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BLUETOOTH BASED HOME AUTOMATION

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ABSTRACT

Nowadays, modern technology is advancing. Use existing technology to develop a system that ben efits people. This article presents the development of an affordable, easytouse and secure home aut omation system based on Android. The project was completed with the help of Arduino Bluetooth board and home appliances were connected to the 4channel relay module. Create wireless connecti on for communication between Arduino Bluetooth board and Android phone. This work is designe d to operate and manage many products with the development of some of their functions. Passwor d protection is necessary to prevent unauthorized users from entering your home. In this article, a t echnical feature that is the effective use of EEPROM has been added.

Keywords: Home automation, smartphone, Arduinouno controller, HC-05 Bluetooth module, 4-channel relay module, DC adapter, home appliances.

I. INTRODUCTION

Since we have now entered the 21st century, we are already familiar with the control systems used . We now hope to upgrade old technology to hightech and control systems to improve people's live s. Thanks to rapid developments in technology, we can now control our home appliances remotely with our smartphones. Electronic devices can operate with low latency and accurate control. Resea rchers and developers are focused on the concept of home automation systems. In addition to impr oving people's lives, electronic devices can also save time and energy. In the past, we were helping the elderly and disabled, but this has changed. The main purpose is to enable elderly and disabled people to carry out their daily activities and operate home appliances remotely. Installing a Blueto othbased wireless home automation system in an existing home is affordable and easy to install. A ccording to my research, bluetooth system is better than infrared control and GSM system. Depend ing on the type of Bluetooth device, Bluetooth technology has a physical range of up to 10 meters and a data transfer rate of up to 3 Mbps. The Arduino board, Bluetooth module and smartphone ap plication form the basis of the working plan. The Arduino board is connected to the Bluetooth mod ule H05, and the 4channel relay module is connected to home equipment. Smartphone applications are used to facilitate communication between devices. The smartphone connects to the Arduino b oard via Bluetooth.

II. RELATED WORK

Various remote home automation technologies are being evaluated. D.Chowdhary and P.Laforge According to the research, home appliances can be controlled wirelessly using Arduino uno and m obile phone. According to these studies, Arduino cards connected to home appliances are controlle d via SMS application. Another study proposed a smart home using Bluetooth and Android apps. But this only works for four lights and is not good for controlling more than four home appliances. Another study describes a WiFibased smart automation system for the elderly and disabled. The w ireless connection between the main control panel and the remote control equipment is established using a WiFi transceiver.Researchers hope to create a lowcost, wirelessly operated intelligent auto mation system. The use of smart automation tools can provide customers with wireless remote con

trol access. From all the research data above, we used the new technology introduced in current home automation, namely the efficient use of EEPROM. Thanks to this EEPROM, we can prevent the device from returning to its previous state in case of a power outage. Although this technology is cheap, it provides more accurate control.

III. SYSTEM DESCRIPTION

Hardware and software design are the two main components of a home automation system. The equipment is divided into four main parts: arduino Uno controller board, HC05 Bluetooth module, 4channel relay module and smartphone. The integrated development environment (IDE) is responsible for the operation of the arduino microcontroller, and the Bluetooth module needs to receive data from the smartphone application and send the written data to the arduino controller. Full commitment to wireless communication between the smartphone and the Arduino Uno board, MIT App Inventor and Proteus emulator.

IV. HARDWARE ARCHITECTURE

The home automation system described in this article consists of four hardware components: a smartphone, an Arduino Unocontroller board HC05 Bluetooth module, and a 4channel relay module. It is used to communicate with the smartphone, Arduino controller board and Bluetooth technology. HC 05 Bluetooth module and Arduino Uno microcontroller are used in the hardware of this research project.

1. Arduino IDE

Arduino IDE is a tool for building computers that understand and navigate the physical world better than a desktop computer. It is a free platform based on a microcontroller board with a development environment for creating control panels. Arduino can be used to create devices using inputs from switches or sensors and outputs from various home devices such as lights, motors, and other physical devices. You can use the Arduino project independently or communicate directly with software (such as Flash, Action) running in the main project.

