IOT-BASED HOME AUTOMATION USING TELEGRAM USING ESP 8266

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ABSTRACT

The goal of this project is to develop a prototype system that enables users to control their home appliances using Wi-Fi. It is a network infrastructure that will allow users to remotely switch their various devices. In our daily lives, we often forget to switch off our lights, TV, and other electrical appliances, which is very costly and harmful to our environment. This project will allow us to save money and time by automating our home. The prototype utilizes a mobile app to send and receive signals to a Wi-Fi module. The proposed system's flexibility and scalability are some of its advantages.

Keywords: Home Automation, Wi-Fi Module, Iot, Home Appliances.

I. INTRODUCTION

IoT-based home automation refers to the integration of smart devices, sensors, and communication technologies to automate and control various aspects of a home environment. One popular and convenient way to interact with an IoT-based home automation system is through the Telegram messaging platform. Telegram provides a user-friendly interface and secure communication channels, making it an ideal choice for controlling and monitoring home automation systems remotely. With IoT-based home automation using Telegram, users can conveniently manage and monitor their home devices and systems using the Telegram messaging app installed on their smartphones, tablets, or computers. They can issue commands, receive real-time updates, and access the status of various home automation features through Telegram’s chat interface. Home automation or demotics is building automation for a home, called a smart home or smart house.

In today’s rapidly evolving technological landscape, the Internet of Things (IoT) has emerged as a transformative force, revolutionizing various aspects of our daily lives. One of the most compelling applications of IoT technology is in the field of home automation. IoT-based home automation systems enable homeowners to control and manage various aspects of their living environment remotely and automatically through connected devices and sensors. This innovation has not only made homes more convenient but also more energy-efficient and secure.

IoT-based home automation leverages the power of the internet to connect everyday devices and appliances, allowing them to communicate and interact with each other. These smart devices can include lights, thermostats, security cameras, door locks, kitchen appliances, and even voice assistants. The central idea is to create a cohesive ecosystem where these devices work together seamlessly to enhance the comfort, convenience, and efficiency of a home.

Appliances, entertainment systems, lights, and climate control are just a few of the things that a home automation system may monitor and/or manage. It could also cover elements of home security like alarm systems and access control. Controlled gadgets are usually connected to a central smart home hub (sometimes referred to as a "gateway") via a home automation system.

The system's user interface may be accessed via wall-mounted terminals, desktop or tablet computers, mobile phone applications, or Web interfaces that can be accessed remotely over the Internet.

II. LITERATURE REVIEW

The following literature surveys provide a useful resource for researchers and practitioners interested in home automation using telegram bot. They cover the latest techniques, challenges, and future directions in this field and can serve as a starting point for further research.


2.3 Mehedi Hasan, Biswas Parag, Toufiqul Islam Bilash and Ashik Zafar Dipto, "Smart Home Systems: Overview and Comparative Analysis", In 2018 Fourth International Conference on Research in Computational Intelligence and Communication Networks (ICRICICN).


III. RESEARCH METHODOLOGY

3.1 Telegram application

Telegram is a cloud-based instant messaging app and social media platform that was first launched in 2013. It was created by Pavel Durov and his brother Nikolai Durov, with the aim of providing a secure, fast, and user-friendly communication platform. Telegram has since become one of the most popular messaging apps in the world, known for its robust security features, innovative functionalities, and commitment to user privacy.

Telegram is a messaging app and service, but isn’t a dedicated IoT framework. It does, however, have lots of advanced features integrated right into the service. One of those is a bot that’s accessible through the messaging app, which is what this home automation system relies on. That offers a couple of advantages over traditional IoT frameworks, most notably that its flexible in how your network is arranged. Both the control device and the IoT device can be located anywhere, so long as internet service is available.

**Figure no 1:** Telegram application interface.

**Figure no 2:** ESP8266 interface.
3.2 ESP8266 Node MCU

It can be utilized as a stand-alone gadget or as a UART to WiFi converter to enable the connection of additional microcontrollers to wireless networks. An ESP8266, for instance, may be connected to an Arduino to enable WiFi on your Arduino board. The most useful use is utilizing it as a standalone gadget. Similar to how an Arduino can be used to control inputs and outputs, the ESP8266 also has WiFi capabilities. This makes it possible for you to publish your projects online, which is fantastic for internet of things and home automation applications.

The ESP8266 NodeMCU is a versatile and popular development board based on the ESP8266 WiFi module. It is designed for IoT (Internet of Things) applications and rapid prototyping, offering a user-friendly platform for building WiFi-connected projects. The NodeMCU is known for its ease of use, low cost, and extensive community support. Here’s an introduction to the ESP8266 NodeMCU:

1. **ESP8266 Module**: The ESP8266 is the heart of the NodeMCU. It is a low-cost, low-power, and highly integrated WiFi microcontroller unit. It provides WiFi connectivity and can be programmed to perform a variety of tasks, making it an excellent choice for IoT projects.

2. **Development Board**: The NodeMCU development board is designed to facilitate the use of the ESP8266 module. It includes a USB-to-serial converter for programming and a voltage regulator to power the ESP8266.

3. **Lua-Based Firmware**: Initially, NodeMCU development boards were popular for their support of the Lua scripting language. However, it can now be programmed using Arduino IDE, PlatformIO, and other programming languages as well. This flexibility allows users to choose the development environment that suits their needs.

