The Bluetooth Based LED Control For Arduino Test Platform By Using Mobile APP

Yi-Jen Mon

Abstract: The Bluetooth is a commonly known, convenient and famous communication protocol. In this paper, it is used to control LED mounted on Arduino test platform by using the APP of mobile phone. At first, the control program is completed by Arduino development software environment, then the Android APP is installed in mobile phone. Finally, by using the Bluetooth of mobile phone, the test platform will be connected. The LED can be controlled by APP of mobile phone. The experiment results are demonstrated the effective performance.

Index Terms: Android, Arduino, Bluetooth, mobile APP

1 Introduction

Recently, the Android operation system (OS) has become a popular OS of mobile phone [1-3]. Android is focused on the demand of embedded systems such as mobile devices, camera, monitor systems and vehicle electronics, etc. Many APPs have been developed in many areas. The environment of developing APP is also very easy and convenient, such as by using Ecllipse, Java, HTML, APP inventor, etc. Many applications of mobile app have been proposed [4-6]. Bluetooth was developed in 1994 which is a protocol of wireless technology in case of the requirement of communication under the environment of short distance. Now it has become popular tool for many mobile devices, networking, vehicle electronics and consumer devices, etc [7-9]. The Arduino introduced in 2005 is a free used software and hardware tool such that all designers can develop their products. It is very easy to learn and connect to other devices and sensors. Now it has also become a popular test platform to learn, design and develop any applications [10, 11]. In this paper, the Bluetooth based Arduino Test Platform is used to control the LED by means of Mobile APP. Arduino based 2560 board manufactured by *DMATEK Ltd, Taiwan* [12] is used to do experimental LED control. The experimental results possess good performances.

2 The Bluetooth based LED Control for Arduino board by APP

Arduino program is developed by free software integrated development environment (IDE) issued by Arduino web [13]. The open-source Arduino Software IDE makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. After the software is installed successfully in personal computer, then we can develop any applications by connecting suitable sensors. In this paper, the Arduino ADK is used.

The Arduino ADK is a microcontroller board based on the ATmega2560. It has a USB host interface to connect with Android based phones, based on the MAX3421e IC. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The ADK has 256 KB of flash memory for storing code (of which 8 KB is used for the bootloader), 8 KB of SRAM and 4 KB of EEPROM [13]. The programming for LED can be used by the libraries supported by Arduino. At first, the Bluetooth borad should be connected with ADK, then select board type and COM port number. There are three steps should be done. First is compiling, 2nd is to upload the machine code to ADK, finally is to search Bluetooth device then connect it. For program diagram is shown in Fig. 1. The LED can be controlled to be on or off. The mobile APP should be also installed in advance in mobile phone. The APP diagram is shown in Fig. 2. The diagram of Arduino test platform for Bluetooth based LED control is shown in Fig. 3.

