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Online Monitoring of Transformer Status using Wi-Fi Technology

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Abstract -Transformers are generally provided with advanced control measures that ensure their operation and safety at a high reliability because their failure usually leads to long power outage, increase maintenance cost and unreliable provision of electricity to customers. Despite the protection measures that accompany a distribution transformer, there is still a need to provide extra remote monitoring systems to increase the reliability of operation and the confidence of instantaneous fault reporting.

Key Words –Transformer oil,Temprature,Dissolved gas analysis IoT,Aurdino

I. INTRODUCTION

Electrical energy plays an vital role in our day today life. Every moment of our life is connected to electricity. Electricity has many tools and devices that help people change and manage distribution based on usage. Transformers are the most important equipment for power transmission and distribution. A transformer is a device used for the transmission of electrical energy.Transformer condition monitoring is the process of collecting and processing data regarding various measures to predict and prevent transformer failures. This can be done by analyzing the differences between the variables from their expected values. This will help and guide the equipment to use transformers and make the equipment last longer. The proposed project presents the design and implementation of an embedded system for temperature measurement and gas detection. This can be done using the Internet of Things (IoT), Arduino microcontrollers and online measurement using transformer mounted sensors for error alerting.When the change in the oil change amount is too much or there is no oil in the allowable range, the sensor detects these changes and sends an alarm with a push message and terminates the operation of the transformer. It can also diagnose faults such as electrical faults, thermal faults, fuel overheating and low fuel. This article contains descriptions, block diagrams and results.

II. LITERATURE SURVEY

DEVELOPMENT OF IOT BASED SOLUTION FOR MONITORING AND CONTROLLING OF DISTRIBUTION TRANSFORMERS

The IoT-based solution for monitoring and controlling of distribution transformers is quite easy and effective compared to manual monitoring method. The paper focuses on transmitting real time data from each transformer to IoT platform using LoRa (Long Range) modules which we have used the wifi module. Selected advantages of this method are like, continuous monitoring of DTs, timely alerts to rectify the abnormality and fault analysing of the working transformer is fetch through the IOT using the matlab simulation, there by extending the lifetime of distribution transformers we can simplify the work load on a individual person and make it a more efficient one to work fast and quick monitoring of the faults that might occur during losses of voltage or current.
In this paper distribution transformers are monitored and controlled using LoRa modules and LoRaWAN (LoRa wide area network) which are referred under Internet of Things (IoT) technology. IoT is a network of smart devices that are embedded with sensors, actuators and network connectivity that enables them to collect and exchange data. Through this we can monitor transformer from a very long distance just using the IOT based system . Online monitoring made every thing easy and fast we don't need to manually monitor every thing like in the olden days.This reduce work load and improve more accuracy to find the faults and the faults can be analysed individually and there will be no extra time wasted just to find the faul inside the transformer.

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III.EXISTING METHODOLOGY

There are many parameters that will affect the performance of a transformer. The four main areas of concern here are fuel, heat, overload and low fuel. The central processing unit ARM7 processor manages transmission and control functions as well as this ARM process is a 32-bit embedded processor.

