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# Distribution Transformer Monitoring and Controlling using GSM Modem

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**ABSTRACT:** As we know nowadays, complexity of distribution network has grown, automation of substation has become a need of every utility company. To improve the power quality, it is necessary to be familiar with what sort of constraint has occurred. Also, if there is any inadequacy in the monitoring and control of a power system. Therefore, it needs a monitoring system that will be able to automatically detect, monitor, and classify the existing constraints on electrical lines. The purpose of this project is to acquire the remote electrical parameters like voltage, current and temperature and send these real time values over network at power station. This project is also designed to protect the electrical circuitry by operating a relay. This relay gets activated whenever the electrical parameters exceed the predefined values. This system can automatically update the real time electrical parameters periodically. This system can be designed to send alerts whenever the relay trips or whenever the voltage or current exceeds the predefined limits. This project makes use of a GSM, as this is a prototype of the proposed project, for demonstration purpose we have used Arduino Uno here. The controller can efficiently communicate with the different sensors being used.

**KEYWORDS:** Distribution Transformer, GSM Modem, Arduino Uno.

## I. INTRODUCTION

The electrical system is most important part in our today's life; hence there is large amount of electric power is distributed from the substation to complete the requirements of all of us. But as think electricity came at home not just like that it is easy to generate and distribute in all surrounding area. There are many more steps to reach it at specific distance without any fault with specified required amount.

In power systems, distribution transformer is electrical equipment which distribute power to the low voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition guarantees their long life. However, their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers.

According to the above requirements, we need a distribution transformer real-time monitoring system to detect all operating parameters operation, and send to the monitoring center in time. It leads to online monitoring of key operational parameters of distribution transformers which can provide useful information about the health of transformers which will help the utilities to optimally use their transformers and keep the asset in operation for a longer period. Widespread use of mobile networks and GSM devices such GSM modems and their decreasing costs have made them an attractive option not only for voice media but for other wide area network applications.



II. RELATED WORK

Provides reliable communication quality with nationwide coverage. Short message service (SMS) that is ideal for intermittent small packet data transmission has now become the most widely used value added service based upon GSM standard [1] in the Indian power system, each of the five regional grids is currently synchronized. The central-level power dispatch is divided into five regions northern, western, southern, eastern, and north-eastern. The more inexpensive sources are operated in the Western and Eastern systems [2] discussed the model of a flexible energy measurement system consisting of a DSP, sensor and communication units [3] associates stated that, as complexity of distribution network has grown, automation of substation has become a need of every utility company to increase its efficiency and to improve quality of power being delivered [4]

III. METHODOLOGY

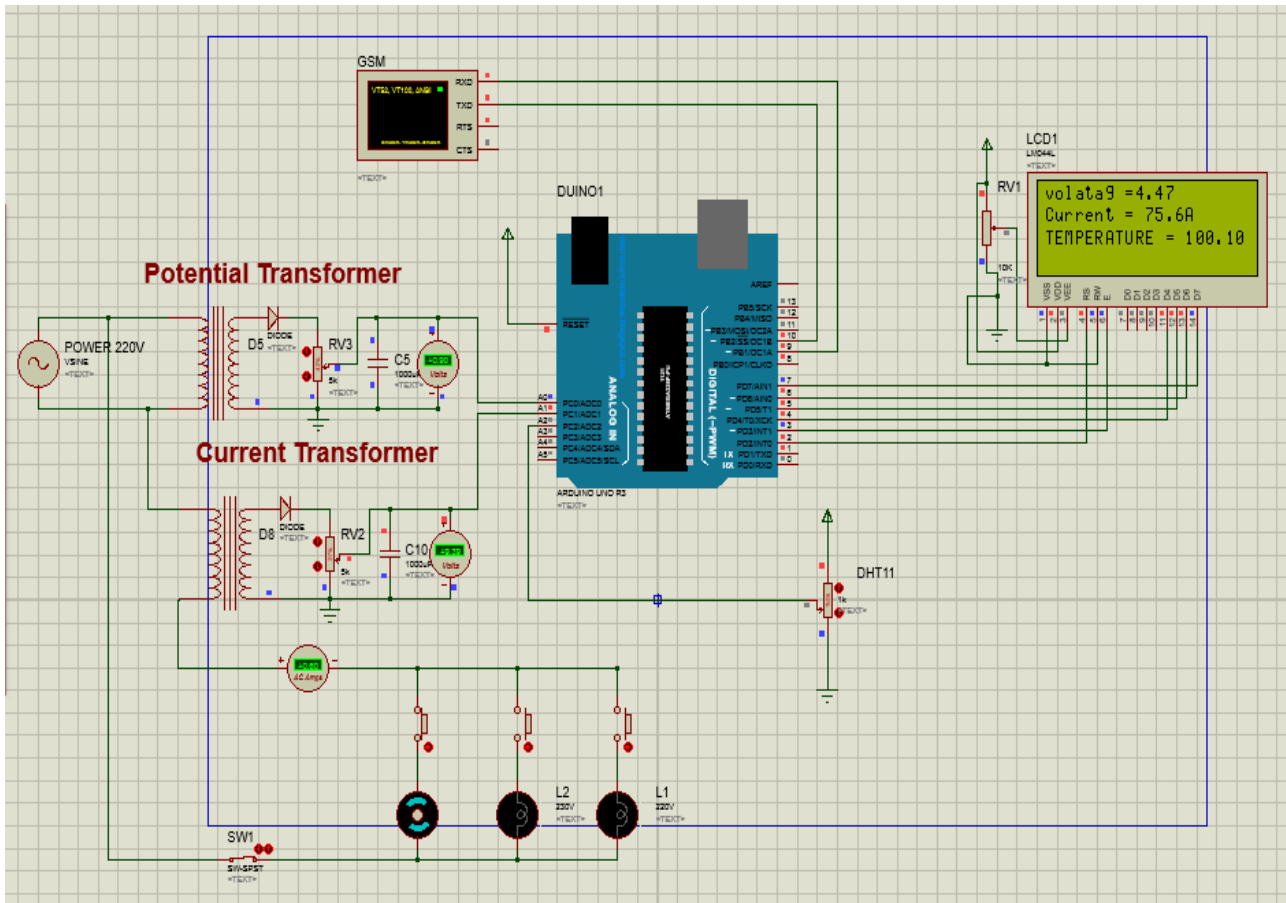
We used Arduino Uno as our primary microcontroller. It will work as heart of the system; all other measurement circuitries will be interfaced through this. Besides the microcontroller we have used current sensor and voltage sensor ZMCT103C5A, DHT11 temperature sensor. Alongside we also have used a supply unit, consisting of a transformer, which converts 230 Volt AC to 12 Volt AC then it is passed through bridge rectifier unit which converts this 12 Volt AC to 12 Volt DC which is pulsating in nature which is then fed to the capacitor which work as a filter, makes the pulsating DC to smooth DC. As a lot of our components like Arduino Uno and some of the sensors as well require regulated DC, that is why this 12 Volt DC is fed to 7805 Voltage regulator which makes it to 5 V regulated DC. When we give supply to our system, all the sensor starts sensing the current, voltage, and temperature and update all the real time values to the server as well as shows on the display. It compares all the real time values with the pre- defined values, if any of the values exceeds pre-defined values it sends a fault alert to the relay as well as update it on the display.