The most important parts on the Arduino board high lighted in red:

1: USB connector
2: Power connector
3: Automatic power switch
4: Digital pins
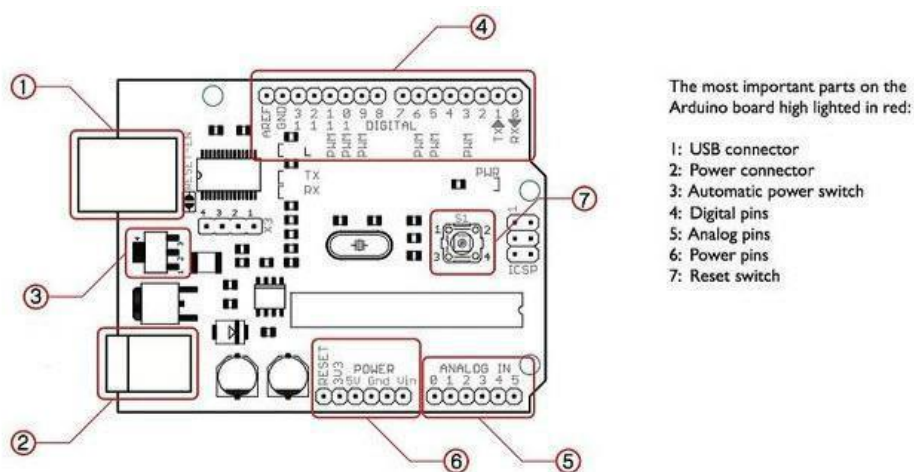5: Analog pins
6: Power pins
7: Reset switch

Fig 1. Arduino Uno Controller Board

The dashboard can be created manually or purchased from an ecommerce portal; The software can be downloaded online for free. The microcontroller card called Arduino Uno contains an IC called ATmega328. It has 6 analog inputs, 16 MHz ceramic crystal oscillator, USB connection, power i

nput connector, ICSP header and reset button. It has 14 input/output pins, 6 of which are used as P WM outputs. Everything you need to support the microcontroller is already there; To turn on the c ontroller board, simply connect it to your computer with a USB cable or power it with an AC-DC adapter or battery.

2. HC-05 Bluetooth Module

HC05 Bluetooth module is required to establish a wireless connection between Arduino Uno and y our smartphone. The HC05 auxiliary component of the Bluetooth module can operate with 3.3 and 6 volt power supplies. It has six pins: RXD, State, TXD, VCC, GND and EN. For communication , connect the RX of the Arduino Uno microcontroller to the TXD pin of the HC05 Bluetooth modu le and connect the RXD pin to the TX of the Arduino Uno controller. Below is the connection bet ween Arduino Uno and HC-05 Bluetooth module.

Fig 2. HC-05 Bluetooth Module

When the Bluetooth module is turned on, it will call the main command given by the user with the help of the Android phone. Bluetooth function commands are already in the flash memory of the A rduino controller. Once the user sets the command through the connection of the Bluetooth module , the data will be sent to the arduino Uno controller.

3. Four Channel Relay Module

The Four Channel Relay board uses wires to connect to the digital output pins of the Arduino Uno controller. It has 4 relays for special switching applications. The card is small enough to fit into tig ht spaces and is generally designed for lowpower applications. It has an isolation optocoupler to se parate the main power from other components. Due to the use of optical couplers to protect other p roducts

Features:

a. 4-channel relay interface board, each relay needs 15-20 mA drive current

b. This module can work under 5V input voltage.

c. This module can drive large current relays such as 10A, AC250V; DC30V 10A d. Optocoupler i solation input

e. LED shows output current.

Fig 3. Four channel Relay Module

V.   SOFTWARE ARCHITECTURE

In this project, we use the following software to ensure communication between the Arduino micr ocontroller board and the Bluetooth module.

