AUTOMATIC STREET LIGHT ILLUMINATION AND VEHICLE SPEED CONTROLLING SYSTEM ON ARM7 FOR ROADWAYS USING WIRLESS NETWORK

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Abstract: The proposed remote-control system can optimize management and efficiency of street lighting systems. It uses ZigBee -based wireless devices which enable more efficient streetlamp-system management, thanks to an advanced interface and control architecture. It uses a sensor combination to control and guarantee the desired system parameters; the information is transferred point by point using ZigBee transmitters and receivers and is sent to a control terminal used to check the state of the street lamps and to take appropriate measures in case of failure.

Key words: zigbee module, light sensor, IR Sensors.

I. Introduction

Lighting systems, especially in the public sector, are still designed according to the old standards of reliability and they often do not take advantage of the latest technological developments. In many cases, this is related to the plant administrators who have not completed the return of the expenses derived from the construction of existing facilities yet. However, the recent increasing pressure related to the raw material costs and the greater social sensitivity to environmental issues are leading manufacturers to develop new techniques and technologies which allow significant cost savings and a greater respect

for the environment. We can find three possible solutions to these problems in the literature.

The first one, and perhaps the most intuitive, is the use of new technologies for the sources of light. In this area, light-emitting diode (LED) technology is the best solution because it offers many benefits. Researchers have already considered this possibility, designing an advanced street lighting system basedon LEDs. The second possible solution, and perhaps the most revolutionary, is the use of a remote-control system based on intelligent lamp posts that send information to a central control system, thus simplifying management and maintenance issues.

II. The Hardware System

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (LCD) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be

displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

IR Sensor: The IR LED is used as the IR transmitter, which is connected by using the resistor logic as shown in the schematic. The IR receiver is connected by using the transistor logic whose collector is connected to the base of the transistor. The base of the transistor is connected to the photo diode through the resistor.

LDR: The LDR is used to measure the light intensity.

Driver circuit: L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

ZIGBEE: Zigbee is new wireless technology guided by IEEE 802.15.4 Personal Area Network standard. It is primarily designed for the wide ranging controlling applications and to replace the existing non-standard technologies. It currently operates in 868MHz band at a data rate of 20Kbps in Europe, 914MHz band at

40kbps in USA, and the 2.4GHz ISM bands Worldwide at a maximum data-rate of 250kbps.

III. Design of Proposed Hardware System

Street Section:

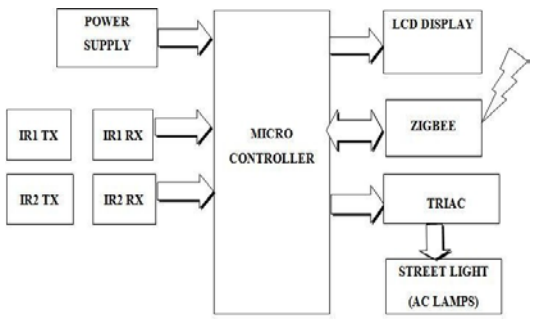

Fig.1.Block daigram of street section

Vehicle Section:

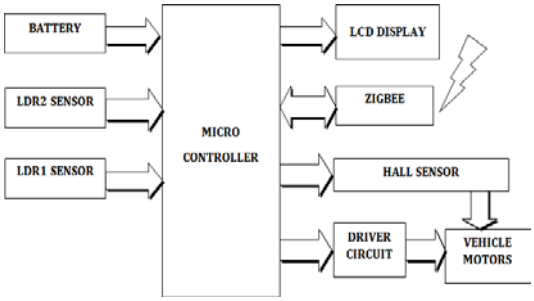

Fig.2.Block diagram of vehicle section

If the street light is not stopped after the night, the loss will continue throughout the day. And also the street light is not necessary when there are no human movements in the street. So to come out of these disadvantages this paper is introducing a ZIGBEE based street lighting system. An application will be created for this particular system and by using this application the street light can be operated wirelessly by using ZIGBEE. Whenever the human movements

will be occurred beyond the street light then the light will be automatically controlled. After the sunlight has been reduced in the street then the Street light will glow by using a light sensor. By using this project wastage of electricity will be reduced and human effect also reduced.

