STM JOURNALS

Journal of Electronic Design Technology
ISSN: 2229-6980 (online), ISSN: 2321-4228 (print)
Volume 7, Issue 1
www.stmjournals.com

Library and Auditorium Electrical Appliances Automation

N. Dinesh Kumar*, M. Priyanka
Electronics & Communication Engineering, Vignan Institute of Technology & Science, Deshmukhi, Nalgonda, Telangana, India

Abstract

Wireless technologies are used in consumer applications for quite a long while. On the other hand, the operation of radio based communication frameworks in mechanization of applications was viewed as dubious for long time. Basically, the exceptionally fluctuating nature of remote transmission channels, contrasted with wired ones, was responsible for this fact. The use of wireless technology in industrial automation systems offers a number of potential benefits, from the obvious cost reduction brought about by the elimination of wiring to the availability of better plant information, improved productivity and better asset management. It is always difficult in a place like library and auditorium, where we need to monitor the status of the electrical appliances. The aim of this paper is to introduce a wireless automation which is more cost efficient and easy to handle. Because of the progression of wireless innovations, such as, GSM, WIFI, ZIGBEE, and Bluetooth, each of the innovation has its own particular exceptional specifications and applications. Among the four prominent wireless associations that are frequently executed in this work, Bluetooth is being picked with its suitable capability. Bluetooth with all around accessible frequencies of 2400 Hz has the ability to provide network up to 100 m at pace of up to 3 Mbps contingent upon the Bluetooth gadget class. Likewise, a Bluetooth master gadget has the capacity join up to seven gadgets in a Piconet. The abilities of Bluetooth are all that could possibly be needed to be executed in the design outline. Additionally, a large portion of the present tablet/laptop or mobile phones have built in Bluetooth connector. It will in a roundabout way reduce the cost of this framework.

Keywords*: Automation, Bluetooth, electrical appliances, library, microcontroller*

**Author for Correspondence* E-mail: dinuhai@yahoo.co.in

INTRODUCTION

The utilization of wireless innovation in modern computerization frameworks offers various potential advantages, from the undeniable expense reduction realized by the elimination of wiring to the accessibility of better plant data, enhanced profitability and better resource administration. Another critical advantage is enhanced workforce efficiency.

The way that there are no wires prompts lessened establishment and authorizing exertion, while the way that specialists; whether administrators or upkeep engineers, can be really portable takes out the requirement for settled neighbourhood boards. Enhanced plant administration results from the enhanced accessibility of feature observation and individuals following for better wellbeing and security, alongside a decreased need to get to dangerous or remote plant ranges. The points of interest are lower costs, installation, maintenance, improved flexibility.

Mobile phones have their significance in human life and have now become a part of our life and an essential thing in this modern world that could control almost any sort of appliances, which would make controlling devices much easier and provide safer operations. Bluetooth is a basic feature in every mobile phone for data transfer. It is widely used for connecting with the electronic gadgets through mobile/smart phones.

In recent years, the home environment has seen a fast presentation of system empowered computerized innovation. This innovation offers new and energizing chances to expand the network of gadgets inside of the home with

the end goal of home computerization. Additionally, with the quick extension of the Internet, there is the included potential for the remote control and checking of such system empowered gadgets. Then again, the reception of home robotization frameworks has been moderate. In paper presented by Gill *et al.*, they distinguished the explanations behind this moderate appropriation and assessed the capability of ZigBee for tending to these issues through the configuration and execution of an adaptable home mechanization structural engineering [1]. A ZigBee based home mechanization framework and Wi-Fi system are incorporated through a typical home passage. The home passage gives system interoperability, a straightforward and adaptable client interface, and remote access to the framework. A devoted virtual home is implemented to cater for the framework's security and wellbeing needs [1–3].

Remote home mechanization systems embody wireless embedded sensors and actuators that empower observing and controlling applications for home client solace and effective home administration. Tsao *et al.*'s article studies the fundamental, present and developing arrangements, that are suitable for WHANs, including Zigbee, Z-Wave, INSTEON, Wavenis, and IP-based innovation [3, 4].

