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STUDY OF LINK PROTECTION MECHANISM USING VISIBLE LIGHT COMMUNICATION FOR SMART INDUSTRY

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ABSTRACT

A protective connection technique that operates efficiently with wireless and visible light communication is proposed here to achieve reliability and performance in industrial communication network. It is considered implementing this technique in industries, wireless area, and Ethernet. In recent years, wireless networks and applications have attained peak success in private, governmental, business homes, and personal area communication. The useful features of this communications attract more attention to the industrial communication and expected to bring benefits such as reduction of usage and maintenance. However, the industrial communication systems require accurate real-time industrial motion control system in industries control and rapid communication. In this application, the systems working condition and efficiency are evaluated to ensure its applications in the industrial network. However, in the wireless communication, fading, multipath propagation and interference problem issues change the industrial communication system operation and reliability.

Key words: Light communication, Wireless, Link protection, Smart industry.

INTRODUCTION

Li-Fi is a VLC, visible light communication technology, and deals with transfer of data through illumination by taking fiber out of optics by sending data through a LED light bulb that varies in the intensity faster than a human eye can follow. It is now part of visible light communication (VLC) PAN IEEE 802.15.7 standard. It can be very easily explained as, if the LED is ON, you are transmitting the data means you transmit a digital 1; and if the LED is OFF you transmit a digital 0,or null, or simply no data transfer happens. More sophistication in the transmission techniques can further increase the data rates through VLC.

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Till now it was implemented through white LED bulbs only but teams at the University of Oxford and the University of Edinburgh are focusing on parallel data transmission by using multiple LEDs or array of LEDs, where each LED transmits a different stream of data. Mixtures of red, blue, green LEDs are also used by some groups to encode different data channels by altering the light frequencies. In simple terms we can consider it to be a light based Wi-Fi which has achieved blistering high speed in the labs at Heinrich Hertz institute in Berlin, Germany of around 500 megabytes per second using a standard white-light LED.

Hardware description and functionality

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices.