1) Arduino IDE

Integrated Development Environment Tool is called IDE. All programming of the system is done using this tool. The required baud rate for serial communication between the Arduino Bluetooth m odule and the smartphone is 9600 bits/second. Examples of Arduino commands are discussed. Wh en serial data is available or not defined by the adjacent command, "Serial.available( ) > 0" means to receive data serially from the smartphone via Bluetooth, and the command "Serial.println()" des cribes how to send data from the smartphone. Connect the Arduino Data control board to the smart phone.The transmission system receives the value from the smartphone and stores the value, then compares it with different conditions and performs the necessary operations according to the progr am code logic.

if (val == '0') //Used for decision control

{

Serial .println("LIGHT1 ON"); digitalIWrite(LIGHT1, high); // Light1 is on

if (val == '1') //

{

Serial.println(used for " control) IŞIK1 CLOSED"); digitalaIWrite(LIGHT1, low); // Light1 CLOS ES

2) Proteus Simulator

Hardware work can be done with the help of proteus software. In the software, everything that nee ds to be provided by the component library of the software and the component blocks are connecte d according to the circuit diagram. Now the compiled hex code will be sent to the flash memory of the Arduino board and the run command will be given to the simulator.

3) MIT App Inventor

MIT now manages the integrated web application development environment previously provided by Google under the name MIT App Inventor (MIT). It allows beginners in computer programming to create software applications (apps) for Android and iOS operating systems.

PROPOSED METHODOLOGY

When power is turned on, the Arduino loads the necessary libraries and turns the relay OFF. Arduino will wait to receive the command value from the smartphone via the Bluetooth module. These four components are reported as useful events, such as numbers. If a state is changed by the Bluetooth module in the chain, the state of the connected device will also change
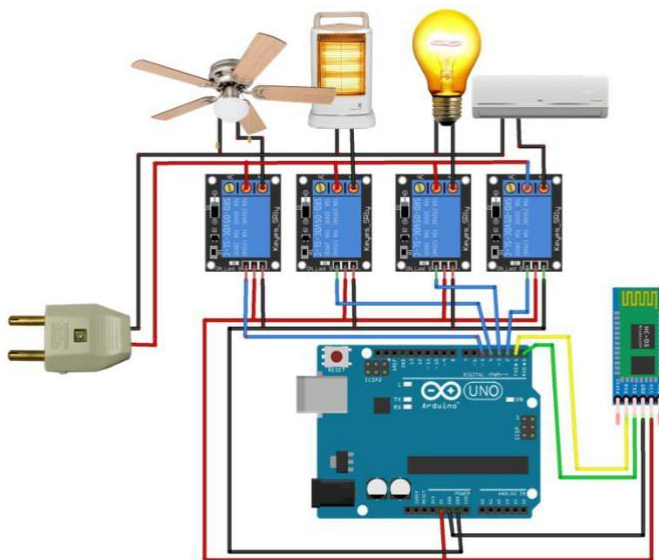