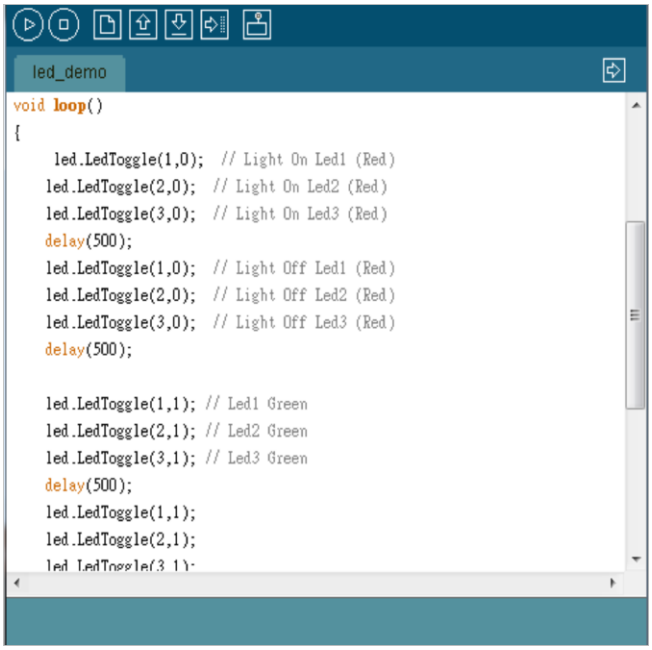

Fig. 1 *The diagram of Arduino program for LED control window*

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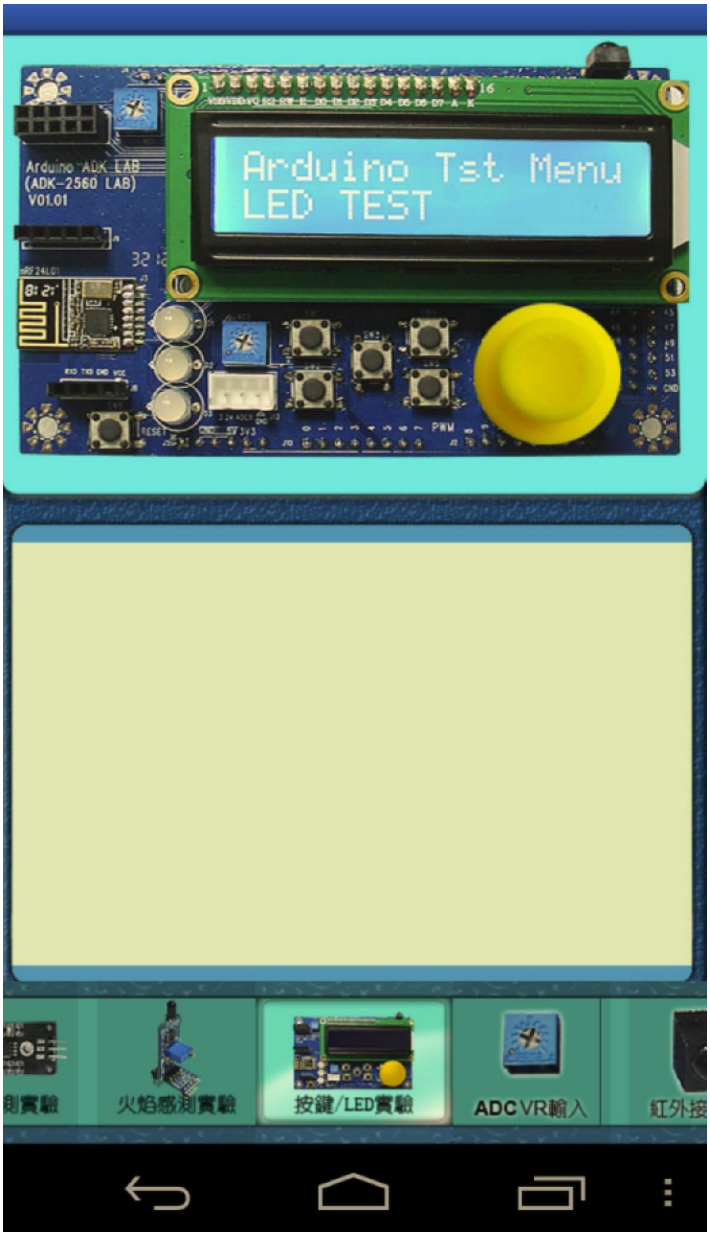

