

HOME AUTOMATION BASED ON BLUETOOTH USING ARDUINO AND ANDROID

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Abstract: The development of a cost-effective Home Automation System with remote control is presented in this study. This framework is designed to assist and provide assistance to the elderly and handicapped in their homes. Furthermore, the concept of a home automation system would increase the standard of life in homes. The basic control system makes use of a Bluetooth device that allows smart phones to connect wirelessly. The system design keeps the current electrical switches in place and uses a low-voltage control approach to offer the switches a safer control. This research project shows how to build a Home Automation System (HAS) with Arduino and Bluetooth wireless control. It uses the integration of Bluetooth wireless communication with an Android smartphone to offer the user with remote control. They have a variety of lighting, fans, and appliances in their house. This system was created to be cost-effective and extensible, allowing for the control of a wide range of devices.

Keywords: Smartphones, Home Automation Systems, Arduino Uno, Android, Bluetooth Module, Bluetooth Module.

I. Introduction:

The employment of information technology and control systems in a home automation system reduces human work. The fast advancement of technology has influenced us to use cellphones to manage household appliances remotely. An automated gadget has the capacity to function with a high level of variety, diligence, and accuracy. For researchers and home appliance manufacturers, the concept of a home automation system is a crucial concern. Not only does an automation system reduce human work, but it also saves time and energy. Initially, home automation systems were utilized in labor-saving devices, but now, their primary goal is to enable elderly and handicapped persons to conduct

everyday duties and manage household equipment remotely. A Bluetooth-based wireless home automation system is inexpensive to construct and simple to integrate into an existing home. Bluetooth technologies are speedier than wireless and GSM systems, according to study. Bluetooth technology can send data serially at up to 3 Mbps across a distance of 10 to 100 meters, depending on the type of Bluetooth device. An Arduino board, a Bluetooth module, sensors, and a smartphone app are used in the recommended method's design. The Bluetooth module HC-05 is connected to the Arduino board through a relay, and the Arduino board is also connected to domestic appliances. A smartphone application is used to communicate serially between the

smartphone and the Bluetooth module, which is then connected to the Arduino board.

II. Technologies Used

A. Android OS

Android OS is an open source mobile operating system based on the Linux kernel and including a Java programming interface [4]. It was created with touch screen devices in mind. Since October 2008, the android has been in use. Google Play is the principal application store for Android, with almost 70,000 apps accessible [7]. There are multiple levels to the android architecture. In order to access the hardware, the programmed must be layered. The fundamental hardware platform for Android is the ARM architecture.

B. Bluetooth Technology

Home appliances are controlled via Bluetooth technology. It was used to give the user wi-fi access that could be managed remotely. It is inexpensive and allows users to operate equipment within the Bluetooth network's range [5]. The majority of Bluetooth applications are for interior use, where signal fading due to signal reflections and attenuation of walls reduce the range well below the Bluetooth devices' advertised line-of-sight ranges. It operates from 2.4GHz to 2.845GHz in the unlicensed industrial, scientific, and medical (ISM) band. Two Bluetooth-enabled devices that are familiar with each other are used in the pairing. It features a 10 to 100 Mbps speed, 2.4 GHz bandwidth, and a range of 10 to 100 Mbps.

C. Arduino

Arduino is an open source computer hardware and software company that makes single board microcontrollers and microcontroller kits for building digital gadgets and interactive objects that can sense and manipulate objects in both the physical and digital worlds

[8]. The hardware and software for the project are opensource and licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), allowing anybody to build Arduino boards and share software. Arduino boards employ a variety of microprocessors and controllers. Expansion boards, shields, and other devices can be connected to the boards' digital and analogue input/output (I/O) pins. On the boards, serial connection interfaces such as the Universal Serial Bus (USB) are accessible. A USB connection is included on some models, which may be used to load programmers from personal computers. Features from the C and C++ programming languages are used to programmed the microcontrollers. In addition to typical compiler tool chains, the Arduino project features an integrated development environment (IDE) based on the Processing language project.

III. Proposed work:

A mobile phone and Bluetooth technologies are used in the suggested system. It makes use of a Bluetooth Arduino board. The user interface of the mobile phone is provided by an interactive C application. The Bluetooth board's I/O ports and relays are utilized to interface with the devices that need to be controlled. Bluetooth is password-protected to guarantee that the system is safe and that attackers do not take advantage of it [6]. The phone application is portable. It's also a quick and inexpensive system. The circuitry has a diagnostic mechanism that can identify faults. After each signal toggle, a feedback mechanism will indicate the state of the devices. The suggested system's circuit and simulation diagram are displayed in Figure 1. The biggest disadvantage of Bluetooth is that discovering and accessing objects in its proximity takes a long time. It does not include any energy-saving suggestions. Real-time access is not possible. It is impossible to gain access to the devices from anywhere. Within the Bluetooth range, access is restricted. The client is a computer that connects

to the Arduino board, which is connected to the Bluetooth module, through USB. The circuit is controlled by sensors and actuators. It will be able to receive various commands over Bluetooth thanks to the Bluetooth module that is linked to it. Bluetooth devices can quickly scan and detect other Bluetooth devices. It may also be feasible to determine whether or not gadgets are operational. This technology also has the disadvantage of having a Bluetooth range of only about 10 meters. This system has the benefit of being able to be integrated into an existing system. The controller's implementation is described in this section. An Arduino ATmega328 microcontroller, a Bluetooth module HC-05, relays, and other electronic components are used to build the controller.

