GSM based Smart Home Monitoring System using Visible Light Communication

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Abstract— Home automation involves control and automation of lighting, heating, air conditioning, security, and ventilation. Eco friendly VLC can be used for achieving larger bandwidth and high data rate. In this LI-FI (light fidelity) is bidirectional, fast, cheap and fully wireless communication technology similar to Wi-Fi that uses light as communication medium. The functionality of the GSM is to allow the user to control the target system away from residential using the frequency bandwidth. The proposed system monitors temperature, image with the help of sensors. The sensors gather information and transmit to the microcontroller through the visible light communication. With the information received the user can take remedial measures.

Key words: Home Automation, Visible Light Communication, Sensor, GSM Module, PIC

I. INTRODUCTION

The objective of developing smart home system technology is to fulfil their promise of vastly improving the lifestyle of families through socially appropriate and timely assistance. Sensing, anticipating and accordingly responding to the various activities in homes is the basic requirement of such system. The system intended to control electrical appliances and devices in the house with relatively low cost design, user-friendly interface and ease of installation. The Intelligent Home Controller or simply the Home Controller is a software or any device that may be used to control the appliances in a home environment smartly. Presently two main smart home technologies Zigbee, RF are surveying in the market. As an option to block RF groups a short range correspondence, visible light communication have been introduced. VLC innovation is one of the progressed optical remote correspondence advancements, in which light in the unmistakable area (375-780 nm in wavelength) is utilized as a medium for information. VLC is more secure against hacking, because light cannot penetrate through the walls. Eco-friendly Visible light communication is used for efficient transfer of data between controller and sensors. In this system, we are monitoring the home's temperature, security and the ventilation. The controller automatically controls the components and a message alert is given to the user via GSM module. VLC is used for effective communication between the controller and user. Sensors are used to monitor the appliances and the environmental condition of the homes. GSM module is used to inform the user about the conditions of the home.

II. EXISTING SYSTEM

The existing system of smart home which uses the Wi-Fi for the transmitting and receiving purposes. However the wireless communication system has a well-known problems such as communication signal fading, multipath propagation, shadow effect and interference problems. Moreover, the wireless network has a higher Bit error rate (BER) result in the randomness of data latency while transmit data.

III. PROPOSED SYSTEM

In our proposed system Visible Light Communication can be used as a communication medium between the transmitter and the receiver section. Visible Light Communication is a fast growing technology to provide data communication using low-cost and energy efficient light emitting diode (LED). This white visible light source can be modulated at high-speed so there is the potential to transmit communication data in real time without high BER. VLC is more secure against hacking, as light can't enter through dividers and likewise offers high information. Visible light is a constant stream of photons emitted from the LED light bulb when a constant current is applied to LED light bulb. The output intensity of the light dims up and down with respective up and down current flowing through LED bulb. LED bulbs are semi-conductor devices. When the current varies at extremely high speeds and hence the optical output is variable this can be detected by a Photo Diode (PD) but which are undetectable to the human eye. High speed data can be transmitted from an LED light bulb using this technique. RF communication requires complex Tran's receivers with antennas, whereas VLC is much simpler and use direct modulation methods similar to low cost IR communications devices such as remote control units. IR communication is limited in power due to human eye safety. LED light bulbs have high intensities and can achieve very large data rates. White LEDs are considered as the capable light source which is used as modulator in the transmitter side when compared to the incandescent lamps and fluorescent lamps. White LEDs have advantages such as high brightness, low power consumption and more lifespan. Proper driving circuit must be constructed to drive the LED. Since the LED provides both illuminations along with the data communication as well as brightness and control of the white LEDs must also be considered.

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IV. BLOCK DIAGRAM

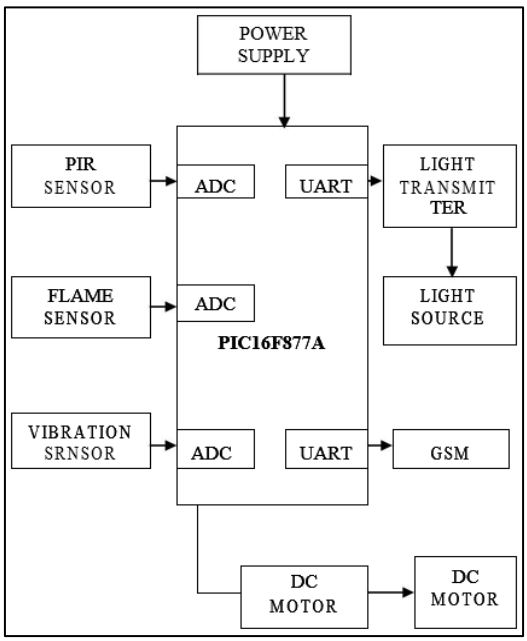

Fig. 1: Block diagram

V. BLOCK DIAGRAM DESCRIPTION

The proposed system monitors image, glass windows and flame with the help of sensors. The sensors gather information and transmit to the microcontroller through the visible light communication. In this system three sensors are used. PIR based motion detector is used to sense movement of people, animal or other objects. When an object such as a human, passes in front of the background such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature. Flame can be designed to prevent the unnecessary flow of gas from the furnace unit.

Vibration sensor detects if a pane of glass is shattered or broken. The Microcontroller analyze the received information and if it exceeds the threshold values an alert message will be given to the user through GSM communication. With the information received the user can take remedial measures. The functionality of the GSM is to allow the user to control the target system away from residential using the frequency bandwidth. The concept of AT-command has been applied towards development of the smart GSM-based home automation system. By a simple SMS sending to the GSM module of the user at remote place the device can be turned ON/OFF and the status of the device can be sent to the prescribed mobile number stored in database. Home automation provides a safer and secured home with the help of visible light communication. The sensors and the microcontroller are operated with the help of power source. A particular threshold voltage is maintained for every appliance in the microcontroller. If it varies a signal is sent via Li-fi from sensors to microcontroller. It senses the fault and controls it at the same time the status is sent to the user via GSM. The motor driver which is used to drive the motor.

VI. RESULT

Home automation provides a safer and secured home with the help of latest and easiest technologies. It also helps to gather knowledge about the latest technologies and a way to a smarter city. Since it is automation and centralized control it has serious benefits for family care.

VII. CONCLUSION

In future this Eco friendly data transmission will be promised to play a main role in everyone's life by replacing the white LEDs with the incandescent and fluorescent light. The proposed VLC based model can be conducive to affordable, greener and safer smart homes.

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