The point of home computerization is to control home gadgets from a focal control point. Tsao *et al*. and Alakr *et al.* introduced the configuration and execution of a minimal effort however yet adaptable and secure Internet based home computerization framework. The correspondence between the gadgets is remote. The convention between the units in the configuration is improved to be suitable for the vast majority of the machines. The framework is intended to be minimal effort and adaptable with the expanding assortment of gadgets to be controlled [3, 5].

Callaway *et al*.'s article displays the IEEE 802.15.4 draft standard and its home systems' administration applications. The principle components of the standard are system adaptability, ease, and low power utilization; the standard is suitable for some applications in the home obliging low-information rate interchanges in a specially appointed self-arranging system [3, 6]. These days, brilliant home utilizing remote correspondence is supplanting the wired framework which was extremely messy and hard to setup. Notwithstanding, the current smart home framework just can conceal to a certain scope of territory that is constrained by the scope of wireless module being utilized. Sarijari *et al*. present the applied comprehension and procedure of Zigbee IEEE 802.15.4 standard to be sent in savvy home environment. Zigbee innovation offers a multi-jump correspondence ability for information exchange. Multi-bounce correspondence will give boundless scope of correspondence to the framework in the middle there are halfway hubs that will pass the information starting with one hub then onto the next until it achieves the destination. Model frameworks of home security and mechanization are assembled using Zigbee based sensor system to present knowledge for its functional usage in brilliant home idea [3, 7].

PROPOSED METHODOLOGY

As of late the thought of a home automation has been a critical issue in numerous distributions and home appliances organizations. Home automation is a house or living environment that contains the innovation to permit gadgets and frameworks to be controlled consequently. Remote and neighbourhood control are helpful to keep home agreeable and to back the elderly and the disabled individuals. In this paper, we talk about conceivable improvements of Bluetooth remote advances and portray the equipment for gadgets and programming for the contemplations of a home automation framework. Finally, we testbed by recreating in the Bluetooth home system gathering units. They fundamentally speak with an interface board at-Bluetooth, innovation is equipped for transmitting information and voice at half-duplex rates of up to 1 Mbps without the utilization of links in the middle of convenient and settled electronic gadgets. The center innovation of home computerization is corresponding and controlling consequently with every gadget and sensor in Bluetooth in light of home system [3]. Bluetooth system endeavors to give huge favorable circumstances over the other information

exchange advancements, for example, IrDA, Home RF, and Wireless LAN. Bluetooth was planned basically as a link trade innovation for buyer electronic gadgets and information correspondence that uses short-run proportion connections to work in the 2.4 GHz. The ability of Bluetooth and points of confinement integration is truly suitable for home remote systems administration environment. This project can be utilized for the libraries and the auditoriums by increasing the setup for controlling more number of devices using a larger LCD so that its display allows us to track all the devices time duration of ON state. Figure 1 shows the block diagram and the overall functioning blocks of the circuit.

HARDWARE AND SOFTWARE IMPLEMENTATION

The wireless capability of the Bluetooth module was exploited. The icing on the cake was the UART capability of Bluetooth. The serial port of the microcontroller was paramount in this regard. The microcontroller utilized was MSP430F149 which was chosen partly because of the ultra low power capability and also owing to the fact that it came inexpensively. 16-bit Texas Instrument MSP430 Microcontrollers (MCUs) is a RISC-based, mixed-signal processor. It is specially designed for ultra-low-power. It is easy-to-use, low cost and has lowest power consumption.

On the software front the project derived its aspiration to be open source. Henceforth, the MSP430 port of GNU compiler collection (GCC) was used. The geany integrated development environment was used to write and execute the code. Apart from GCC, an open source application, Blue term an android application used to connect to Bluetooth module is used. Any serial device can be communicated using a Bluetooth serial adapter using VT-100 terminal emulator.