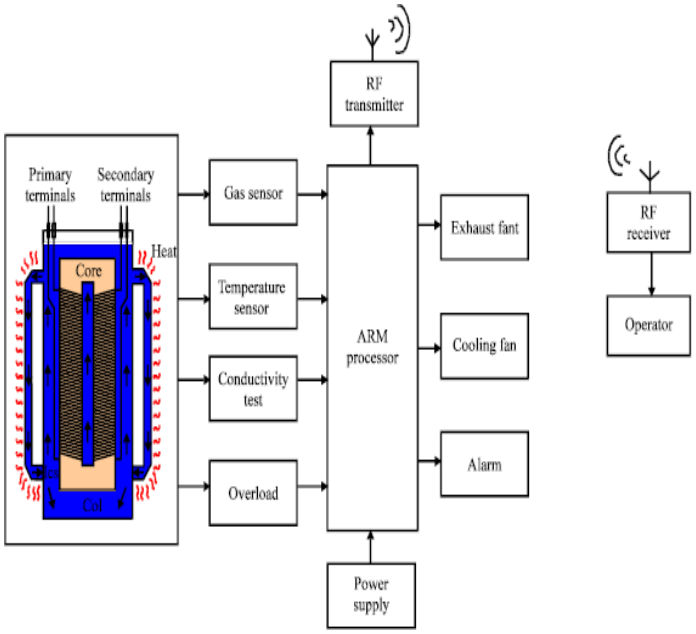

Fig 1.Existing Methodology

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It can support the thumb tips. It has RISC architecture used for loading and storage. It completes the fixed width's instructions, properly locates the pipe using the thumb tips, and sends it.Execution of instruction will be highly arithmetic, ARM executes instructions as a unit and supports all operating systems depending on application, web browsing performance with ARM processors is compared to other advanced processors such as Intel atomic processors. the same.

All the features of this ARM will provide the best performance for building technology in various applications such as mobile, network, consumer, business automation. If there is a mismatch, the wireless communication will determine the Wi-Fi, control it and notify the user.

IV.PROPOSED METHODOLOGY

A suitable transformer monitoring system can monitor many things such as oil temperature, oil in oil, moisture in oil, oil level, voltage, current and etc. This job includes the process of monitoring Transformer oil temperature and oil contained in oil and tanks. detected value is given to Arduino. The programming output is displayed on the LCD with local display.

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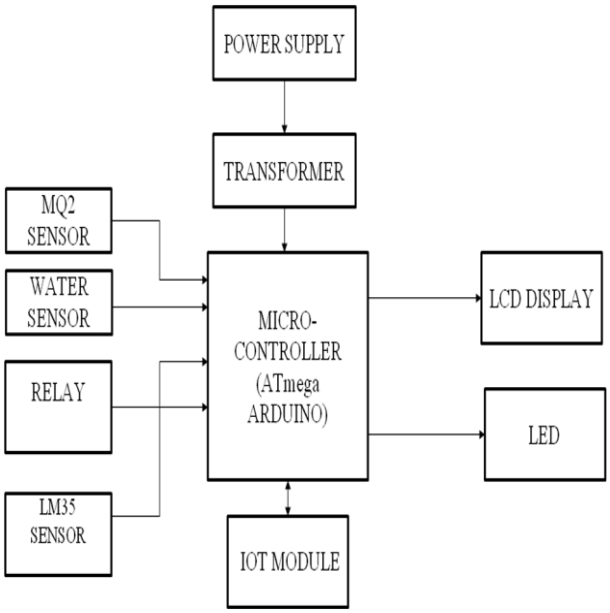

Fig 2.Proposed Methodology

The same output of is also transmitted from the Wi-Fi module to the internet server and then from the cloud server to the mobile phone application programmed in Arduino. IT. From Matlab we can see the idle time and monitor engine changes for temperature, low fuel level, pollution and loss of current or voltage. The performs various Internet of Things monitoring to detect changes in temperature, current, voltage, and gas volume.

V.CIRCUIT DIAGRAM

Online Monitering Of Transformer Status using Wi Fi Technology Circuit Diagram is given below.