IV. Board Hardware Resources Features

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this ase is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The below table gives the pin description of transceiver.

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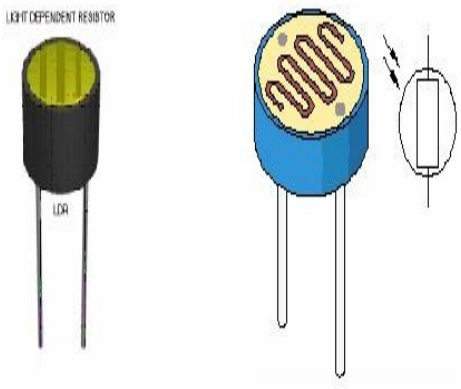
- Minimum connections: VCC, GND, DOUT & DIN
- Minimum connections for updating firmware: VCC, GND, DIN, DOUT, RTS and DTR
- Signal Direction is specified with respect to the module
- Module includes a 50k ohm pull up resistor attached to RESET
- Several of the input pull-ups can be configured using the PR command
- Unused pins should be left disconnected

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART. Just in case you are producing data faster than the X-Bee can process and transmit it, both X-Bee modules incorporate a clear-to-send (CTS) function to throttle the data being presented to the X-Bee module's DIN pin. You can eliminate the need for the CTS signal by sending small data packets at slower data rates.

Light Dependent Resistor:

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1,000,000 ohms, but when they are illuminated with light, the resistance drops dramatically. Thus in this project, LDR plays an important role in switching on the lights based on the intensity of light i.e., if the intensity of light is more (during daytime) the lights will be in off condition. And if the intensity of light is less (during nights), the lights will be switched on.



IR SENSOR:

Here the IR transmitter is nothing but the IR LED. It just looks like a normal LED but transmits the IR signals. Since the IR rays are out of the visible range we cannot observe the rays from the transmitter. These are infrared LEDs; the light output is not visible by our eyes. They can be used as replacement LEDs for remote controls, night vision for camcorders, invisible beam sensors, etc.

Infrared LEDs are ideal light sources for use with night vision goggles, surveillance cameras, medical imaging, recognition and calibration systems. Due to their resistance to ambient-light impediments and electromagnetic interference (EMI), Infrared LEDs enhance the performance of wireless computer-to- PDA links, collision avoidance systems, automation equipment, biomedical instrumentation, and

telecommunications equipment. Solid-state design renders Infrared LEDs impervious to electrical and mechanical shock, vibration, frequent switching and environmental extremes. With an average life span of 100,000-plus hours (11 years), Infrared LEDs operate reliably year-after-year.

V.CONCLUSION

This paper describes a new intelligent street lighting system which integrates new technologies available on the market to Offer high erefficiency and considerable savings.

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This can be achieved using the highly efficient LED technology supplied by renewable energy of solar panels, for which the cost of energy is independent from the power supplier prices, combined to an intelligent management of the lamp posts derived by a control system switching on the light only when necessary, increasing the lamps' lifetime. Another advantage obtained by the control system is the intelligent management of the lamp posts by sending data to a central station by ZigBee wireless communication. The system maintenance can be easily and efficiently planned from the central station, allowing additional savings. The proposed system is particularly suitable for street lighting in urban and rural areas where the traffic is low at a given range of time. The independent nature of the power-supply network enables implementing the system in remote areas where the classical installations are prohibitively expensive. The system is always flexible, extendable, and fully adaptable to user needs.

The simplicity of ZigBee, the reliability of electronic components, the feature of the sensor network, the processing speed, the reduced costs, and the ease of

installation are the features that characterize the proposed system, which presents itself as an interesting engineering and commercial solution as the comparison with other technologies demonstrated. The system can be adopted in the future for loads supplied by the power system, which enables the monitoring of energy consumption. This situation is particularly interesting in the case of economic incentives offered to clients that enable remote control of their loads [31] and can be useful, for example, to prevent the system blackout. Moreover, new perspectives arise in billing and in the intelligent management of remotely controlled loads and for smart grid and smart metering applications.

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