Fig. 2. *The diagram of APP installed in mobile phone*

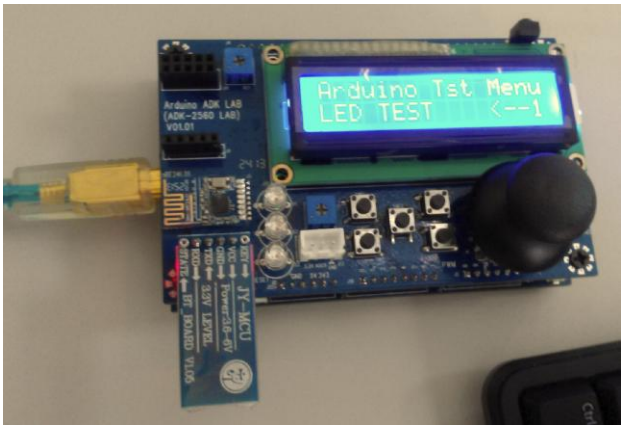

Fig. 3. *The Arduino test platform for Bluetooth based LED control*

3 Experimental Results

In the test, the Bluetooth must be setup firstly. After searching device is successful, the Arduino ADK will connect with mobile phone. The screen of mobile phone will be same with real platform, that is the data is transferred between them successfully. The initial setup LED test run diagram is shown in Fig. 4. This is real platform diagram, meanwhile, in mobile phone will show the same diagram which is shown in Fig. 5. This time, the LED is off. When we control LED to be on by using APP, the result is shown in Fig. 6. This is real platform diagram, meanwhile, in mobile phone will show the same diagram which is shown in Fig. 7. In this paper, the Arduino, Bluetooth and mobile APP are used to test and teach students to learn basic theoretical and implemental applications of LED. From this topic of course of Bluetooth based LED control for Arduino board by using mobile APP, good experimental results are possessed in this paper.

Fig. 4 *The setup diagram of LED test run*

Fig. 5 *The screen diagram of mobile phone for LED test run*

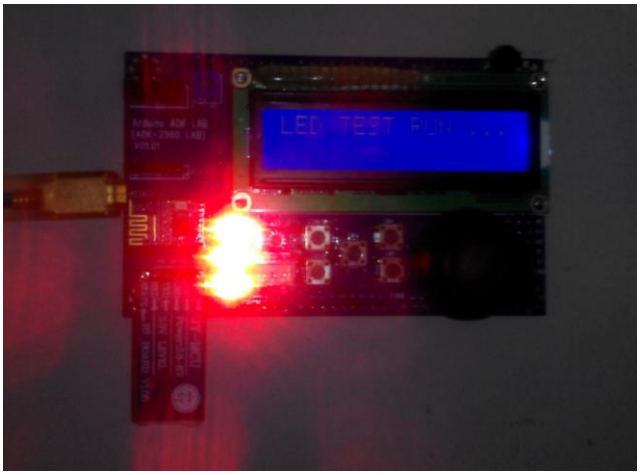

Fig. 6 *The diagram of LED on by using APP control*

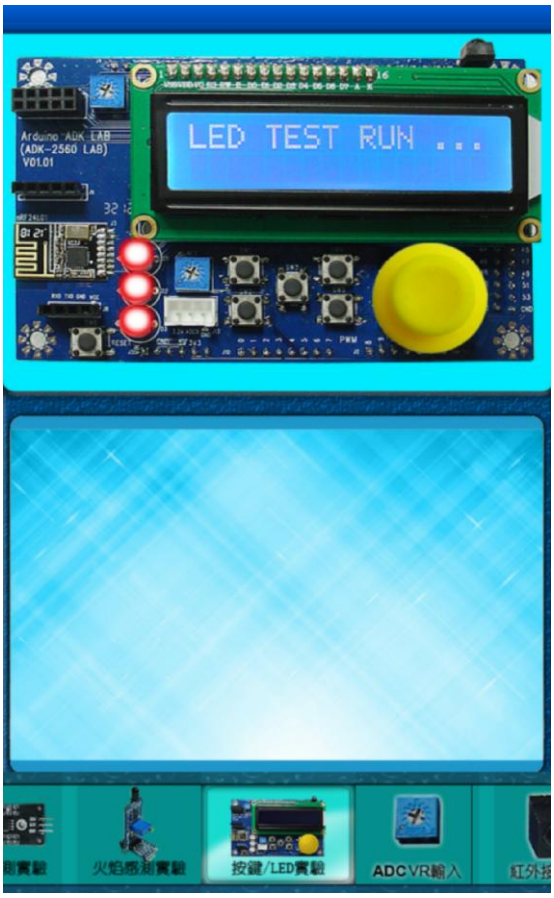

Fig. 7 *The screen diagram of mobile phone for LED on*

4 Conclusion

In this paper, the Bluetooth based LED control for Arduino board by using mobile APP has been developed successfully. This is verified by the Bluetooth based board, Arduino ADK 2560 board and mobile APP. The development of LED control application can be used to develop other different useful applications such as robotic, consumer electronics and vehicle electronics, etc. The experimental results demonstrate that good performances are possessed.

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