Home Automation with Water Level Sensor

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Abstract: *This paper provides remote controlling and automation for homes and offices. These are very essential in present life style. Wireless control is primary concern for everyone. This paper describes a design of effective remote control system that can monitor the house. Apart from remote control system we can also control manually. This paper gives the best solution for electrical power wastage. The home appliances are switched on/off using IR without actually going near to the switch boards or regulators. The water level of the tank can also be monitored and the motor can be controlled through automation.*

Keywords: IoT(Internet of Things), Ultrasonic Sensor, Water Level Sensor, Home Automation, Blynk Application, relay.

I. INTRODUCTION

Home automation system is the term used to describe the practice of automatically and sometimes remotely managing household appliances. The idea of home automation first emerged in the early 1970s. Nowadays, there is a growing demand for the ability to access, control, and monitor network-enabled appliances from a distance. The global emphasis is on creating automated functionality in all possible objects, aiming to simplify and enhance security in our lives while also conserving electricity and time. This system can encompass various aspects, including lighting control, machine operation, heating and cooling management, and securing doors.

The utilization of internet access in home automation systems allows for remote control. Traditionally, the internet has been predominantly used for browsing, gathering information, and downloading software. However, technological advancements have necessitated the integration of the internet with machinery and devices. Home automation systems have significantly improved the comfort and security of households, while also addressing concerns regarding costs. In office settings, certain

individuals were previously tasked with supervising manual operations. These arrangements have now been replaced by home automation, resulting in a substantial reduction in costs. Moreover, manual labour involved in controlling appliances often leads to energy wastage when appliances continue to run even in the absence of people. This prolonged energy consumption can potentially result in significant energy misuse. To tackle this issue, the implementation of home automation is highly recommended, as it effectively manages such tasks and is recognized for its energy efficiency. In recent years, home automation has witnessed a surge in popularity, with an increasing trend of its adoption in residential, commercial, and public spaces, such as residences, malls, and offices.
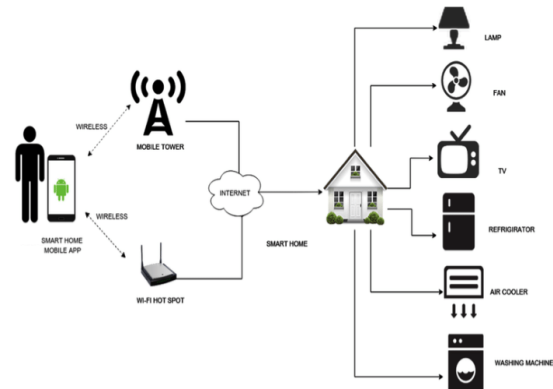
Simple Home Automation

II. LITERATURE REVIEW

Home Automation system using Android Application:
This system operates by allowing users to send signals to an TTGo Model through an Android application. A wireless module connected to the TTGo Model receives these signals and then relays them to control smart appliances using a relay board. The TTGo Model serves as the central control hub for this system. Relays are used to execute the "ON" and "OFF" operations. This system is particularly beneficial for individuals who are unable to move frequently between different locations to manually control their home appliances.

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Benefits of Home Automation:
Numerous studies highlight the advantages of home automation systems. These benefits include enhanced comfort, convenience, energy efficiency, security, and improved quality of life. Research has shown that automated climate control, lighting, and appliance management contribute to energy savings and reduced utility costs. Additionally, home automation's remote monitoring and security features offer peace of mind to homeowners.

Challenges and Limitations:
Despite the promising benefits, home automation also faces challenges and limitations. Studies indicate that high initial costs, complex installation processes, interoperability issues, and concerns regarding privacy and security are key challenges that hinder widespread adoption. The need for technical expertise and compatibility between devices and protocols remains an area of concern.

Technologies and Systems:
This section explores the various technologies and systems employed in home automation. It covers wireless communication protocols, such as Zigbee, Z-Wave, and Wi-Fi, as well as sensor technologies like ESP module, Water level sensor, Ultrasonic sensor, Fan Module, LED'S, Relay's Module. Additionally, research investigates the integration of voice assistants, mobile applications, and artificial intelligence algorithms to enhance user experiences and automate routine tasks.

User Acceptance and Adoption:
Understanding user acceptance and adoption is crucial for the successful implementation of home automation systems. Studies delve into factors influencing user attitudes and intentions towards adoption, including perceived usefulness, ease of use, privacy concerns, and personalization. Research also examines user experiences, satisfaction levels, and barriers to adoption to provide insights for system designers and manufacturers.

