
DISTRIBUTION TRANSFORMER PROTECTION & MONITORING SYSTEM USING IOT

**Vaibhav Deshmukh^{*1}, Ayushi Tinkhede^{*2}, Khushbu Ramteke^{*3},
Prof Dr. G.H. Agrawal^{*4}**

^{*1,2,3}Electrical Engineering & KDK College Of Engineering, RTMNU, Nagpur, India.

^{*4}Professor And Dean Electrical Engineering Of KDK College Of Engineering,
RTMNU, Nagpur, India.

ABSTRACT

A system is designed to display the Transformer inside the route of its operation, using Arduino. additionally, a safety scheme is employed with the help of the relay circuit. A lcd is related to Arduino which continuously shows the transformer's parameters. Values of parameters like oil level & temperature are pre-set inside the gadget already, while the values are passed buzzer gadgets the alarm to signify that a fault has occurred and simultaneously the values are updated over Wi Fi. in addition, if the fault is excessive the relay circuit will perform and the device will shut down. certainly one of a kind circuits like extremely-Sonic sensor, NTC-10K, and so on. are used to show the parameters and pass the facts to Arduino. After receiving the data those values are in evaluation with the predetermined values and actions are taken for this reason. all the records of the parameters can be saved and used for in addition evaluation with the help of Wi Fi module. Henceforth, the monitoring in addition to protection of the transformer is finished neatly.

Keywords: Transformer, Faults & Protection, Arduino, Relay Circuit, Wi-Fi Module, Iot Module.

I. INTRODUCTION

A transformer is a static electric powered device which is used to replace electric powered power amongst or extra circuits. Transformers can be used either to increase the voltage i.e., stepping up or lower the voltage i.e., step down. under everyday going for walks conditions, the energy machine and lines supply everyday voltages and currents which results in a more comfy operation of the gadget. but, even as fault occurs, it motives excessively high currents to go along with the go with the flow, which reasons harm to tool and gadgets , while a larger than meant electric contemporary exists via a conductor it outcomes in excessive generation of warmth, and the hazard of harm or wi-fi wireless to device.

Over voltage because of surges can bring about spark over and flash over amongst section and ground on the weakest point inside the community. there is often a danger of prevalence of uncommon over voltages in electric power device. additionally, it's far essential for oil tiers inside the transformer critical tanks to be whole, as they act as an insulator and lets in the transformers to function Adil Naseem et al.(2015) states that the gadget designed is touchy and dependable for strange situations due to the fact the scheme desires to be operated internal fraction of seconds. retaining the right oil degree is extremely vital due to the fact if the oil degree falls under the predetermined level the transformer will overheat. as a result, to conquer those forms of mishaps passed off within the transformer a tracking gadget can be wi-fi that's the use of Arduino because the essential factor issue. A single-section transformer of 220/12 VA is used proper right here; high-quality parameters like oil temperature and oil degree are monitored constantly. while temperature of oil exceeds a preset price then the sign is exceeded to Arduino and buzzer is became on and relay is tripped. this could shut down the system. This entire operation can be monitored thru module. As an give up result, the transformer parameters are monitored constantly.