4. **Onboard USB-TTL Converter**: The NodeMCU board features a built-in USB-TTL converter, which simplifies the programming process. Users can connect the NodeMCU directly to their computer via USB for uploading code and debugging.

5. **GPIO Pins**: The NodeMCU includes a range of General Purpose Input/output (GPIO) pins, which can be used to interface with various sensors, actuators, and other hardware components.

6. **WiFi Connectivity**: The ESP8266 module offers built-in WiFi connectivity, allowing the NodeMCU to connect to local wireless networks and the internet. This is a fundamental feature for IoT projects, enabling remote data exchange and control.

7. **Community and Libraries**: NodeMCU has a robust and active user community. This community support includes libraries and documentation, making it easier for users to find resources, code examples, and solutions to common problems.

8. **Compact Size**: The NodeMCU board is relatively small, making it suitable for projects with limited space requirements.

9. **Cost-Effective**: The NodeMCU is an affordable solution for IoT development, making it accessible to hobbyists and professionals alike.

10. **Wide Range of Applications**: NodeMCU is used in a wide range of IoT applications, including home automation, remote sensing, smart devices, and more. It is versatile and can be adapted for various projects with WiFi connectivity needs.

The ESP8266 NodeMCU is an excellent choice for those looking to develop IoT projects or experiment with WiFi connectivity. Its ease of use, flexibility, and community support have made it a favourite among electronics enthusiasts and developers, and it continues to play a significant role in the maker and IoT communities.

**Table 1**: Main differences between the ESP8266 and the ESP32 chips:

<table>
<thead>
<tr>
<th></th>
<th>ESP8266</th>
<th>ESP32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MCU</strong></td>
<td>Xtensa Single-core 3 2-bit L106</td>
<td>Xtensa Dual-Core 32-bit LX6 with 600 DM IPS</td>
</tr>
<tr>
<td><strong>802.11 b/g/n Wi-Fi</strong></td>
<td>HT20</td>
<td>HT40</td>
</tr>
<tr>
<td><strong>Bluetooth</strong></td>
<td>X</td>
<td>Bluetooth 4.2 and BLE</td>
</tr>
</tbody>
</table>
### Table 3.3 Relay

<table>
<thead>
<tr>
<th>Typical Frequency</th>
<th>80 MHz</th>
<th>160 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRAM</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Flash</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>GPIO</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>Hardware / Software PWM</td>
<td>None / 8 channels</td>
<td>None / 16 channels</td>
</tr>
<tr>
<td>SPI/I²C/I²S/UART</td>
<td>2/1/2</td>
<td>4/2/2</td>
</tr>
<tr>
<td>ADC</td>
<td>10-bit</td>
<td>12-bit</td>
</tr>
</tbody>
</table>

#### 3.3 Relay

Three of a relay’s five pins—NC, COM, and NO—are high-voltage terminals that link to the object being controlled. Depending on whether the device should stay generally on or off, it is linked between the COM (common) terminal and either the NC (normally closed) or NO (normally open) terminal.

There is an electromagnet coil (coil1 and coil2) between the other two pins. The NO terminal is open and the COM terminal is linked to the NC terminal in the original position. The switch’s internal contact moves as electricity passes through the coil, energizing the electromagnet. After then, the COM disconnects from the NC terminal and connects to the NO terminal. When the electrical current is cut off.

![Relay Module Pinout](https://www.engineers.com)

**Figure no 3: channel relay module**

### IV. APPROACH OF STUDY

**Telegram** is a messaging application which is used to send text, images or video messages free of cost. With the free messaging software Telegram, users may exchange text, picture, or video messages.

It also permits the creation of programs that incorporate Telegram into other apps by using different APIs. Certain bots can be configured to interface with any embedded software program or trigger an event using Telegram text messages without requiring a phone number. Install the “Telegram” app from the Apple Store or Play Store on your smartphone. If this is your first time using it, sign up using your cell number and country code. For verification, an OTP code will be required. Once you’ve successfully registered, look for and open BotFather. Click RESTART when BotFather opens to start building your bot.
Justification for components used ESP8266:

- **Low-cost**: you can get ESP8266 boards starting at $3 (or less) depending on the model.
- **Low-power**: In comparison to other microcontrollers, the ESP8266 uses a very small amount of power and has the ability to enter deep sleep mode.
- **Wi-Fi**: The ESP8266 has the ability to create its own access point or network or link to existing networks (stations) to obtain internet connectivity. Thus, the ESP8266 has access to the internet for send HTTP requests or store information on the cloud, for instance. It might also serve as a web server, allowing you to access it through using a web browser, and having command over and watch your boards from a distance.
- **Compatible with the Arduino "programming language"**: those that are already familiar with programming the Arduino board, were happy to know that they can program the ESP8266 in the Arduino style.
- **Compatible with MicroPython**: MicroPython firmware, a re-implementation of Python 3 designed for microcontrollers and embedded systems, can be used to program the ESP8266.

V. CONCLUSION

Through the use of the internet and WiFi, we are able to enable smart home appliances to be controlled from anywhere in the world, thereby solving the issue of handling large amounts of data. An affordable and effective platform for putting the smart home automation system into place is offered by Arduino.

Numerous devices can be connected to this system and communicate with it. It uses less time and electricity, and it also makes it easier for the elderly and disabled to perform simple household tasks on their own. In addition to offering home security, it is less expensive than the current systems.

VI. REFERENCES