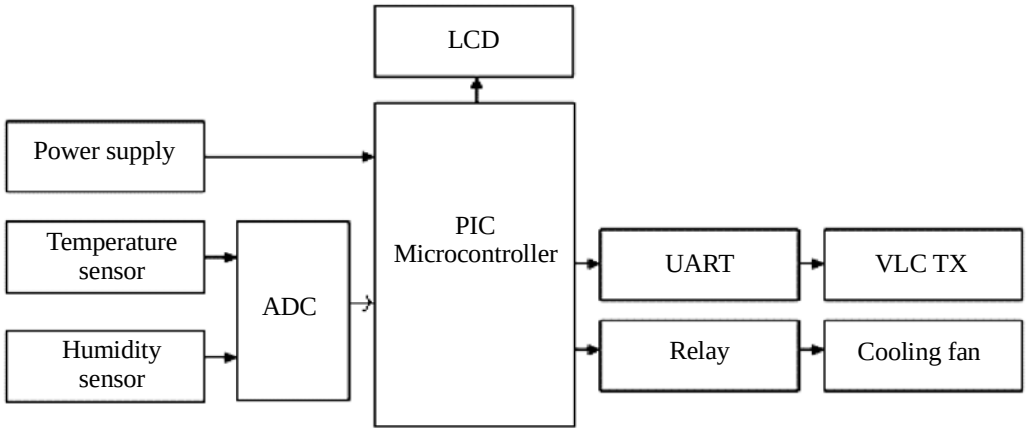

Fig. 1: Block diagram of Node 1

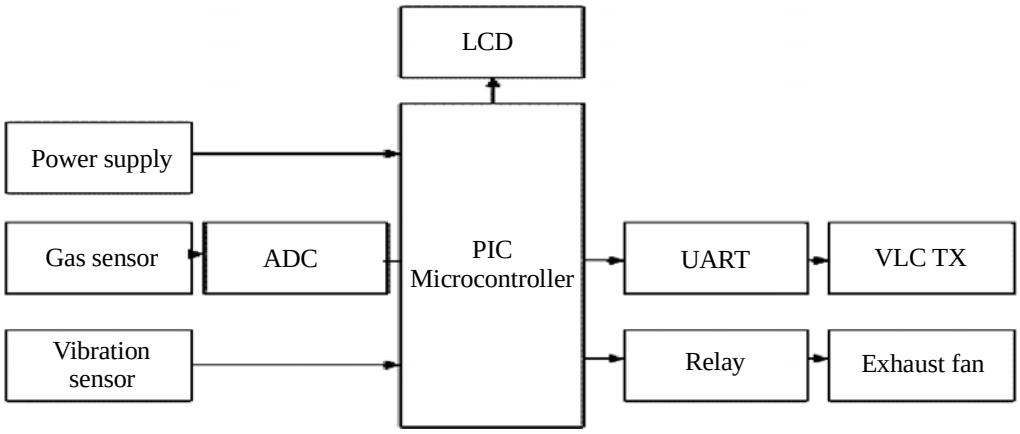

Fig. 2: Block diagram of Node 2

Fig. 3: Receiver block

A 0-12V/1 mA transformer is used for this power supply purpose. The primary of this transformer is connected in to main. The secondary is connected to the diodes filtered by the capacitors, which are further regulated to +5v, by using IC 7805. Relay is an electrically operated switch. Current flowing through the coil of the relay creates contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It mostly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Humidity is the amount of vapor in the air. Water vapor is the gaseous State of water and is invisible. Humidity indicates the likelihood of precipitation, dew, or fog. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in ºC).Sensor is mounted at the bottom of the unit. The unit should be fixed with the vibrating body firmly the sensitivity is adjusted for the required vibration/shock is detected the output goes low and the delay is provided for proper operation vibrating frequency and amplitude can be detected. A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. A UART (Universal Asynchronous Receiver/ Transmitter) is the microchip with programming that controls a computer's interface to its attached serial devices.

RESULTS AND DISCUSSION

This system is made as prototype model by using light. The transmitter, receivers are made separately. Temperature and vibration readings are shown in the display. Gas value is also displayed. The output section shows the working model of the prototype.

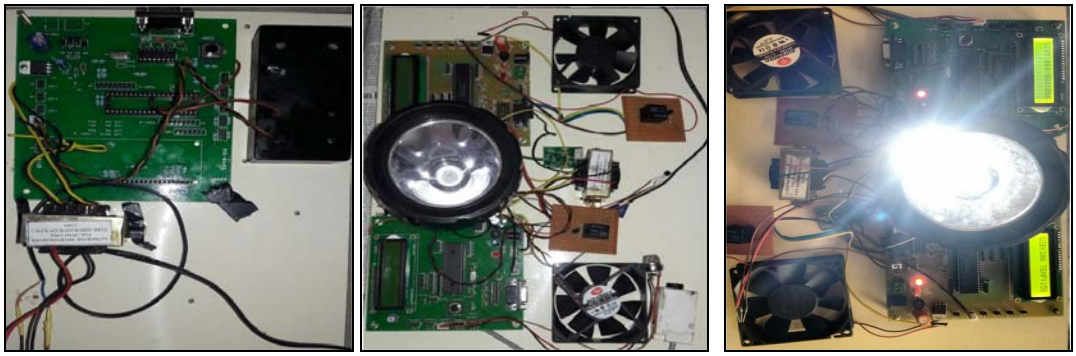

Fig. 4: Receiver, transmitter and output section for Li-fi technology

CONCLUSION

A link protection mechanism is presented. It uses a light communication technology. Possibilities for future utilization are abundant. Every light bulb can be converted in to Li-fi signal receptor to transfer data and we could proceed toward the cleaner, safer, greener and brighter future. Li-fi can offer a genuine and very efficient alternative. Optical networks linked with cellular communication based on Li-Fi are the link between future energy efficient illuminations.

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