BLOCK DIAGRAM

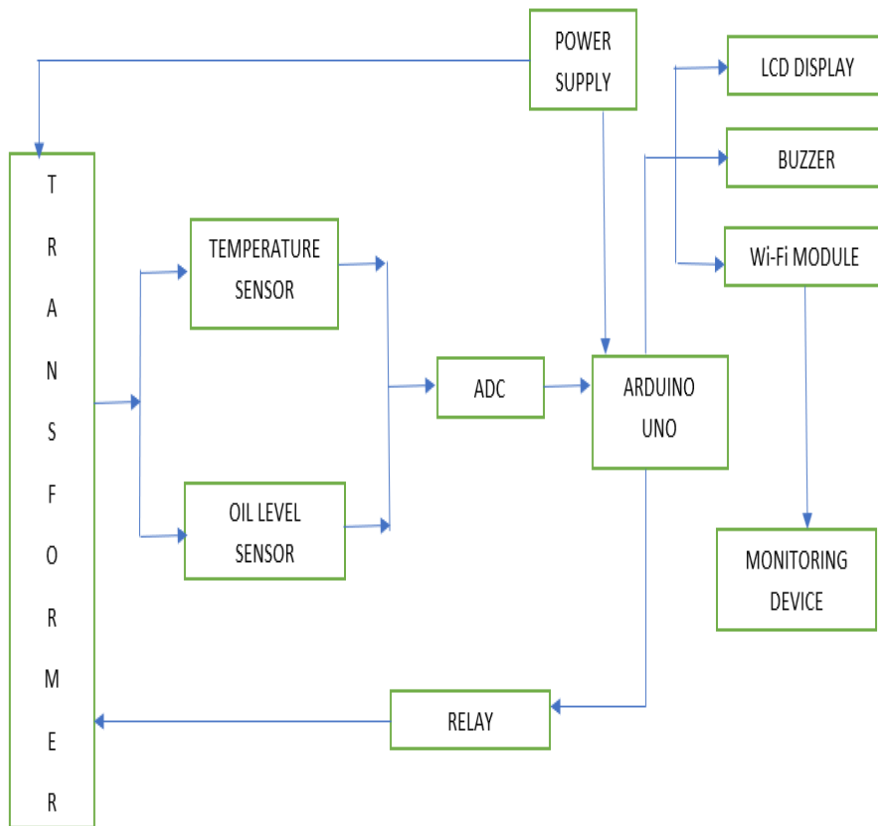


Fig 1: Block diagram of transformer protection system

We are utilizing the most modern day innovation to increase this undertaking, it is a version due to the fact this assignment or this framework may be applied in a excessive comparing transformer that's exorbitant to us and because of complete well-being conditions we are indicating the entire intimation shape on a version. on this form, we're acquainting extremely good sensors with level in specific parameters of the transformer in particular weather conditions. This information can use for the insurance of the framework and use to lower debacle takes vicinity due to a flaw circumstance. we are moreover associating this data to the IoT module for non-prevent watching and in the occasion that any faults takes place within the framework, at that issue the administrator can without an awful lot of a stretch understand shortcoming location and problem kind so it may decrease recuperation time and increment talent.

II. CIRCUIT DIAGRAM OF PCB

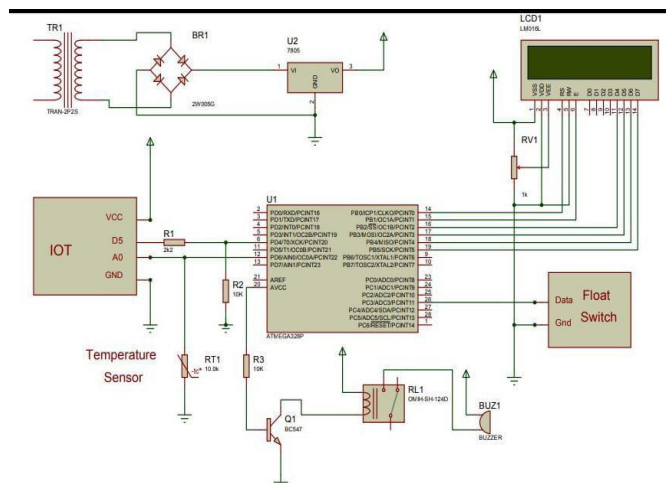


Fig 2: Circuit diagram of transformer protection system

III. COMPONENTS

Arduino Uno:

Arduino uno is microcontroller based on ATMEGA-328P. it works with a mini-USB cable. It's a small sized one. operating voltage is 5V, with an input Voltage version of 7 to 12 V. It has 14 virtual pins, eight analog pins, 2 reset pins & 6 electricity pins.

Node MCU:

Node MCU is an open supply IoT platform. It includes wireless rewire which runs at the ESP866 Wi-Fi module SoC from Espressif device, and hardware that is based at the ESP-12 module. This is a single board microcontroller. The operating system is XTOS that is V3 and its primarily based-on ESP-12E.

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate tool chains to allow Arduino C/C++ to be compiled down to these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file down to the target MCU's machine language. Some creative ESP8266 enthusiasts have developed an Arduino core for the ESP8266 WiFi SoC that is available at the GitHub ESP8266 Core webpage. This is what is popularly called the "ESP8266 Core for the Arduino IDE" and it has become one of the leading software development platforms for the various ESP8266 based modules and development boards, including NodeMCUs. For more information on all things ESP8266, check out the ESP8266 Community Forum on GitHub.



Fig 3

IOT Technology:

IoT is an interconnection of many physical gadgets with the help of the internet. The controlling and monitoring of any physical tool or parameters are viable with the help of IoT generation.