Integration with Renewable Energy and Sustainability:
With the increasing emphasis on sustainability, the integration of home automation with renewable energy sources and energy management systems is gaining attention. This section examines the potential for incorporating solar panels, battery storage, and smart grid technologies into home automation systems. It explores the benefits of demand response strategies and energy optimization algorithms for maximizing energy efficiency.

Advantages:
- Error probability reduced Ease of access and low cost and power consumption
- Can reduce human effort
- Smarter processing and services
- Can be implemented at any device and automated Eliminates the use of PC for automation
- Helps old age people to control the remote devices
- Simple interface

Disadvantages
- Replacing humans is dangerous May take time and learning
- Security concerns
- Vulnerable to attacks
- Most of the times range is restricted
- High dependency on sensor devices which makes the system vulnerable if sensor fails

III. PROBLEM SOLVING STATEMENT
The problem statement in home automation revolves around addressing the need for convenient, efficient, and secure control of household appliances. Traditional manual operation methods require physical presence, which can be inconvenient for individuals who are frequently away from home. There is an increasing demand for a system that enables remote access, control, and monitoring of appliances, allowing users to manage their homes from a distance. This includes controlling lighting, machines, controlling level of water tank, and implementing security measures like door locking. The ultimate goal is to develop a comprehensive home automation solution that simplifies daily tasks, enhances security, and promotes energy and time savings.

3.1 OBJECTIVE
The objective of a water level sensor is to accurately measure and monitor the level of water in a container, tank, or any other water storage system. The sensor provides real-time information about the water level, allowing for effective management, control, and automation of water-related processes

The primary objective of home automation is to enhance convenience and comfort for homeowners. By automating various tasks and processes, such as controlling lighting, temperature, security systems, and entertainment devices, home automation aims to simplify daily routines and provide a more comfortable living environment.

IV. RESEARCH METHODOLOGY

1. Understand the Components:

Familiarize yourself with the TTGO module, the 5-volt 4-relay module, and the switches. Understand their pin configurations, functionalities, and how they can be connected together.

2. Design the Circuit:

Determine the wiring connections between the components. Connect the TTGO module to the relay module and the switches. Make sure to connect the power supply (5 volts) appropriately. Refer to the datasheets or documentation of each component for pin details and connection guidelines.

3. Set Up the TTGO Module:

Configure the TTGO module to connect to your Wi-Fi network. This will allow you to control the home automation system remotely. You may need to upload the necessary firmware or code to the module, depending on the specific TTGO model you are using. Consult the module's documentation for instructions on setting it up.

4. Write Control Logic:

Develop the software logic to control the relays based on the switch inputs. This can be done using a programming language compatible with the TTGO module, such as Arduino or MicroPython. Determine the desired functionality for each switch (e.g., turning on/off lights, controlling appliances), and write code to handle the switch inputs and trigger the corresponding relay outputs.

5. Test and Debug:

Upload the code to the TTGO module and test the system. Verify that the switches are working as expected and that the relays are activating/deactivating accordingly. Troubleshoot any issues or bugs that may arise during testing.

6. Implement Additional Features:

Depending on your requirements, you can add more functionality to the system. For example, you can incorporate sensor inputs (such as motion sensors or temperature sensors) to trigger specific actions. You can also enhance the system by integrating it with voice assistants or mobile applications for remote control.

### 7. Finalize and Secure the System:

Once you are satisfied with the functionality and performance of the home automation system, secure the connections and components properly. Ensure that all electrical connections are secure and insulated to prevent any safety hazards. Consider enclosing the circuit in a protective case if necessary

V. DETAILS OF THE COMPONENTS

1. INTRODUCING THE TTG0 T-CALL ESP32 SIM800L

The TTGO T-Call is a new ESP32 development board that combines a SIM800L GSM/GPRS module. To use the capabilities of this board you need to have a nano SIM card with data plan and a USB-C cable to upload code to the board.
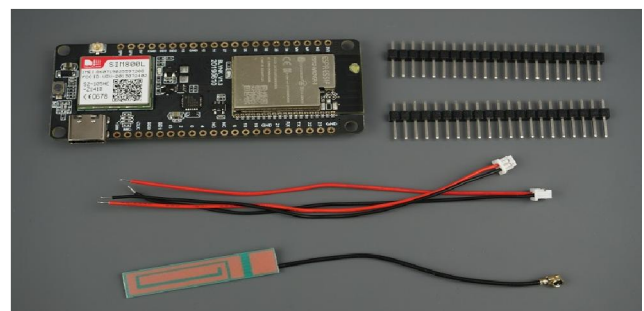
The package includes some header pins, a battery connector, and an external antenna that you should connect to your board.

