Real Time Electrical Parameter Monitoring and Protection System for Transformer

Vipeen Jayant Joshi[1] Aditya Ashok Bhangale[2] Durgesh Prabhakar Patil[3] Divyang Ramesh Patil[4] Praful Desale[5]

[1,2,3,4]U.G. Student [5]Assistant Professor

[1,2,3,4,5]Department of Electrical Engineering

[1,2,3,4,5]G.H.R.I.E.M., Jalgaon, M.S. India

Abstract— The main aim of the project is to accumulate time period knowledge of transformer remotely over the net falling underneath the class of web of Things (IoT). For this time period side, we have a tendency to take one temperature sensing element, one potential transformer and one current transformer for observation Temperature, Voltage, and Current knowledge of the transformer and so send them to a distant location. These 3 Associate in Nursing along values are taken in multiplexing mode and connected to microcontroller ATmega328p families through an ADC 0808. they're then sent on to a Wi-Fi module underneath transmission control protocol science protocol to a fervent science that shows the information in real- time chart kind in any net connected computer / portable computer for display in three completely different charts. So, this transformer Health measurement can facilitate to spot or acknowledge sudden things before any serious failure those results in a larger responsibility and vital value savings. A recent Brobdingn again interest in Machine to Machine communication is thought because the web of Things (IoT), to permit the chance for autonomous devices to use web for exchanging the information. This work presents style and execution of real time observation and fault detection of transformer and record key operation indictors of a dispersion transformer like load current, voltage, transformer oil and encompassing temperatures and wetness. they need to seem at it incessantly by mistreatment this project it will minimize operating efforts and improve accuracy, stability, potency during this project, sensors are wont to sense the most parameters of apparatus like voltage, current(over voltage, under voltage, over current) this detected knowledge is distributed to microcontroller and this controller checks parameter limits that more send to the IoT net server thingspeak website package mistreatment Wi-Fi module of those knowledge creates positive the correct info is in hand to the operator and operator will make helpful choices before any ruinous failure on basis of that knowledge of parameters.

Keywords: IoT, Wi-Fi module, Aurduino ATmega328p

I. INTRODUCTION

Each moment of our life depend upon electricity. It has many parts and instrumentations serving to human to transfer and regulate the distribution in step with usage. The foremost crucial instrumentation of transmission and distribution of electrical power is transfer.

In facility, AN electrical part transformer directly distributes power to the low-tension users and its operation condition is a criterion of the whole network operation. The bulk of the devices are in commission for several years in numerous (electrical, mechanical, environmental) conditions. They the most part and represent the big portion of capital investment. Operation of distribution transformer underneath rated condition (as per specification in their name plate) guarantees their long service life. Overloading, oil temperature, load current and ineffective cooling of transformer the most important explanation for failure in distribution transformer. As an oversized range of transformer is distribution over a good space in gift electrical systems, it's thought to live the condition manually of each single transformer. Therefore we'd like a distribution transformer system to watch all essential parameter operation, and send to the watching system in time. It provides the mandatory info concerning the health of transformer. This can facilitate and guide the utilities to optimally use the transformer and kept this instrumentation operational for an extended amount.

This projected project presents style and implementation of a IOT embedded system to live load currents, over voltage, transformer oil levels and oil temperature. This is often enforced by exploitation on line instrument exploitation web of things (IOT), with single chip Arduino microcontroller and sensors. It's put in at the distribution transformer website. The output values of sensors are processed and recorded within system memory. System program with some predefined directions to envision abnormal conditions. If there's any abnormality on the system, details are mechanically updated within the web through serial communications. This web of things (IOT) can facilated the utilities to optimally utilized transformers and determine issues before any ruinous failure happens. Therefore, online-instruments is employed to gather and analyze temperature information over time. Therefore transformer health activity can help to spot or acknowledge sudden things before any serious failure that ends up in a larger dependableness and important price savings. Transformer in one among the vital electrical instrumentation that's employed in facility. Watching transformer for the matter before they occur will forestall faults that are pricey to repair and lead to a loss of electricity. Currently, failure of the transformers detected by color dynamic of collide and decreasing the standard and viciousness of oil the main aim of the project is to a mass time period information of transformer remotely over the net falling underneath the class of web of things (IOT).

