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LOAD SHARING BY PARALLEL TRANSFORMER HEALTH MONITORING

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ABSTRACT- Transformers are the main building block in a power system. Any damages in transformer adversely impacts a power system's balance.Overloading and inadequate cooling are the main causes of the dam ages.The primary goal the Internet of Thingstime distribution transformer health monitoring system.Servers are used to monitor, process, and record a transformer's parameters, including temperature, voltage, current, and oil level.To do this, we make use of sensors that are interfaced with Espwroom 32 microcontroller. The recorded data can be send using Wi-Fi module and accessed from anywhere around the world using IOT technology. This helps in identifying human dependency, and solving a problem before a failure without human monitoring.
Keywords: Transformers, Health Conditions, Microcontroller, IOT Technology

I. INTRODUCTION

Systems for distributing electricity are essential for providing dependable and effective energy to suit the needs of contemporary society.Transformers are essential components of these systems because they convert voltage l evels into levels that are appropriate for use and transmission, so facilitating the distribution and transmission of power.Several transformers run in parallel in many distribution networks to accommodate the increasing dema nd for power while maintaining redundancy and dependability.Maintaining system stability, maximising resour ce utilisation, and avoiding overloading or underutilizing individual transformers all depend on effective load sh aring amongst parallel transformers. Historically, load sharing has control mechanisms. However, with the advent of advanced technologies such as the Internet of Things (IoT), there is an opportunity to enhance the capabilities of power distribution systems by incorporating intelligent monitoring and control solutions.The integration of IoT technology enables real-time monitoring of transformer parameters, predictive maintenance, and remote control functionalities. By leveraging IoT-enabled sensors and actuators, parallel transformers can dynamically adjust their load-sharing behavior based on real-time operating conditions, thereby improving system efficiency and reliability.This project aims to address the challenges associated with load sharing by developing a novel approach that combines parallel transformers with IoT integration. The project seeks to optimize load distribution, improve system performance, and enable remote monitoring and control capabilities. Through a comprehensive exploration of hardware implementation, software development, testing, and validation, this project endeavors to contribute to the advancement of power distribution systems and pave the way for smarter and more resilient energy infrastructure.In the subsequent sections of this report, we will delve

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into the existing literature on parallel transformers and IoT applications in power distribution systems, present the proposed system architecture and design considerations, detail the implementation of hardware and software components, discuss testing procedures and results, and conclude with insights into the project's implications and future directions.

II. METHODOLOGY

The design and construction of an Internet of Things embedded system to measure load currents, overvoltage, transformer oil level, and temperature are shown in this proposed project.
This is accomplished by utilising sensors and an Arduino singlechip microcontroller to create an online measu rement system over the Internet of Things (IOT).At the location of the distribution transformer, it is installed.
The system memory is used to process and store sensor output values.
The system is configured to check anomalous conditions using predetermined instructions.
if any specific transformers are being underutilised or overloaded.Historically, load sharing has been accompli shed by hand abnormality on the system, details are automatically updated in the internet through serial communication. This Internet of Things (IOT) will help the utilities to optimally utilize transformers and identify problems before any catastrophic failure occurs. Thus, online measuring system is used to collect and analyze temperature data over time. So, Transformer Health Measuring will help to identify or recognize unexpected situations before any serious failure which leads to a greater reliability and significant cost savings. Transformer is one of the important electrical equipment that is used in power system. Monitoring transformer for the problem before they occur can prevent faults that are costly to repair and result in a loss of electricity

