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IOT BASED HOME AUTOMATION SYSTEM- A REVIEW

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Abstract

This paper examines the design and implementation of an IoT-based home automation system that focuses on instant mechanical monitoring using basic components such as GSM, relays, Wi-Fi, electronic sensors, and ESP32. The system, which enables remote control and monitoring of home appliances, allows users to instantly control the devices and monitor their energy usage. Module connection. Wi-Fi connection provides seamless communication between the device and the user's mobile phone, while the GSM function keeps users informed even at home by providing SMS notifications of important notifications. Allow automatic operations based on user programs or instant commands by managing the on/off status of devices. Energy meters monitor energy consumption, providing useful feedback that helps increase energy efficiency and reduce costs. Control energy efficiency and usage patterns. The proposed IoT-based home automation system integrates these technologies to provide solutions for modern home management, improving comfort, security, and hearing safety.

Keywords – Online Monitoring, IoT, Machine, Performance etc.

I. INTRODUCTION

The rapid growth of the Internet of Things (IoT) technology has revolutionized the home automation landscape, creating a better and more efficient life. As buildings acquire smart devices, the need for advanced control, energy efficiency, and security is increasing the need for real-time monitoring. This article focuses on an IoT-based home automation system designed for real-time machine monitoring, showing its features, functions, and future applications. Wi-Fi, electronic meters, and microcontrollers (ESP32 in particular) will change the way we interact with our homes. These devices work together to create a seamless connection between users, allowing homeowners to monitor and control their devices from anywhere.

II.RESEARCH METHODOLOGY

This methodology outlines the development of an IoT-based home automation system that focuses on real-time monitoring and control of household machines. The system integrates GSM technology, relays, an ESP32 microcontroller, and a DHT sensor for temperature and humidity monitoring. The approach emphasizes design, component integration, software development, testing, and future enhancements.

1.GSM module (e.g., SIM800) for sending SMS notification and remote-control commands. Implement functions for sending and receiving SMS alerts based on sensor readings. The GSM network to wirelessly send energy supplier via short message system (SMS).

2. the ESP32 due to its Wi-Fi capabilities, processing power, & support for multiple sensors. ESP32 is a family of low-cost, low-power on-chip microcontrollers that integrate Wi-Fi and dual-mode Bluetooth. The ESP32 series uses Xtensa LX6 dual-core and single core microprocessors, Xtensa LX7 dual-core microprocessors, or single-core RISC-V microprocessors, and includes onboard antennas, RF baluns, power amplifiers and low noise gain amplifiers, filters, and power management modules. ESP32 is designed and manufactured by Expressive Systems, a Chinese company headquartered in Shanghai, and manufactured by TSMC using a 40nm process. It is the successor to the ESP8266 microcontroller.

3. Integrate a DHT11 or DHT22 sensor for real-time monitoring of temperature and humidity levels. The DHT digital temperature and humidity sensor is a simple, ultra low-cost digital temperature and humidity sensor. It is uses a capacitive humidity sensor and a thermistor to measure ambient air and send a digital signal to the data pin (no analog input pin required).

4. Use a relay module to control the power supply to connected appliances. 12V DC relay switches are the best solution for all power applications because they allow current to be controlled such as car horns, headlights, auxiliary lights, fan, develop routines to control relays based on user commands or sensor thresholds.

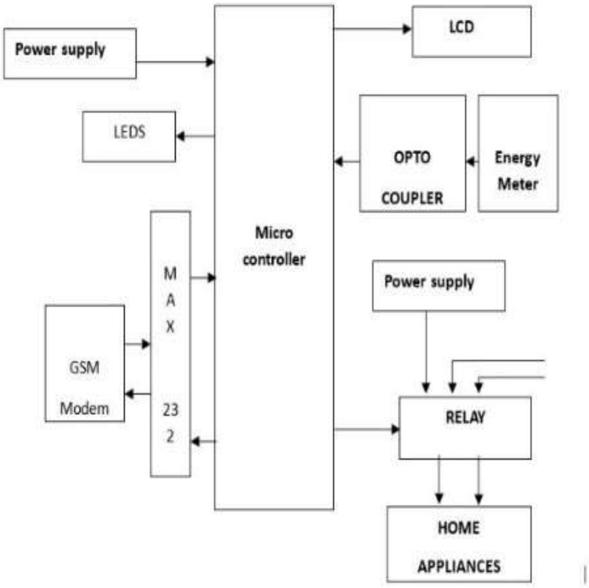
III. COMPONENTS RATING

Component	Value	Software Tool
ESP32 microcontroller	+5V,250mA	
Power Supply		
AC Induction Motor	2.05 Amps	1. Arduino (for Esp32 coding)
Buzzer	2-5V	
GSM Modem	3.4V – 4.5V	
LCD	4.7V to 5.3V	
Relays	6v,12v	2. MPLAB (for PIC coding)
8-bit microcontroller	2.4-5.5 V	
Driver IC	50v & 500mA	
Opto coupler MOC3021	1.5 V	3. Embedded C (language of coding)
TRIAC BT16	16A	
(C.T)	0.3-2V	