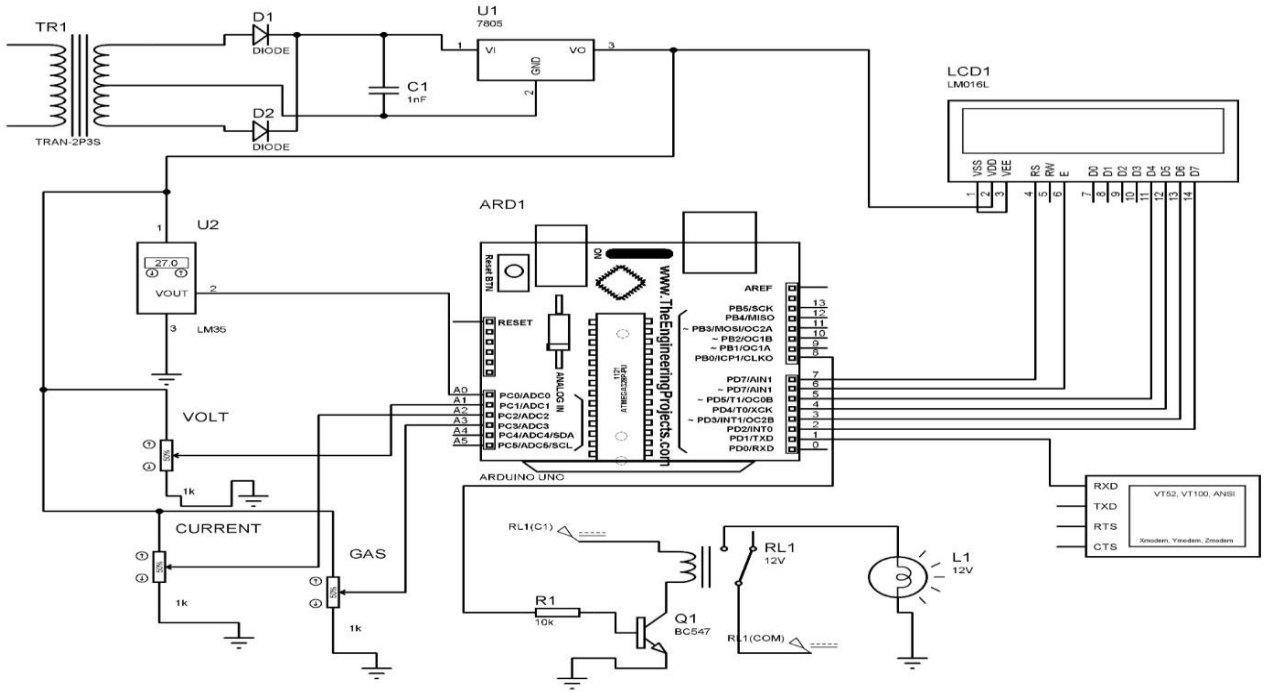

Fig 3.Circuit Diagram

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VI.

CIRCUIT DIAGRAM EXPLANATION

The 230 volt supply is given to the current transformer and voltage transformer through this we control the flow of current and voltage accordingly to our requirements .the supplied power is given to the board and the the connection are done with the temperature sensor (LM35D),WIFI module,water sensor or oil sensor the function of oil sensor is to measure the oil level and if the oil is reduced then it will show the result in low level oil in the display which is connected to the circuit board for output,the LM35D sensor rectify the temperature inside the transformer and when the temperature get's above the 50°c then it will automatically trip the transformer and the output will be displayed in the led screen (high temperature is noted),gas sensor identify the gas and make the Stop the function of the transformer and the gas module here used is MQ2 which has a gas measurement of 30-1000 and the output will show toxic gas is detected in the transformer and the work of wifi module is to monitor the the working of the transformer and if the faults occur then it should send the message to the host who is monitoring the the transformer through the the cloud ,the website used for IOT is the Thingspeak.com which enables the channel of requirements to show the the temperature rise or low,toxic gas,oil low level .the graphic representations is shown to the the website of the IOT THIS helps to monitor every transformer very easily,quich fault analysing can be done and there will be time saved for the fault analysing of the transformerThrough this we can save time, money and maintenance of the transformer will be very fast and power delay will not be seen.

VII. COMPONENT EXPLANATION

A. LM 35 SENSOR

The LM35 arrangement are exactness coordinates circuit temperature sensors whose yield voltage is directly corresponding to temperature in degrees Celsius. This is why the LM35 has better linear temperature sensors calibrated in degrees Kelvin because the user doesn't need to extract a large constant from its output. Voltage, for easy Celsius scaling. The LM35 requires no external calibration or termination to provide an accuracy of ±¼°C at room temperature and ±¾°C over the full temperature range of -55 to +150°C. wafer level. The LM35's low output impedance, high output impedance and high precision measurement make it particularly easy to interface with reading or controlling circuits. It can be used with a single material or with good and bad materials.Because it draws only 60 µA from the supply, it has a very low self-heating of less than 0.1°C in air. The LM35D measures from 0° to +100°C.

The outputs 10mV per degree, which can also be read directly from the generator or microcontroller. For example, at 30 degrees Celsius, it will output 300mV on a linear scale.The LM35D's maximum temperature is 40°C, so it can sense the temperature and cut the power supply to the transformer, reducing the failure rate.