IV. EXPERIMENTAL RESULTS

The programming and operation of Arduino and GSM in a accurate working conditions gives us the necessary output. If the values of current, voltage and temperature is exceeds the pre-set values the operation of relay is carried out along with the GSM, which sends the information with the parameter values on the given sim number in the text SMS format as shown below. Also, the request of analyzing the transformer health can be done. Just by sending the request SMS to the GSM program.

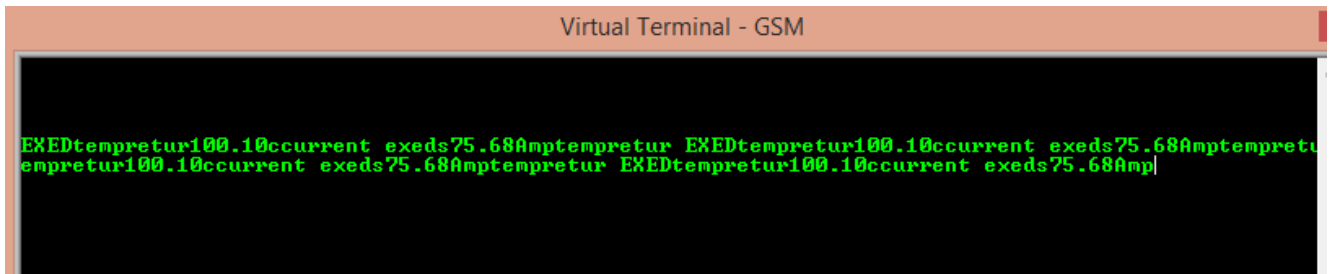


Fig. 1. Fault detection (a)SMS of Transformer health received after requesting the program via SMS. (b)Automatic SMS Alert Received by GSM



(c)

Fig. 2 As shown in above fig, is the simulation circuit of the project. The simulation is done in PROTEUS 8.1 Simulation software. The LCD screen shown in the figure displays about the output values of the parameters which we are about to monitor. It shows Voltage value, Current Value and Temperature. Similar results of the parametric values are also displayed into the virtual terminal display on the GSM version in this simulation software.



## V. CONCLUSION

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region. The GSM based monitoring of distribution transformer is quite useful as compared to manual monitoring and also it is reliable as it is not possible to monitor always the temperature rise, ambient temperature rise, load current and voltage manually. After receiving of



message of any abnormality we can take action immediately to prevent any catastrophic failures of distribution transformers. In a distribution network there are many distribution transformers and associating each transformer with such system, we can easily figure out that which transformer is undergoing fault from the message sent to mobile. We need not have to check all transformers and corresponding phase currents and voltages and thus we can recover the system in less time. The time for receiving messages may vary due to the public GSM network traffic but still then it is effective than manual monitoring.

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