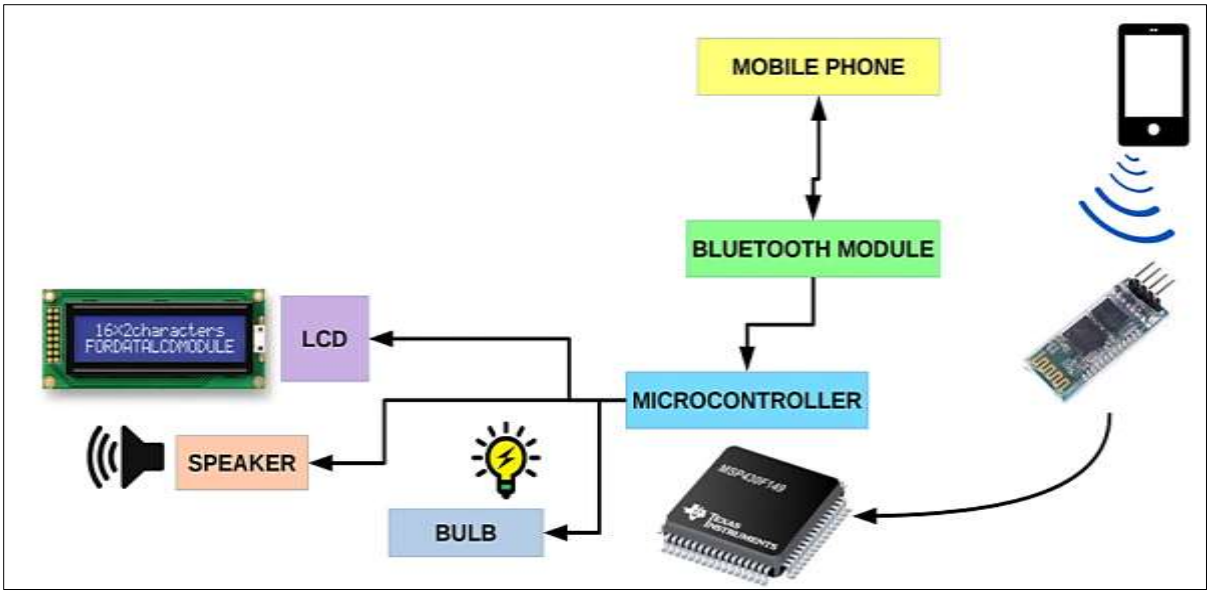

Fig. 1: *Block Diagram.*

Description

- The mobile sends a tracking signal to the Bluetooth.
- The Bluetooth relays the signal to the microcontroller.
- The microcontroller switches the device accordingly.
- It keeps track of the devices on the LCD display.

Figure 2 shows a portion of the circuit that uses two relays controlled by a microcontroller to toggle the appliances. The microcontroller takes instructions from the Bluetooth module which inturn receives them from the mobile phone. The second part of the circuit shows the same microcontroller connected to LCD. The LCD is responsible for displaying the state of devices and the duration of their ON time.