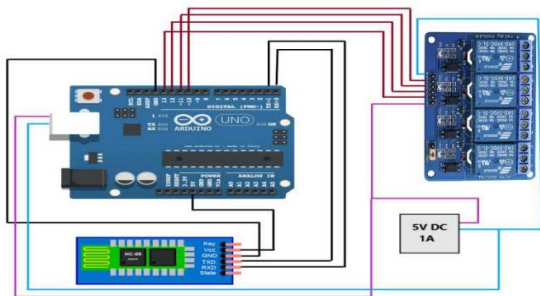


Fig 1. Basic Circuit Diagram of Proposed System.

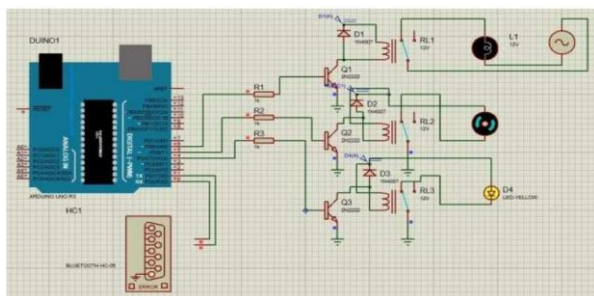


Fig 2. Simulation of Proposed System in Proteus.

IV. Result:

I was able to implement the HOME AUTOMATION SYSTEM WITH ARDUINO effectively, and it was both user-friendly and cost-effective. User-friendly in the sense that

everything works with simply a click of a button on an Android screen. It's also cost-effective in the sense that it'll cost exactly what the job demands (optimum price). The system's prototype is shown in Figure 3. As shown in Figure 4, the Android app aids in the establishment of a Bluetooth module connection. It also aids in the control of the Arduino-connected device through Bluetooth module. When the ON button on the screen is hit, the first appliance, in this example a light bulb, is turned on. It will turn off once you touch the OFF button.

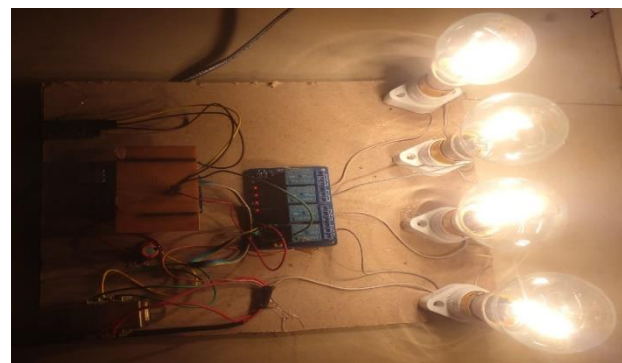


Fig.3 Prototype of the system

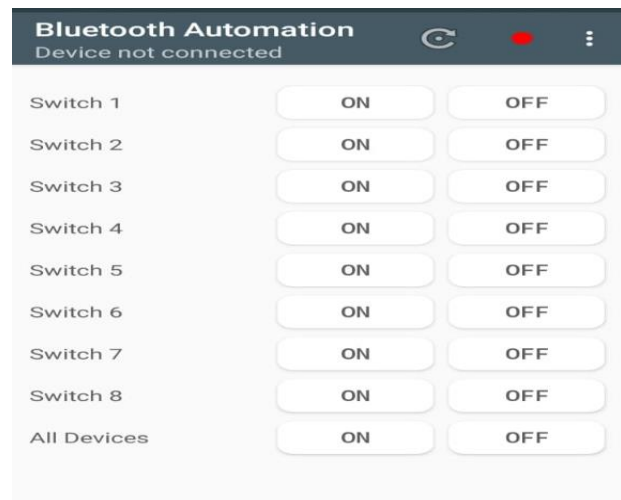


Fig.4 Android App Front panel.

V. Conclusion:

We have presented the design and execution of a low-cost, adaptable, and wireless home automation solution in this work. Any user or invader cannot get access to the system. To access the home appliances, customers must get a pairing password for the Arduino BT and the mobile phone. This adds an extra layer of security against unwanted users. Without an internet connection, this system may be utilized as a test bed for any equipment that need on-off switching applications.

VI. References:

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