Fig 4. Circuit Diagram of Home automation System

VII.RESULTS

The end of this article explains how to use smart home automation as a plan. The automation system was created from this article to facilitate our work at home, such as lamps, fans, tube lamps, air conditioners, lighting, TV and refrigerators.
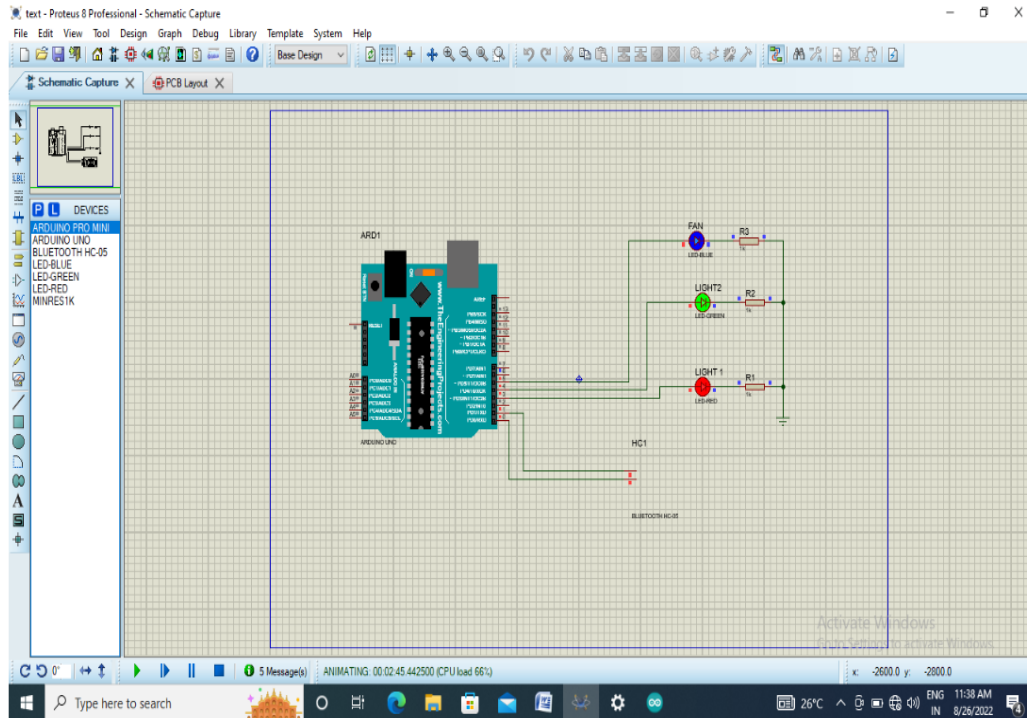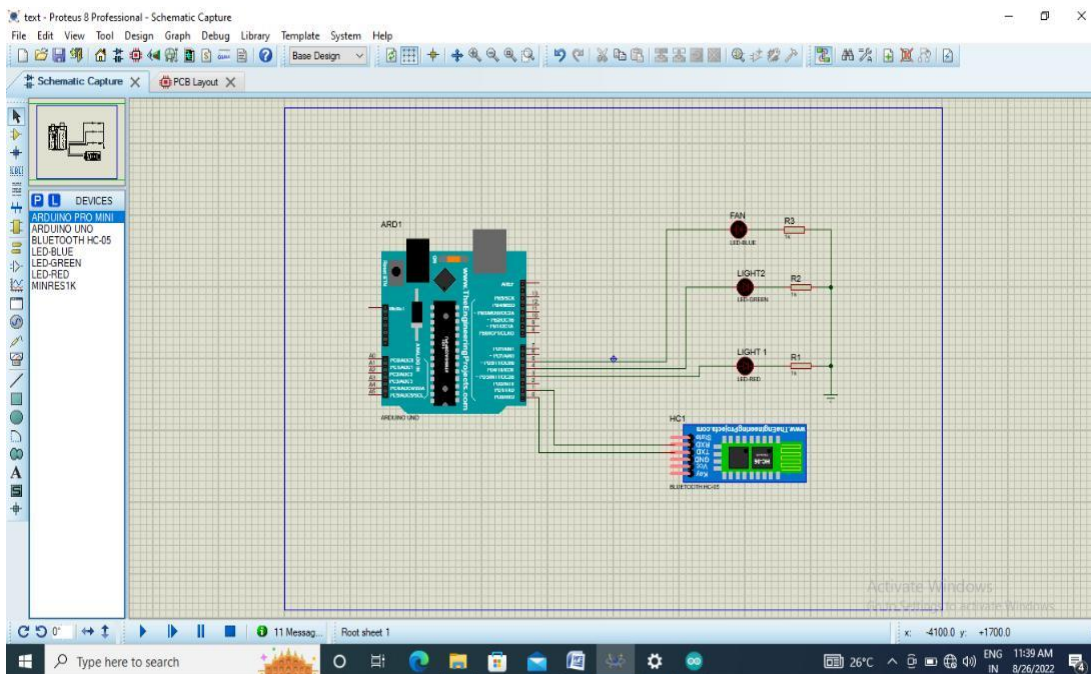
Fig 5. Proteus simulator output while running

Fig 6. Proteus simulator output while in standby condition

As a result of the work done in this paper, a new feature has been added to the source code, which is the use of electrically erasable programmable readonly memory (EEPROM). EEPROM works like a flash memory, storing data received by the Bluetooth module during operation. After the affected service is removed, it continues to perform the previous operation. The project was developed with ISR technology.

Fig 7. Hardware Implementation of Home Automation System

VIII. CONCLUSION

Looking at the results, it is understood that home automation refers to special equipment that requires more effort to operate at home, such as fans, air conditioners, lights and televisions. In this study, it is shown how to install a home generator, its better operation is shown and its applications are discussed. The advantage of this work is that the delay of the controller is improved, and when the process is completed, in case of power failure, the controller must stop, and when the effect is eliminated when the power is cut, the controller continues to execute the previous process. process.

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