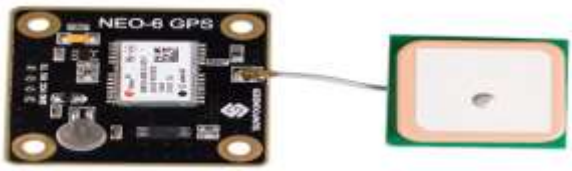
The ESP8266 modules are low-power 802.11b implementations. All RF components, the baseband and the entirety of the 802.11 MAC reside on-module, creating a simple and cost-effective means to add Wi-Fi connectivity for embedded devices. The module(s) implement a high-level API, simplifying design implementation and allowing the ZG2100M or ZG2101M to be integrated with 8- and 16-bit host microcontrollers.



NEO 6M

A GPS tracking unit is a device, normally carried by a moving vehicle or person, that uses the Global Positioning System to determine and track its precise location, and hence that of its carrier, at intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location database, or Internet-connected computer, using a cellular(GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or when analysing the track later, using GPS tracking software. Data tracking software is available for smart phones with GPS capability.The GPS was originally developed for use by the United States military, but in the 1980s, the United States government allowed the system to be used for civilian purposes. Though the GPS satellite data is free and works anywhere in the world, the GPS device and the associated software must be bought or rented.

A GPS device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth. A GPS reception requires an unobstructed line of sight to four or more GPS satellites, and is subject to poor satellite signal conditions. In exceptionally poor signal conditions, for example in urban areas, satellite signals may exhibit multipath propagation where signals bounce off structures, or are weakened by meteorological conditions. Obstructed lines of sight may arise from a tree canopy or inside a structure, such as in a building, garage or tunnel. Today, most standalone GPS receivers are used in automobiles.



LCD DISPLAY:

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

RELAY:

Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. There are also other operating principles for its working. But they differ according to their applications. Most of the devices have the application of relays. The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. The application of relays started during the invention of telephones. They played an important role in switching calls in telephone exchanges. They were also used in long distance telegraphy. They were used to switch the signal coming from one source to another destination.

BUZZER:

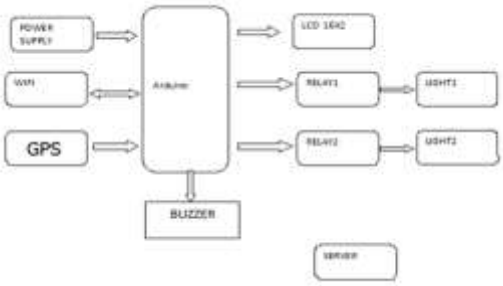
A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

SOFTWARE REQUIREMENTS:

- **ARDUINO IDE**

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards. First, the Arduino compiler/IDE accepts C and C++ as-is. In fact many of the libraries are written in C++. Much of the underlying system is not object oriented, but it could be. Thus, "The arduino language" is C++ or C.

PROJECT DESCRIPTION:



WORKING:

The proposed smart street lamp (SSL) mainly consists of three parts:

1) intelligent sensing street lamp, the brightness of street lamp can be adjusted, and an autonomous alarm will notify about abnormal behavior; for this here I used used LDR sensor used for brightness adjustment through intensity of light.

2) efficient network, the network can be used for real time communication, the NB-IoT is adopted for communication between server and massive street lamps, and the Internet technology, such as Wi-Fi and 4G, are adopted for communication between server and managers; Here I used the ESP8266 WIFI for communication and Wi-Fi used for to know the communication when iot is not available

3) flexible management platform, the management platform can optimize resource scheduling for easy and highly automated management like thefting or fault condition . The SSL architecture is shown in block diagram. In this situation, I used IR sensor and Bulb and holder and Current sensor. Vibration sensor for activated when the bulb is someone theft.

IV CONCLUSION:

In order to satisfy the requirements of smart cities, this paper proposes a smart street lamp (SSL) based on fog computing. The SSL mainly consists of three parts: 1) intelligent sensing street lamp (street lamp brightness can be adjusted and autonomous alarm notifies about lamp abnormal state); 2) efficient network (real-time communication is achieved, the NBIoT is adopted for communication between server and massive street lamps, and the Internet communication technology, such as Wi-Fi and 4G, is adopted for communication between server and managers); and 3) flexible management platform (management platform can optimize resource scheduling for easy and highly automated management of street lamp system). The proposed SSL was verified by its application in Xiasha district of Hangzhou, China, and obtained results proved high efficiency. The average maintenance period, which denoted the time between the abnormal lamp state appeared and the server checked it, was about 20 minutes. Moreover, the proposed SSL can reduce human resources by eliminating unnecessary periodic inspections. In the future, we have two mainly works: 1) make the proposed SSL be used in current smart cities; 2) adopt the proposed technique to some other fields in smart.

V. REFERENCES:

[1] Vladimir Bychkovsky, Bret Hull, Allen Miu, HariBalakrishnan, Samuel Madden. A measurement study of vehicular internet access using in situ Wi-Fi networks.In MobiCom'06, pp. 50-61, 2006.

[2] B Chatschik. An overview of the Bluetooth wireless technology. IEEE Communications Magazine, 39(12): 86-94, 2001.

[3] H Farahani. ZigBee and IEEE 802.15.4 Protocol Layers C ZigBee Wireless Networks and Transceivers. Zigbee Wireless Networks & Transceivers, pp. 33-135, 2008.

[4] S Schwarz, C Mehlfuhrer, M Rupp. Calculation of the spatial preprocessing and link adaption

feedback for 3GPP UMTS/LTE. Wireless Advanced, pp. 1-6, 2010.

[5] R. He, B. Ai, G. Wang, K. Guan, Z. Zhong. High-Speed Railway Communications: From GSM-R to LTE-R. IEEE Vehicular Technology Magazine, 11(3): 49-58, 2016.

[6] RS Sinha, Y. Wei, SH Hwang. A survey on LPWA technology: LoRa and NB-IoT. lct Express, 3(1), 2017.

[7] Weisong Shi, Jie Cao, Quan Zhang, Youhuizi Li, LanyuXu. Edge Computing: Vision and Challenges. IEEE Internet of Things Journal, 3(5), PP. 637-646, 2016.

[8] Yuyi Mao, Changsheng You, Jun Zhang, Kaibin Huang, Khaled B. Letaief. A Survey on Mobile Edge Computing: The Communication Perspective. IEEE Communications Surveys & Tutorials, DOI: 10.1109/COMST.2017.2745201, 2017.