Wi-Fi Based Monitoring System

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Abstract- *Among sensible goals of active and assisted living paradigm is the unobtrusive monitoring of daily living activities. Home automation can be used for maintaining hassle free living conditions within a home. Because of its ability to ensure security and ease in access, home automation is gaining more popularity day by day. This project proposes IOT based Smart Home application used to remotely control the home appliances. In the system will be interfaced with Relay Module and SMART HOME android application installed on the smartphone. We here use the Internet as a medium to control loads, acquire data for data monitoring purposes. This enables an instant monitoring of data and appliance control residing from anywhere in the world.*

I. INTRODUCTION

Nowadays, a secure and comfortable house is hard to get. Another problem is energy. Inside the house, there is often a waste of energy by the appliances turned on without being used. By using smart home systems, users can easily monitor and control the device inside the home by using Internet of Things. The monitoring system uses Internet of Things (IOT) technology, that utilizes the internet to be able to exchange data and communicate. The use of IOT is based on the ease of every user in accessing the internet. By using IOT technology, users can access all devices in the home anytime and anywhere through mobile devices, only condition being, the mobile device should be connected to the internet.
Therefore, by using a smart home system, users can enjoy the ease of monitoring and controlling the house in real time.

Literature Survey:

- Smart energy efficient home automation system using IOT.
- IOT based approach for load monitoring and activity recognition in smart homes.
- Efficient energy management in smart homes using IOT- based Low-Power & Wide-Area Network (LORA WAN) protocol.
- A monitoring and control gateway for IOT edge devices in smart home.
- IOT based load sensing seats controlling lights and fans.

In the realm of IoT, energy conservation and security are paramount concerns. Initiatives focus on smart solutions for energy management and security in various settings. One initiative proposes automating lighting and fans using Arduino-based IoT systems, enhancing energy efficiency by employing Force Sensing Resistors for load sensing. Another addresses IoT security risks in smart homes, introducing a Monitoring and Control Gateway to detect vulnerabilities in edge devices. Additionally, research explores LPWAN technologies like Sigfox and LoRa for energy-efficient smart home management, concluding that a hybrid approach may be optimal. Furthermore, a novel IoT-based appliance load monitoring system is proposed, utilizing machine learning algorithms for activity recognition. Lastly, an IoT-enabled home automation system allows remote control of household devices via web or voice commands, leveraging Internet connectivity for enhanced accessibility and security.

II. EXISTING SYSTEM

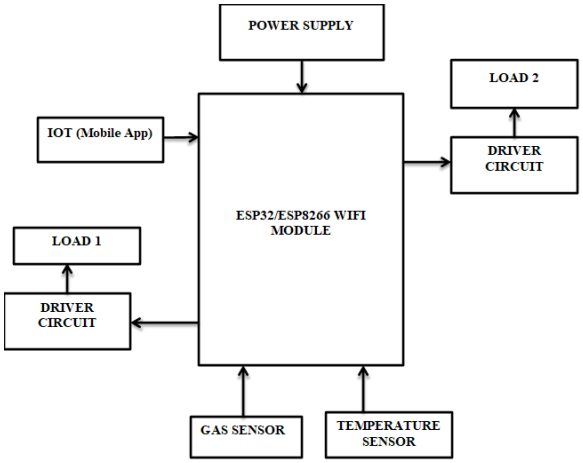
The existing system consists of a Bluetooth based load controlling system. This causes a drawback in the system as it requires a physical presence of human within certain meters with the device radius. This causes a disadvantage as the evolution of smart phones is at its peak and to use this technology.

2.1. Disadvantages:

- It only operates within a constrained range, limiting its operational scope to a defined area.
- The single control node setup can pose limitations, potentially leading to onset of bottlenecks in system management.
- It lacks scalability and flexibility in adapting to the needs of the user.
- Both the module and the controller should be connected to the same network.

III. PROPOSED SYSTEM

To overcome the existing impacts, we design an intelligent smart monitoring system. The process will be equipped with one small electronics unit which consists of Micro Controller, light, DC motor, servo motor, gas sensor, temperature sensor and an IOT module. This system enables the use of Internet of Things (IoT) to make the system range-less for controlling the device. All the user requires is the Internet and the IoT module should also be provided with a network. Whenever the user logs in to IOT login page, the user can control the appliances from anywhere in the world only with the use of Internet and by using mobile apps like Alexa and Google Home. Temperature and gas sensors sense the indoor environment parameters. If a fire occurs indoors, that information is sent to the house owner mobile.



IV. HARDWARE OVERVIEW

4.1 Microprocessor ESP32:

ESP32 is a low-cost System on Chip (SoC) Microcontroller from Espressif Systems, the developers of the famous ESP8266 SoC. It is a successor to ESP8266 SoC and comes in both single-core and dual-core variations of the Tensilica's 32-bit Xtensa LX6 Microprocessor with integrated Wi-Fi and Bluetooth.

The good thing about ESP32, like ESP8266 it has integrated RF components like Power Amplifier, Low-Noise Receive Amplifier, Antenna Switch, Filters and RF Balun. This makes designing hardware around ESP32 very easy as you require very few external components.

4.2 Connection of Relay with Microprocessor:

This paper examines the interface between a microprocessor and relay for controlling high-power devices. It covers each step, from identifying relay pins to connecting the relay module to the CPU. The abstract emphasizes the necessity of programming for relay control, making it a useful resource for both beginners and experienced electronics professionals.

V. SOFTWARE OVERVIEW

5.1 Arduino software (IDE):

Arduino is an open-source electronics platform which is based on easy-to-use hardware and software. Arduino boards can read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

5.2 Embedded C:

The Embedded C specification extends the C language to support freestanding embedded processors in exploiting the multiple address space functionality, user-defined named address spaces, and direct access to processor and I/O registers. These features are common for the small, embedded processors used in most consumer products. The features introduced by Embedded C, are fixed-point and saturated arithmetic, segmented memory spaces, and hardware I/O addressing. The description we present here addresses the extensions from a language-design perspective, as opposed to the programmer or processor architecture perspective.

VI. RESULTS & TALK

- **Energy Efficiency:** Reduce energy wastage by remotely controlling appliances to operate only when needed.
- **Enhanced Security:** Monitor and secure home remotely with features like door locks and camera surveillance.
- **Remote Accessibility:** Control home devices from anywhere via smartphone connectivity.
- **Assisted Living Support:** Provide unobtrusive monitoring for elderly or disabled individuals to maintain independence.
- **Data-driven Optimization:** Utilize collected data to optimize energy usage and improve overall home management.

VII. SUMMARY

These systems offer invaluable solutions for establishing smart monitoring systems through the integration of IoT technologies. They provide cost-effective solutions and also, they also deliver reliable outputs, surpassing alternative systems, thus contributing significantly to societal welfare.

The emphasis on safety is paramount, ensuring that users can trust the performance of the system and its integrity. Implemented on a large scale, these solutions promise enhanced results and trouble-free operations in the future, paving the way for widespread adoption and long-term benefits across various domains.

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