IV.MODELING WORKING

The ESP32 (or any similar microcontroller) reads data from sensors, processes the input, and sends output signals to other devices (like the motor, relay, or LCD).It runs a program that defines the conditions under which various components (e.g., motor, light) will be activated or deactivated. This is also likely connected to Wi-Fi or Bluetooth (if ESP32 is used), allowing remote monitoring or control via a smartphone or computer. The DHT11/DHT22 sensor measures the temperature and humidity of the surrounding air and sends this data to the microcontroller. The sensor has two output pins: one for temperature (measured in °C or °F) and one for humidity (measured as a percentage). The microcontroller reads this data and either displays it on the LCD screen or uses it to trigger actions, like turning on a fan or controlling ventilation. The microcontroller sends the sensor readings to the LCD display, which converts the digital data into readable numbers. The displayed values, such as 28°C for temperature and 83% for humidity, help users monitor the system's current state. The LCD may also display system messages or alerts, for instance, if a threshold is crossed and an action is triggered. A relay is essentially a switch that is operated by an electrical signal from the microcontroller. It allows the microcontroller to safely control high-power devices (like motors or lights) that operate on higher voltage, such as 220V AC. When the relay receives a signal from the microcontroller, it closes or opens the circuit, thus turning the connected device (like the motor or light bulb) on or off. The motor is connected to the relay, which controls when it receives power. The motor could be part of a ventilation system, where it turns on when temperature or humidity rises above a set point. In another scenario, it might be used to control movement in the system, like rotating a device or controlling air circulation. The light bulb in this setup could be automated, turning on or off based on the time of day, motion detection, or environmental conditions like low light levels. The relay would control whether the light is powered, based on signals from the microcontroller. The switches may be used to manually override the automated system. For example, you could turn the motor or light on or off regardless of the sensor readings. A button might be used to reset the system, stop an action, or trigger specific tasks like calibrating sensors or changing display modes on the LCD. The project would require a stable power supply, likely a combination of low voltage DC power for the microcontroller, sensor, and motor, and potentially AC power for devices controlled by the relay (like a light or high-power appliance). Proper voltage regulation ensures that the microcontroller and sensors receive consistent power, which is crucial for stable operation.

Circuit Diagram



FUTURE SCOPE

The future of real-time monitoring systems looks quite risky. Advances in predictive maintenance, shared intelligence, and the Internet of Things will enable better analytics and decision-making. Remote monitoring will increase operational flexibility, while advanced data visualization will make it easier to monitor machine performance. There will also be a focus on energy efficiency and cybersecurity to protect sensitive information. Overall, these developments will lead to increased intelligence and efficiency across industries.

CONCLUSION

This is a significant development that provides many benefits in business operations, such as efficiency, time reduction, and improved decision-making. The integration of technologies such as the Internet of Things, artificial intelligence, and predictive maintenance will continue to improve these systems, making them smarter and more responsive to change. As businesses increasingly focus on sustainability and efficiency, the use of real-time analytics is critical to driving innovation and maintaining competitiveness in the market. Overall, the future of real-time machine monitoring is bright and promises to revolutionize the way machines are managed and optimized.

REFERENCES

[1] Manisha P Jadhav, Ajij D Sayyad “IOT Biased Home automation”, IJFMR 2024 E-ISSN: 2582-2160

[2] R Harsha Vardhan, R Ramanjan Prasad, Dr.B Pakkiraiah,M. Rajitha, “IOT based Electrical Devices Surveillance Control”, EDP Science,E3S Web Of Conferences 472,01013,2024.

[3] Najmus Saqib malik, Friedrich kupzog, Michael Sonntag, “An approach to secure mobile agents in automatic meter reading”, IEEE, International Conference on Cyber worlds,2010.

[4] Kulkarn Sheetal Vijay, Saahieel Sasane, Mrunali Bajare, Rahul Deshmukh, “Real Time Monitoring of Temperature and Humidity Using LabVIEW and ML” IJRASET.2024.

[5] Dr.Shailesh Madhavrao Deshmukh, Ravi Prakash Mohobia, “Real Time Electric Pattern Based Volatge Regulation Model For Improved Power Stability” ,EDP Science, E3S Of Conference 540,10027,2024.

[6] Syeda Faiza Nasim, Sidra Aziz, Asma Qaiser, Umm-e-kulsoon, Saad Ahmed, “Fault Detection and Fault Diagnosis in Power System Using AI” SSURJET, VOL.14, No.1,2024

[7] Bharat Sigh, Sandeep Sharma, Ayush Gautam, Arnav, Gaurav Kumar Mishra, Saksham Gangotri, “Over voltage and Undervoltage Intelligent Protection” System,Mukta Shabd Journal, VolumeXIII, JAN-2024.

[8] Varun Shukla,Ankit Khushwaha,Shivam Singh Parihar,Shubham Srivastava, Varun Pratap Singh, “Authenticated Wireless Information Display System Using GSM Module,CAE, ISSN:239-4714Volume - 5NO.3,JUN-2016.

[9] [Pranavp.Kulkarni & Mohit Patil 'ONLINE MONITORING Of Electrical Machine Using IOT IEEE' DOI:1109/ICNTE44896.2019][1]

[10] [Magadan, F.J. Suarez Real Time Monitoring of Electrical Motors for The Industry 4.0' International Conference of Industry & Smart Monitoring (ISM 2019)][3]