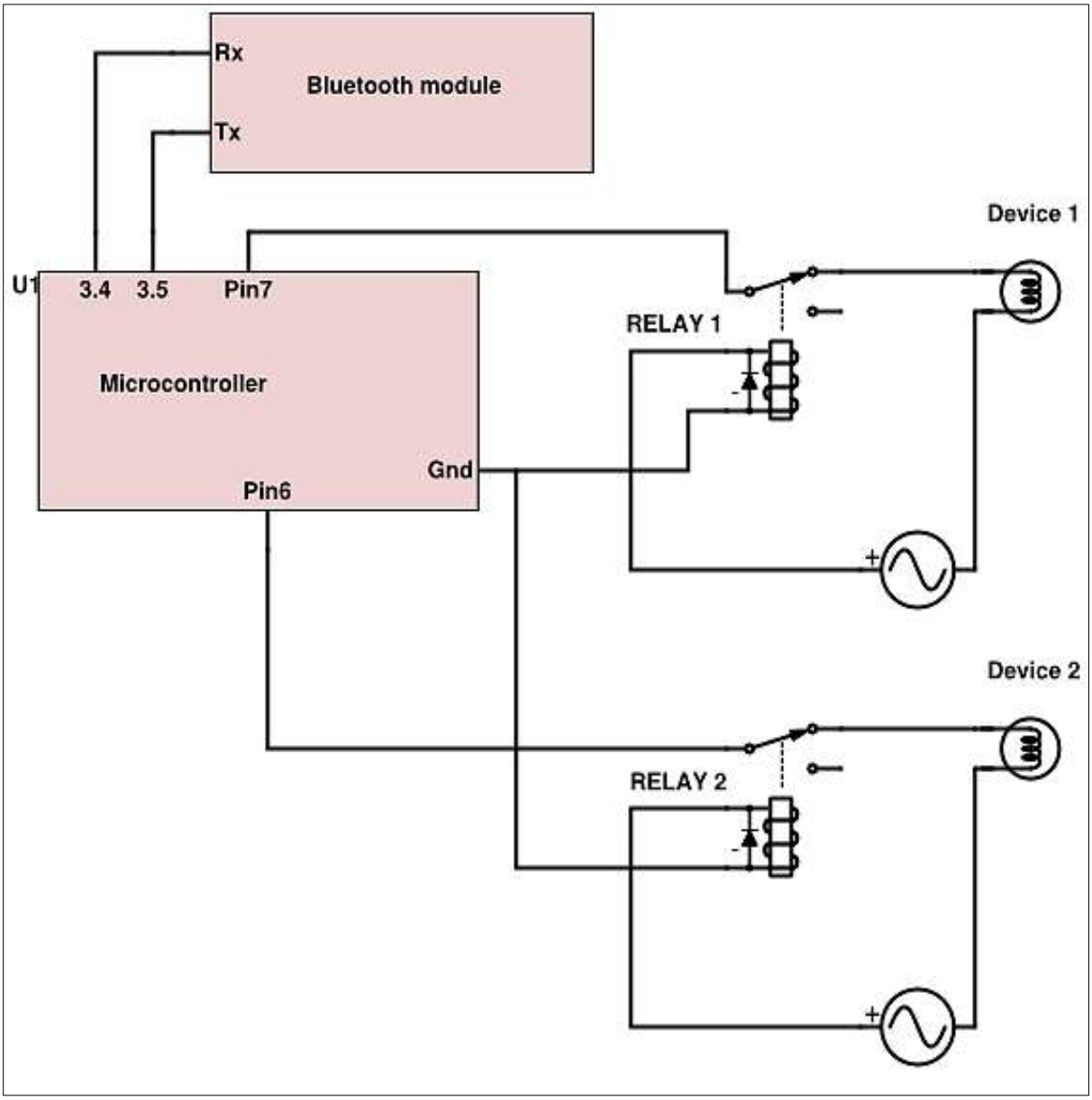

Fig. 2: *Circuit Diagram.*

Flow Chart

In this flow chart shown in Figure 3, the sequential process which is carried in the main function is described.

❖ ***Watchdog_init Function***

This function is used to switch off the watch dog timer, so that the micro controller can be boot strapped program.

❖ ***Clock_init Function***

This function is called only once to set the clock (DCO) to 8 MHz.

❖ ***Port_init Function***

It makes port-02 to data directory and port-6 as command directory. Also it sets the output pins for relay.

❖ ***LCD Reset Function***

It resets the position of the cursor and clears all characters.

❖ ***DispStr Function***

It runs the dispchar function in a loop so that a string is displayed.

❖ ***Delay Function***

It is used to halt the microcontroller for the designated period of time so that other operations may take place elsewhere in the circuit.

❖ ***LCD Write Command Function***

Since port-2 is being used as a data directory LCD write data uses the port-2 as and i/p-8 switch to write the commands onto the 16*2 character display.

❖ ***Locate XY Function***

This function locates the position of cursor on the LCD screen.

❖ ***Wait for Enable Function***

It will delay the processor until the enable signal is said to be high.

❖ ***Dispchar Function***

Dispchar first locates the function and then writes the data.