Temperature Sensor (NTC-10K):

NTC (Negative Temperature Coefficient) thermistor is a semiconductor crafted from metal oxides. It reveals an electrical resistance that has a very predictable exchange with temperature. The resistance varies drastically with temperature, greater so than in popular resistors. they are extraordinarily sensitive to temperature change, very correct and interchangeable. they have an extensive temperature envelope and may be hermetically sealed to be used in humid environments. NTC (Negative temperature coefficient) thermistor is a semiconductor made from metallic oxides. It exhibits an electrical resistance that has a very predictable change with temperature. The resistance varies significantly with temperature, more so than in standard resistors. They are extremely sensitive to temperature change, very accurate and interchangeable. They have a wide temperature envelope and can be hermetically sealed for use in humid environments.



Fig 4

Oil Level Sensor:

The float transfer is a form of stage sensor, a tool used to come across the volume of oil inner a transformer tank. The transfer is used as an indicator, an alarm, or to govern the oil stage of the transformer. wherein the switch detects the rising level of oil within the transformer tank and energizes an electrical pump which then pumps liquid out till the extent of the liquid has been substantially decreased, at which aspect the pump is switched off again. flow switches are often adjustable and might embody huge hysteresis. that is, the switch's "turn on" issue may be plenty higher than the "near off" element.

Voltage Regulator:

The voltage supply in a circuit might also have fluctuation and might no longer offer the constant voltage output. Voltage regulator (LM7805) is used to keep a constant out voltage of +5V.it's far a member of 78xx series of consistent linear voltage regulator ICs. The voltage of +12 volt is carried out to the enter & it gives out +five volt of output which is the requirement of microcontroller, liquid crystal display and numerous distinctive gadgets used in the project.



Fig 5: IC LM7805

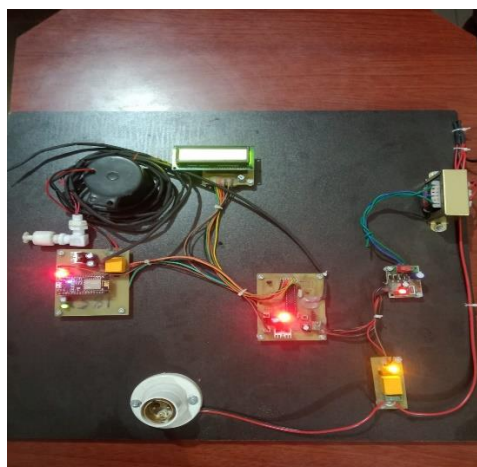
IV. HARDWARE AND KIT

Fig 6

V. CONCLUSION

On compared with manual monitoring, transformer status monitoring using IOT and protection is more useful and reliable. The reason is that it is not always manual to monitor the ambient temperature and

elevated oil level. However, the system can immediately take measures to prevent the catastrophic failure of the transformer after receiving the abnormal message and if any abnormal condition happened in transformer, then the system gets automatically trip. The results of this research are very convenient to prevent transformer failure, so the economic cost of replacing the transformer is saved. In addition, the study design can also plan for large-scale power outages in advance, thereby reducing the total load reduction time.

VI. REFERENCES

- [1] K. Sridhar, M. Assarudeen, J.Ranjith Kumar, E.Sarathbabu Transformer Health Monitoring And Control Through Arduino, IJAERD International Journal of Advanced Engineering and Research, vol. 5, Issue 04, 2018.
- [2] Monika Agarwal, Akshay Pandya, GSM Based Condition Monitoring of Transformer, IJSRD – International Journal for Scientific Research & Development, Vol. 1, Issue 12, 2014 , ISSN (online): 2321-0613 .
- [3] Abdul-Rahman Al-Ali, Abdul Khaliq & Muhammad Arshad GSM- Based Distribution Transformer Monitoring System, IEEE MELECON 2004, May 12-15,2004, Dubrovnik, Croatia.
- [4] IOT based condition monitoring of transformer International Journal of Advanced Research in Science, Engineering and Technology.
- [5] Research of wireless monitoring system in power distribution transformer IEEE.
- [6] "GSM based Distribution Transformer monitoring system' IEEE.
- [7] "IOT Based Distribution Transformer Monitoring System "INNOVATORS guru"
- [8] J. B. Gupta, S. K. Kataria "Theory & Performance of Electrical Machine" Publishers of engineering and computer books, New Delhi-110002 INDIA.