III. BLOCK DIAGRAM

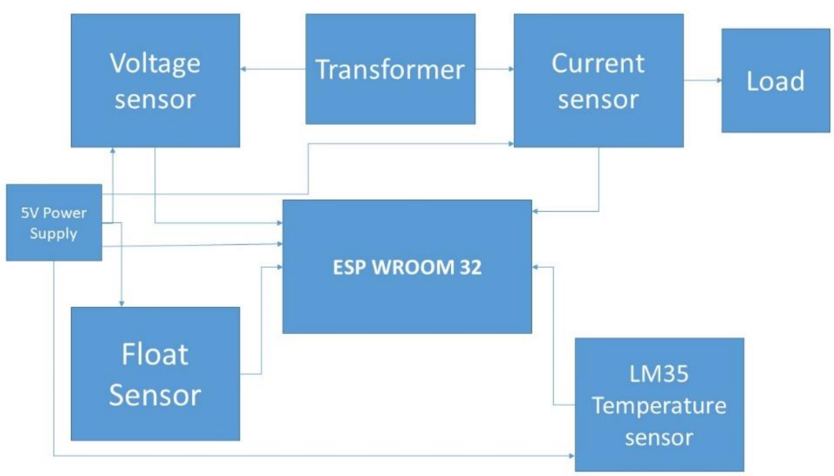

Fig.1 - Block Diagram of Load sharing by parallel transformer health monitoring

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A. working

For This Proposed Real-Time Framework, We Take a Voltage sensor, oil level, A Current sensor And a LM35 Temperature Sensor for Monitoring Voltage, Current, Temperature, Respectively Data of The Transformer and Then Send Them to A Desired Location Anywhere in The World. These Three Analog Values Are Taken in Multiplexing Mode Connected to A Programmable Microcontroller Arduino. Then The Values Are Then Sent Directly Through a Wi-Fi Module Under TCP IP Protocol to A Dedicated IP That Displays the Data in Real Time Chart Form in Any Web Connected PC / Laptop/Mobile for Display. The Real Time Data Is Also Seen at The Sending End Upon an Android App Interfaced to The Microcontroller. The Supply of Power Is Given Through Step Down Transformer 230/12V, Which Steps Down the Voltage To 12V AC. This Is Converted to DC Using a Bridge Rectifier and It Is Then Regulated To +5V Using a Voltage Regulator 7805 Which Is Required for The Operation of The Arduino, 3.3 Volt for The Wi-Fi Unit and Other Component. If Overvoltage, less oil, over temperature And Over current Happens Then Microcontroller Will Send Data Message to An Android App And laptop

B.Hardware Implementation

1. Hardware Setup: Connect voltage and current sensors to the ESP32's analog pins.Use a temperature sensor for oil temperature monitoring.Utilize appropriate sensors for oil level detection, such as ultrasonic or capacitive sensors.Ensure all sensors are properly powered and connected to the ESP32.

2. Programming ESP32:Write code in Arduino IDE (or any compatible IDE) to read sensor data.Use appropriate libraries for interfacing with sensors. Implement Blynk library for ESP32 to enable communication with the Blynk app.Write code to send sensor data to the Blynk server.

3.Blynk App Setup:Create a new project in the Blynk app.Add widgets to the Blynk project for displaying sensor data, such as Value Display widgets for voltage, current, and oil temperature, and Level or Gauge widgets for oil level.Generate an Auth Token for your project in the Blynk app.Integration:Use the Auth Token generated in the Blynk app to authenticate your ESP32 with the Blynk server.Configure your ESP32 code to connect to your Wi-Fi network and the Blynk server using the Auth Token.Map the sensor readings to the corresponding widgets in the Blynk app.

4.Testing and Monitoring: Upload the code to your ESP32 board and ensure it connects to the Wi-Fi network and the Blynk server.Monitor the Blynk app to see real-time updates of voltage, current, oil temperature, and oil level.Adjust the code and widget settings as needed for optimal performance.

IV. FUTURE SCOPE

This project can be advanced in which the distribution point monitored by one central location. The relays are used to cut off supply of concerned geographical region through circuit breaker. In this system user can send commands to concerned DP to read the remote electrical parameters. This system can repeatedly send the real time electrical parameter data like active power, reactive power, voltage, current, frequency etc., periodically in the form of SMS to the user.

V. CONCLUSIONS

Our observations show that real time clocks (RTCs) are less powerhungry, function more accurately than other t ime-keeping options, and enable key functions for the main system.Using real
time clocks (RTC) can even improve the functionality of electronic gadgets.When comparing the times of prior functions, some electrical equipment can rely on real-time clocks.
Device functionalities can be significantly reduced if they occur inside a predetermined time frame.Therefore, u tility departments may find substantial use for realtime clocks interfaced with 328p microcontrollers in load she dding time management systems.

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