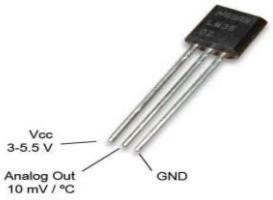

Fig 4.LM35 Sensor

B.MQ2 SENSOR:

The MQ2 sensor has an alumina-based ceramic element, usually coated with tin dioxide, encapsulated in a stainless steel mesh. It is an electronic device used to measure the concentration of methane, carbon dioxide and other gases. The sensor operates at 5V DC voltage. It can detect gases in the range of 200 to 10000 ppm. It is mainly used to control the carbon monoxide that the transformer will produce in case of a problem.

Fig 5.MQ2 Sensor

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C.WATER SENSOR:

Ultrasound works, but it is costly. The Mechanical will work, but will likely break down quickly and be costly. The resistance line is designed for liquids (water or oil) only and tends to wear out over time as the electrodes corrode. Also, in most of my applications we don't want corroded electrode materials that contaminate the water.

Even a .316 can make a difference when subjected to very low currents... even if the current flow is alternating current (AC). The best, most stable, most reproducible and also inexpensive way is to use a pressure sensor on an inverted glass. Make sure the bottom of the glass is below the minimum liquid level and that the glass is filled with air and is not leaking. In this configuration, the air pressure in the vessel is dependent on the level of the surrounding liquid. There are some problems in working because high humidity in the glass causes corrosion, but they are not difficult.

Fig 6.Water Sensor

D.RELAY:

Relays are switches designed to turn electrical and electromechanical circuits off and on. It controls the opening and closing of contacts of electrical circuits. When the relay contact is open (NO), the open contact does not energize the relay. However, if it is closed (NC), the relay does not pull because the contact is closed.

But the situation changes when energy (electricity or charge) is supplied.Relays are often used in control panels, manufacturing and home automation to control power and switch small currents in control circuits. However, the amplifying device can help control the amperes and voltage because if the voltage is low for the relay coil, the voltage can be changed by the contact. If the protection relay is used, it detects overcurrent, overload, undercurrent and reverse current to protect electrical equipment. Last but not least; It is used to heat things up, turn on the alarm, change the start step and control the light.

Fig 7.Realy

E.ESP8266 Wi-Fi MODULE:

The ESP8266 WI-FI module is a complete WI-FI solution with stand-alone and integrated TCP/IP protocol, which can be easily connected to the microcontroller to access the entire Wi-Fi network. The use of other modules or processors to provide or receive applications and processes also means it has space to host or load processes and applications. To connect this module to a WI-FI network, you just need to load the pre-loaded programs in this module as firmware. This is a very cost-effective way to communicate with a large and growing community. The Wi-Fi connects to the phone using an access point and sends data to the web browser so we can track anything that could go wrong or need to be recorded.

This module is capable of storing and processing data, so it can be easily combined with sensors and other functions. This is an integrated product with very little PCB material. IPSD supports application distribution as well as Bluetooth interface. The

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module does not require an external RF signal as it has an independent calibration signal. The ESP 8266 WI-FI module is shown in the figure below.

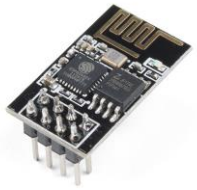

Fig 8.ESP8266 WIFI MODULE

F.ATMEGA ARDUINO:

Arduino Uno is an ATmega328P based MCU board. It has 14 digital input/output pins (can be used as 6 PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power input, ICSP header and reset button. It has everything needed to support the microcontroller. Arduino is an open source electronic device based on easy to use hardware and software.

Fig 9.AtMega Arduino

G.LCD DISPLAY:

LCD (Liquid Crystal Display) is a flat panel whose main function is to use liquid crystal. The LCD screen is an electronic display module with many applications. 16x2 LCD screen is a simple module, A16x2 LCD means it can display 16 characters per line, and there are two such lines. The display shows the temperature, oil and fuel level. All ports connected to wifi, LM35D, gas sensor and oil sensor.

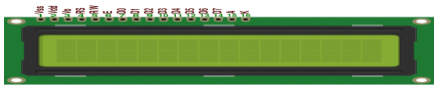

Fig 10.LCD Display

VII.OUTPUT

Fig 11. OUTPUT

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