Home Automation System using Bluetooth Home Network

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Abstract: In recent times, the idea of home automation has become an important issue in many home appliances, companies and publications. Home automation is a living environment that incorporates the technology to control appliances and systems automatically. Remote and local control is helpful in keeping houses comfortable and provides tremendous support to the elderly and the disabled. The aim of this paper is to discuss possible developments in the field of Bluetooth wireless technologies and describe the hardware for the development of home automation systems.

Keywords: Bluetooth, Home automation system, Remote control, Bluetooth Home Network.

1. Introduction

Bluetooth technology can transmit data and voice at half duplex rates of up to 1 Mbps without using cables between the portable and fixed electronic devices. One of the major applications of Bluetooth technology is Home automation. The basis of home automation is to communicate and control automatically each device and sensor in Bluetooth based home network. Bluetooth network provides significant advantages over the other technologies used for transferring data, such as IrDA i.e. Infrared Data Association, Home RF i.e. Radio Frequency and Wireless LAN i.e. Local Area Network [1]. With the help of Bluetooth wireless home network, it has become possible to install a home network system at a low cost and it has become simpler to implement in an existing home [2]. Bluetooth was developed primarily as a replacement to the cable technology for consumer electronic devices and data communication that depends on short-range radio links to operate at 2.4 GHz. Bluetooth technology is very suitable for home wireless networking environment [3]. Here we have proposed a home automation system based on Bluetooth home network technology as shown in Fig.1.

Home automation consists of many devices connected in different ways. Sensor modules communicate between a measured sensor value and actuators with communicating simple data collection units (I/O i.e. Input-Output or a command). They basically communicate with an interface board attached Bluetooth through the PC i.e. Personal Computer. The device attached Bluetooth can be controlled both manually and remotely with the help of local switches and server Bluetooth respectively. The controller interface supports browsing, detection of network devices, context structures, and the user can communicate with the individual devices on the Bluetooth Home Automation Network [4]. The hardware interface is used to access a local home automation network from any computer with an internet connection [5].

2. Bluetooth Home Automation Network

The Bluetooth interface operates in the unlicensed ISM i.e. Industrial, Scientific and Medical band starting at 2.402 GHz and ending at 2.483 GHz in the USA and Europe. A Bluetooth module supports both point to point and point to multi-point connections. It acts as a physical layer and a low-level communication protocol. Bluetooth uses a quick frequency-hopping (1600 hops per second) packet switched protocol in order to minimize interference with other products that use the ISM band. A Bluetooth module supports both point to point and point to multi-point connections. It acts as a physical layer and a low-level communication protocol. Bluetooth uses a quick frequency-hopping (1600 hops per second) packet switched protocol in order to minimize interference with other products that use the ISM band. A Bluetooth module supports both point to point and point to multi-point connections. It acts as a physical layer and a low-level communication protocol. Bluetooth uses a quick frequency-hopping (1600 hops per second) packet switched protocol in order to minimize interference with other products that use the ISM band. A Bluetooth module supports both point to point and point to multi-point connections. It acts as a physical layer and a low-level communication protocol. Bluetooth uses a quick frequency-hopping (1600 hops per second) packet switched protocol in order to minimize interference with other products that use the ISM band. A Bluetooth module supports both point to point and point to multi-point connections. It acts as a physical layer and a low-level communication protocol.
The system enables communication with the GUI electrical switches on the wall. Bluetooth wireless thus improves the standard of living in homes. These types of physical control methods to the Main Control Board, controlling of the target home appliances is performed by the Main Control Board. This system provides three different methods of controlling the home appliances. The second method is done by Android GUI installed in Smart Phone. The user touches the screen of the phone to control the home appliances. In the second and third control methods, the appliances are controlled by using wireless remote control. The second method is by clicking on Window GUI on PC/laptop by means of mouse or touch pad.

This method is advantageous as compared to the use of conventional switches and the wired system because the computer user can control the home appliances without having to go to the switches on the wall himself. Third control method is done by Android GUI installed in Smart Phone. The user touches the screen of the phone to control home appliances. This portable method is able to assist the disabled people who have difficulty in motion and the elderly.

The sensors that connect to the main control board measure room temperature and it’s humidity level. The sensor indication is able to remind the user to switch on/off the heater, fan or air conditioner in the house. The home appliance switch status and temperature or humidity reading are synchronized to the two GUIs on the personal computer or laptop or smart phone. The main control board real-time monitors the switch’s status and sensor reading. Any change in the reading will be transferred to the two GUIs. After the smart phone, Bluetooth connection is connected to PC or laptop. The Window GUI will act as a server to forward or transmit any data from/to the smart phone and main control board. Some connection parts of the system are designed with two connections (Primary and Secondary) to the system. In case any issue occurs on personal computer or laptop, smart phone can directly connect to the main board. While in case of Bluetooth connection, the issue occurs between personal computer and laptop and control board, personal computer or laptop can connect to the board by wired USB i.e. Universal Serial Bus connection. The secondary connection acts as the backup solution in the system.
The existing switch connection is connected and controlled by the relay circuit inside the main control board. Also multiple control boards can be installed in homes. Bluetooth master device in PC or laptop can connect a maximum of 7 devices in a Piconet. Although the Main Control Board becomes compact but can still perform the strong functions and has all the features of the conventional systems. Moreover, this system comes out to be simple and has much cheaper components.

The circuit for Home Automation System is shown in Fig.3. The home components we tried to control are:
- Two Bulbs
- One Fan

4. Conclusion and Future Scope

The ease of installation is taken into account by this system. The system is designed to directly install along with the electrical switches on the wall. Complex wiring, reinstallation and overhead wiring on the wall can be done away with the use of this system. The existing switch connection is connected and controlled by the relay circuit inside the main control board.

The purpose of the system is to use mobile phone’s inbuilt Bluetooth facility for automation.

Furthermore, multiple control boards can be installed in homes. Bluetooth master device in PC/laptop is mostly able to connect up to 7 devices in a “Pico net”. With these simple and low cost components, the main control board can be constructed in pretty small size but can still perform the strong functions and features of the system. The HAS i.e. Home Automation System furnishes a good paradigm for any Automation System based on Bluetooth.

References


Author Profile

Adiba Tabassum received her B.Tech. degree in Electrical Engineering from Zakir Husain College of Engineering & Technology, Aligarh Muslim University in 2011. During 2012-2015, she taught in the University Polytechnic, Jamia Millia Islamia, New Delhi. Currently she is pursuing M.Tech. (Power System) from M.D.University, Faridabad, Haryana, India.