❖ ***DispNchar Function***

Displays only N characters of a string.

❖ ***Uart_init Function***

It sets baud rate as 9600 and pins 3.4 and 3.5 as rx&tx.

❖ ***Putchar Function***

This writes an ASCII character onto the UART bit stream.

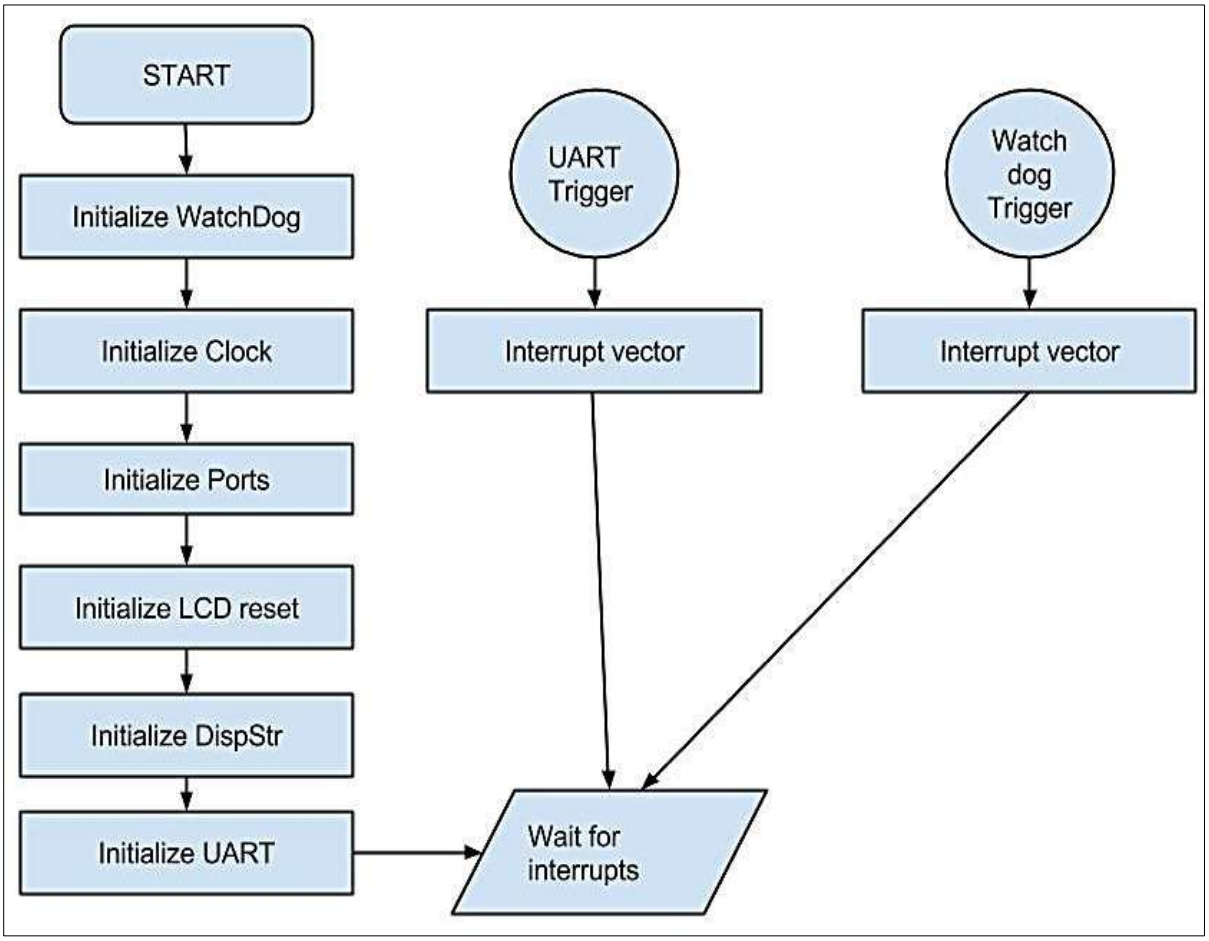

Fig. 3: *Flow Chart.*

Interrupt routines for every second used in the project and the actions taken on the interrupts are listed in the Tables 1 and 2 shown below:

Table 1: *UART Interrupt Routines.*

Received Character	Operation Performed
1	Device 1 is ON
2	Device 1 is OFF
3	Device 2 is ON
4	Device 2 is OFF
5	Both Devices are OFF

Table 2: *Watchdog Interrupt Routines.*

Operation Performed	Action Taken
Device 1 is ON	It counts the time and displays for device 1
Device 1 is OFF	No count but static display
Device 2 is ON	It counts the time and displays for device 1
Device 2 is OFF	No count but static display
Both Devices are OFF	Static display

SOFTWARE IMPLEMENTATION

Software implementation is done in the software compiler by name Geany which is an open source software, the screen shot is shown in the Figure 4. Compiler software implementation comprises of three steps in the first step we need to compile the code, then build the file and lastly execute the program.

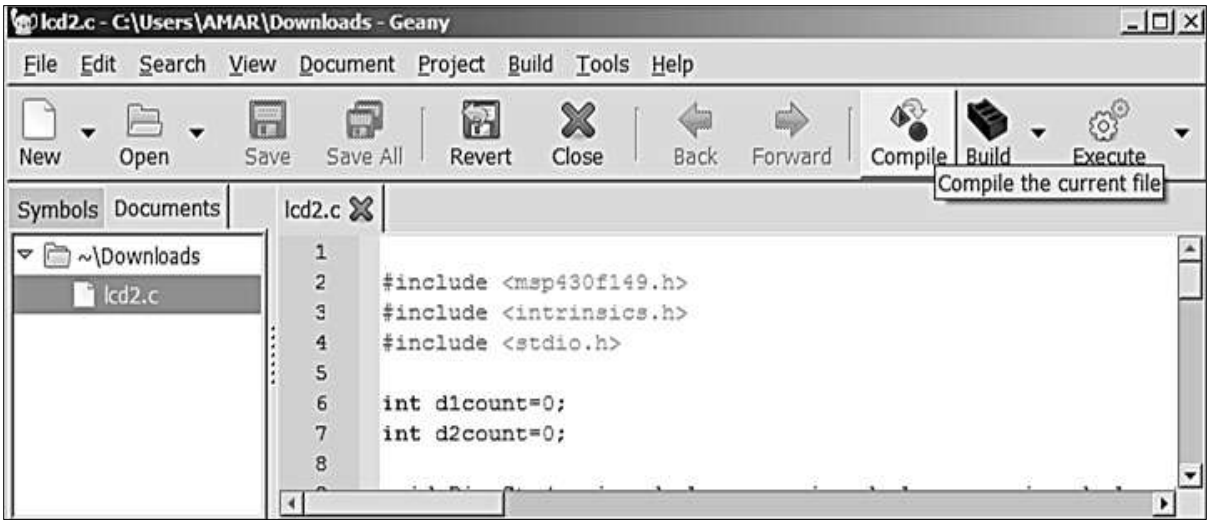

Fig. 4: *Image Showing Compiling of the Program.*

RESULTS AND DISCUSSIONS

Initially when the apparatus shown in Figure 5, is switched on, the LCD displays a welcome screen indicating that the system has started as shown in Figure 6. At this moment pairing the Bluetooth with the mobile phone is done. As soon as the pairing is completed, the Bluetooth stops blinking and emits a steady red light.