The T-Call ESP32 SIM800L board is in deep sleep mode. It wakes up and connects to the internet using your SIM card data plan. It publishes the sensor readings to the server and goes back to sleep.

2. ESP8266
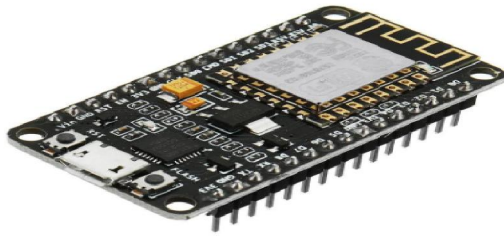
The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 bgn. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self-sufficient MCU by running an RTOS-based SDK.

3. Module HC-SR04

The HC-SR04 Ultrasonic Distance Sensor is a sensor used for detecting the distance to an object using sonar. It's ideal for any robotics projects your have which require you to avoid objects, by detecting how close they are you can steer away from them.

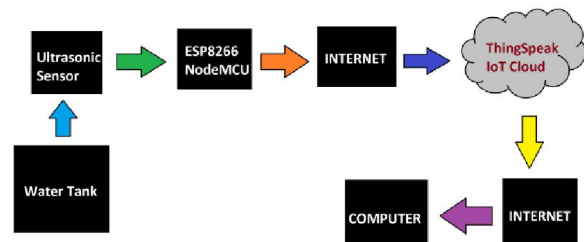### 4. DC 5V opto Isolated Relay Module
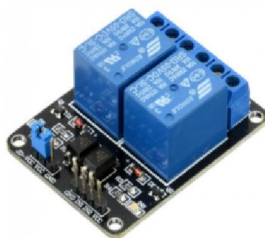
The 5V relay module can be used to control a load such as a lighting system, motor, or solenoid. It can also be used to switch AC or DC voltages. The maximum voltage and current that the 5V relay module can control is dependent on the specifications of the relay

5. Blynk UI
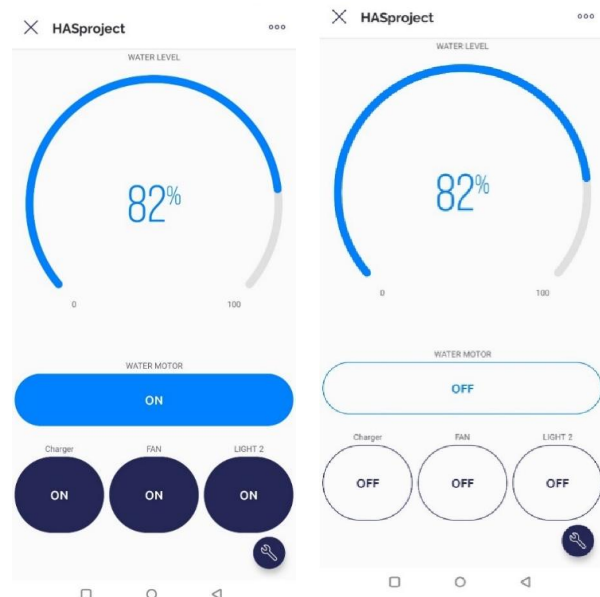
VI. FLOWCHART

VII. CONCLUSION

Today in this century home and offices are equipped with various machineries. Besides, people have various devices for surfing in web. That's why we have introduced a system that can be accessed from all sorts of devices and database can be updated from anywhere. If particular device works on, the other means of devices will be easily operated. The database is developed such a way that can be accessed from any sort of device that supports internet.

Water is one of the most important basic needs for all living beings . But unfortunately a huge amount of water is being wasted by uncontrolled use . Our intension of this research work was to establish a flexible, economical and easy configurable system which can solve our water losing problem. water level monitoring and controlling network which flexibility would offer us to control this system from any place via internet even with different type of devices. This could have a substantial benefit from this research work for efficient management of water.

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The system is very easy to install . For this ,we just need ultrasonic sensor to detect to detect the levels of any medium liquid or solid .It transmits waves and measures the time it takes to receive the return signal back from the water to the sensor. These are controlled by TTGo Model. Home Automation is definitely a resource which is capable of make a home setting automated. People can be in command of their electrical devices via these Home Automation devices and set up the controlling actions in the workstation.

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