II. METHODOLOGY

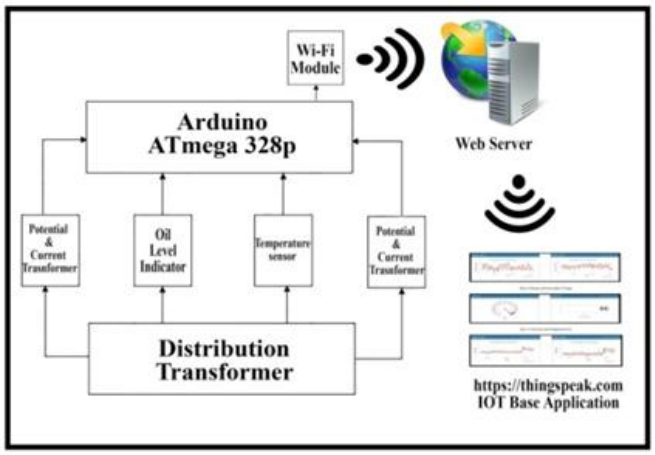

Fig.1 Block Diagram of Project

The figure no. 1 shows the block diagram of flow of the project. There are we use the main controller is the Aurduino ATMEGA328p for controlling the all circuit and we protect and monitoring the real time electrical parameter of distribution transformer we use in this project 230/110V. we also use the current transformer and potential transformer for a measuring the primary as well as secondary current and voltages respectively, and we use the float switch for the measuring the oil level in the transformer. And we use the temperature sensor LM35 for measuring the temperature of distribution transformer. This equipment monitoring all equipment parameter of distribution transformer when any unbalanced condition occurs in the system or transformer so that all sensors sense the fault and convert that signal in digital signals and that a signal provide to the Aurduino ATmega328p and that controller sense the signal on web-server using wifi module ESP8266 then that data update on the server after every ten seconds, and we create electrical parameter likes frequency, primary and secondary voltage, primary and secondary current, oil level, temperature, load arise, load efficiency the panels on the website www.thingsofspeaking.com and we also create account on that website, and we can see easily and anytime, anywhere check the parameter status and whenever fault will occur on transformer and it will get indication on that site then we can overcome that fault by the taking help of technicians. And that unbalanced conditions will come at initial balance conditions.

Fig. 2: Photograph of "thingspeak.com" website

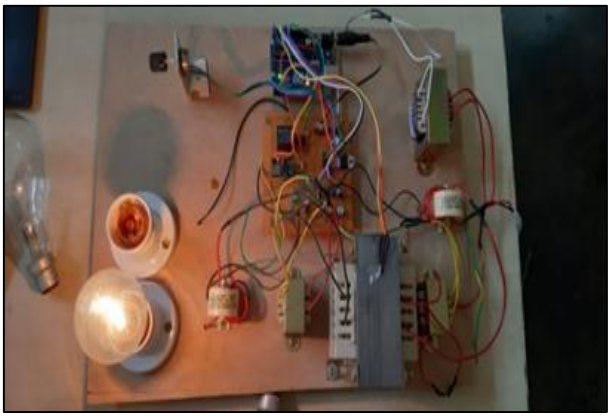

Fig. 3: Hardware of project

III. RESULT

The simulation results using the IOT Adafruit web application below. The simulation result shows the transformer voltages, currents, humidity, temperature, and oil level. In this guide, we are going to build an Internet of Things dashboard using the Adafruit IOT service. We will see that using Adafruit IOT makes the process so much easier, as it will allow us to easily send data to the cloud from an Arduino board, and also easily building an Internet of Things dashboard just by dragging & dropping some elements.

A. During Normal Operating Condition:

During normal operating condition transformer draws normal current which is measured by the CT"s connected in series on both sides of transformer as well as normal load voltage which is measured by the PT"s connected across the both sides of transformer. Normal load primary and secondary current is shown in fig. 4 as well as normal load primary and secondary voltage is shown in fig. 5 it also shows the previous recorded data. Fig.6 shows the oil level and temperature rise of the transformer. Fig.7 shows the load curve and efficiency curve of the transformer.