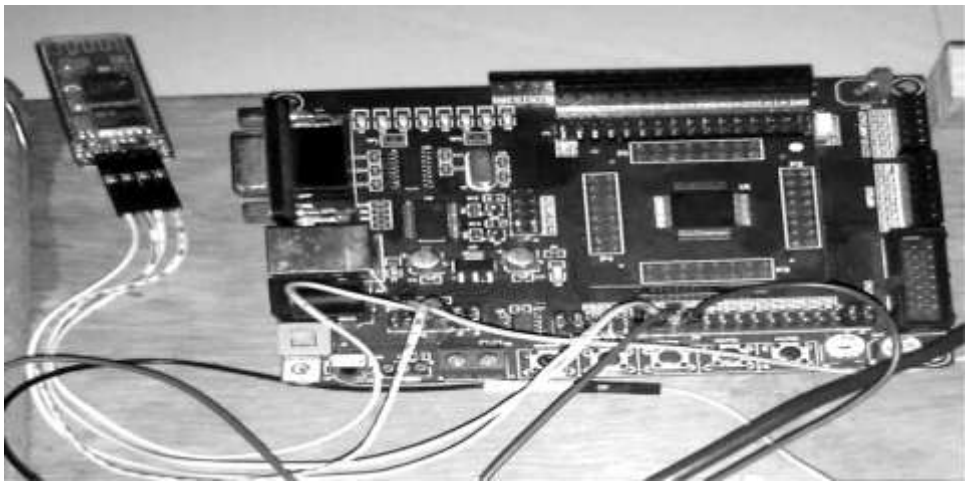

Fig. 5: *Image Showing Bluetooth and Microcontroller Connections.*

Fig. 6: *Welcome Screen.*

Send commands to the apparatus via an application called Blueterm. Table 1 explains the UART inputs and outputs. Figures 7–10 show the status of the devices when the devices are switched ON/OFF.

Fig. 7: *LCD Output When Devices are ON.*

Fig. 8: *LCD Output When Devices are OFF.*

CONCLUSION

This project is paramount automation in library, auditorium and for elderly and physically handicapped people who cannot move towards the mechanical switches and operate on them. Henceforth, we made an easy way to operate on electrical switches through our mobile phones using Bluetooth connectivity provided in it. It can be extended in the various fields such as assembly, hospitals, and conference halls to control the all appliances sitting at one place. It is easy to implement at any location and easy to handle and also cost effective process.

Fig. 9: *Output When Device 1 is ON.*

Fig. 10: *Both Devices are ON.*

REFERENCES

1. Gill Khusvinder, Shuang-Hua Yang, Fang Yao, *et al*. A Zigbee-Based Home Automation System. *IEEE Trans Consumer Electron.* 2009; 55(2): 422–430p.
2. Sanket Anil Vora, Kendre SS. Wireless Control System for Automating Home Appliances and Security Using Android Application. *International Journal of Engineering Sciences & Research Technology (IJESRT)*. Jun 2014; 3(6): 740–744p.
3. Tsao Teng-Fa, Kuo Cheng-Chine. A Smart Monitoring and Control System for the Household Electric Power Usage. *IEEE PES Asia-Pacific Power and Energy Engineering Conference (APPEEC)*. 2013.
4. Gomez Carles, Josep Paradells. Wireless Home Automation Networks: A Survey of Architectures and Technologies. *IEEE Commun Mag.* 2010; 48(6): 92–101p.
5. Alkar Ali Ziya, Umit Buhur. An Internet Based Wireless Home Automation System for Multifunctional Devices. *IEEE Trans Consumer Electron.* 2005; 51(4): 1169–1174p.

6. Callaway E, Paul Gorday, Lance Hester, *et al*. Home Networking with IEEE 802.15.4: A Developing Standard for Low-Rate Wireless Personal Area Networks. *IEEE Commun Mag*. 2002; 40(8): 70–77p.
7. Sarijari, Mohd Adib B, Rashid Rozeha A, Mohd Rozaini Abd Rahim, *et al.* Wireless Home Security and Automation System Utilizing Zigbee Based Multi-Hop Communication. In *IEEE Telecommunication Technologies 2008; and 2008 2nd Malaysia Conference on Photonics. NCTT-MCP 2008. 6th National Conference on*. 2008; 242–245p.

Cite this Article
Dinesh Kumar N, Priyanka M. Library and Auditorium Electrical Appliances Automation. *Journal of Electronic Design and Technology*. 2016; 7(1): 1–8p.