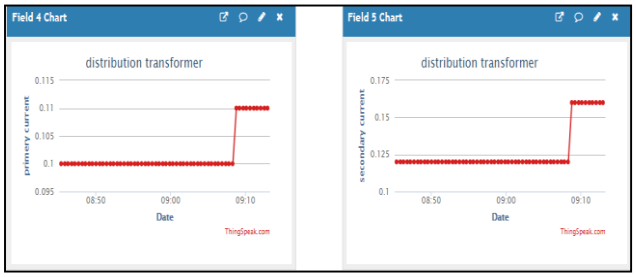

Fig. 4: Primary and Secondary current

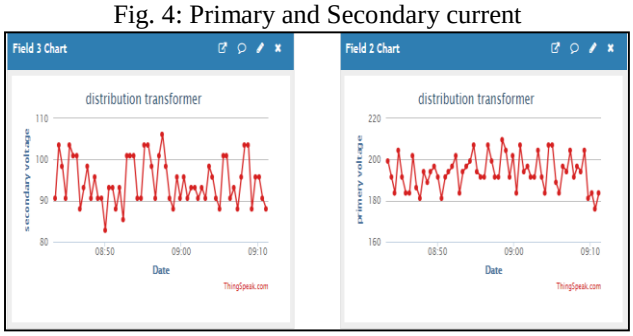

Fig. 5: Primary and Secondary voltage

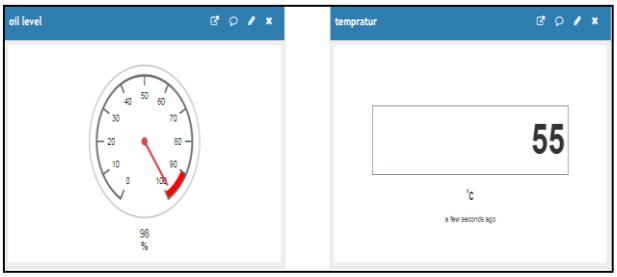

Fig. 6: oil level and temperature rise

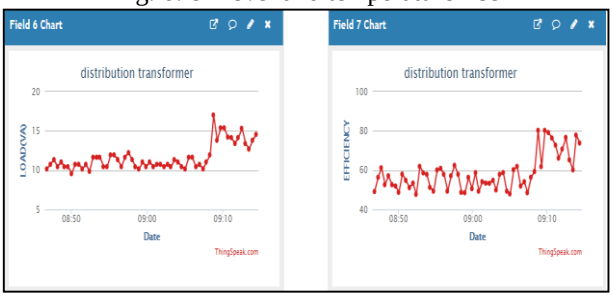

Fig. 7: Load and efficiency

B. During Fault Condition:

During fault condition transformer draws heavy current, primary and secondary current is shown in fig. 8 as well as fault load primary and secondary voltage is shown in fig. 9 and Fig.10 shows the oil level and temperature rise of the transformer. Fig.11 shows the load curve and efficiency curve of the transformer under the fault condition.

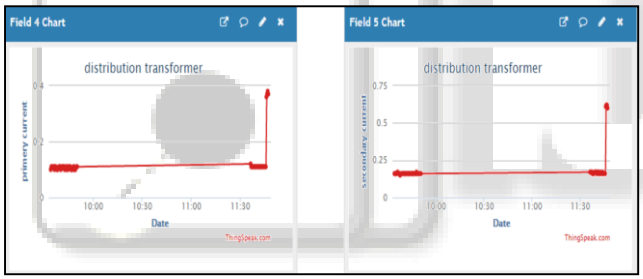

Fig. 8: Primary and Secondary current

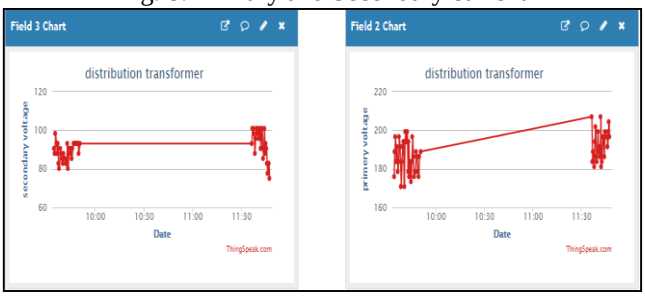

Fig. 9: Primary and Secondary voltage

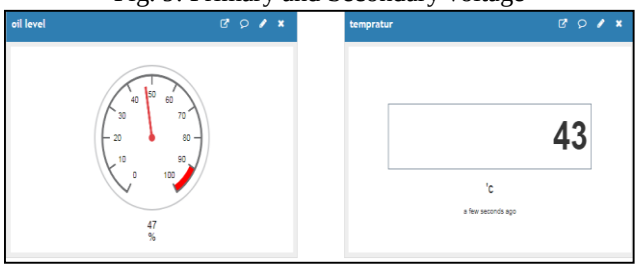

Fig. 10: Oil level and temperature

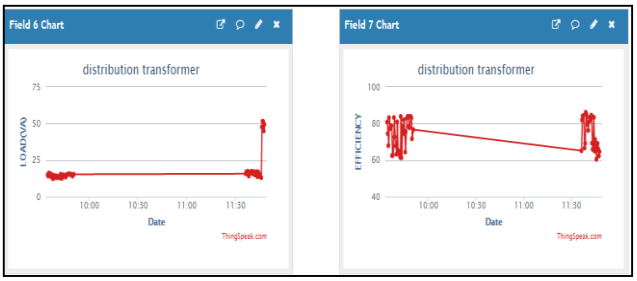

Fig. 11: Load and efficiency

IV. CONCLUSION

An IOT based transformer monitoring system for power transformer was designed, implemented and tested. It is quite useful as compared to manual monitoring and also it is reliable as it is not possible to monitor always the oil level, oil temperature rise, ambient temperature rise, load current manually. A server module can be added to this system to periodically receive and store transformer parameters information about all the power transformers in a database application. After receiving message on any abnormality we can take immediate action to prevent any catastrophic failures of power transformers. We need not have to check all power transformers and corresponding phase currents and voltages and thus we can recover the system in less time and faults before any uncertain failures thus resulting in significant cost saving as well as improving system reliability.

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