

IOT Integrated Real time Data Acquisition and Controlling of Power Transformer

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Abstract

The principle point of our proposed framework is to obtain real time data of power transformer with web categorized under internet of things (IOT). Here, the sensors are utilized to detect the principle parameters such as, over voltage, under voltage, over current, oil insulation, power failure, earth leakage detector, online efficiency, which is sent to the microcontroller. This controller checks as far as possible which additionally send to the IOT cloud server utilized IOT module of these data ensures the correct data is close by to the administrator and can settle on valuable choices previously any disastrous disappointment on premise of that data of parameters. before failure can occur and by ensuring that the quality of the transformer's insulation is prevented and this system offers advanced protection and control features. In feature, if this system will be implemented by the utilities of our country, a huge amount of money can be saved which is spent on the repair of transformer.

Keywords: IOT, cloud server, Real time data acquisition, Transformers, Sensors.

1. INTRODUCTION:

The transmission and distribution sector of electricity purely depends on power transformer. In power system network areas the most important of one is substation power transformer. Failures of transformer not only impact industries and consumers but also the economy of country affected by same social and political ramifications. Supervisory control and data acquisition (SCADA) is being used by many power companies for cloud web based monitoring of power transformers. The SCADA online monitoring system over all system cost is high compared with IOT (or) cloud server system.

A power transformer is a very essential device that connects the generating stations to various types of loads. The appropriate design, manufacturing, testing, operation, and protection inflate the operating life of transformer. In a power network system there are many distribution

transformers and connecting each transformer with such system can easily. The growth of the incipient faults and other faults can be kept in check instantaneously. So, which will help the utilities to optimally use their transformers and kept them in operation longer period. This will also identify problems before any catastrophic failure. Which can result in a significant cost savings and greater reliability.

II. EXISTING SYSTEM

Existing system implementation is to monitor and record key parameters of a distribution transformer like load currents, oil level, voltage level and temperature. The idea of on line monitoring system integrates with a standalone arduino and different sensors.

It installed at distribution transformer side and the above parameter are recorded using the ARDUINO microcontroller. The obtained parameters are processed and recorded in the system memory. This mobile will help the transformers to operates

smoothly and identify problems before any catastrophic failure.

DISADVANTAGES

- It protects transformers only by over voltage and over current.
- Efficiency of the transformer will not be calculated.
- We cannot find earth leakage or power failures in transformer.
- Communication will be short range. LCD display or wireless display. We cannot find earth leakage or power failures in transformers.

III. PROPOSED SYSTEM

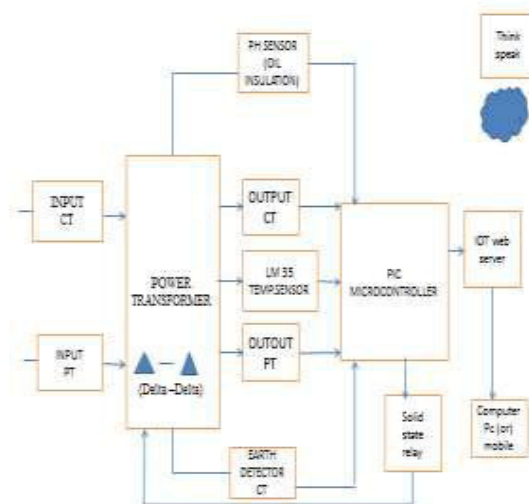
The proposed technique with results has shown that the protection scheme works properly with accuracy, sensitivity of this scheme is very high for the abnormal and faulty conditions. Transformer health monitoring will help to identify or recognize unexpected situations before any serious failure which leads to greater reliability and significant cost savings. If transformer is in an abnormal condition we can know from anywhere. No human power is needed to monitor the transformer.

PROBLEM STATEMENT

- Oil insulation property.
- Online efficiency.
- IOT or Cloud database.
- Open delta fault.
- Earth fault detection and over loading.

Details about the transformer are automatically updated in the web cloud server page when the transformer is in an abnormal condition. We know that cloud computing has the capability to save time especially for computational tasks in comparison with conventional methods. This acquired real-time data of the power transformer is finally available at the control room of the computer of the concerned technical staff with alerts at the time of occurrence of faults. We have validated the acquired real-time data with manually recorded data in the IOT cloud server.

IV. BLOCK DIAGRAM



We are applied in power source in power transformer. At this time, activated both PT and CT to monitor the actual voltage and current. Then, the PH sensor calculates the actual pH value level of the transformer. The earth fault detector is a safety device used in electrical installations with high earth impedance to prevent shock. It detects small stray voltages on enclosures of electrical equipment and interrupts the circuit if a dangerous voltage is detected. In all the above-mentioned data, send to the microcontroller and its integrated with IOT cloud server. Any fault created in power transformer, the microcontroller gives the information from the solid state relay activated to trip the circuit of the power transformer.

The online efficiency of the power transformer is automatically calculated in the PIC microcontroller through programmable language software. This is invalid for the chip microcontroller and its integrated with IOT cloud server. Any fault created in power transformer, the microcontroller gives the information from the solid state relay activated to trip the circuit of the power transformer. The online efficiency of the power transformer is automatically calculated in the PIC microcontroller through programmable language software. This is invalid for the chip.

Once,

We can create and set our own ID and password. The IOT web server saves all data in the cloud permanently. Now, a day's Microsoft with calendar 2019 commercial cloud revenue of \$18.6 billion, Microsoft was without question the world's

largest cloud provider for the enterprise in 2019, ahead of Amazon's \$17.5 billion for the same period. We can pay some amount of money to get requirement of cloud.



Solid State Relay

Solid state relay(SSR)

Solid state relay(SSR) is an electronic switching device that switches on or off when a small external voltage is applied across its control terminals. The relay may be designed to switch either AC or DC to the load. It serves the same function as an electromagnetic relay, but no moving parts. SSR provide improved system life cycle costs, including simplified designs with reduced power supply and heat dissipation requirements.

PH level sensor

PH Level sensor

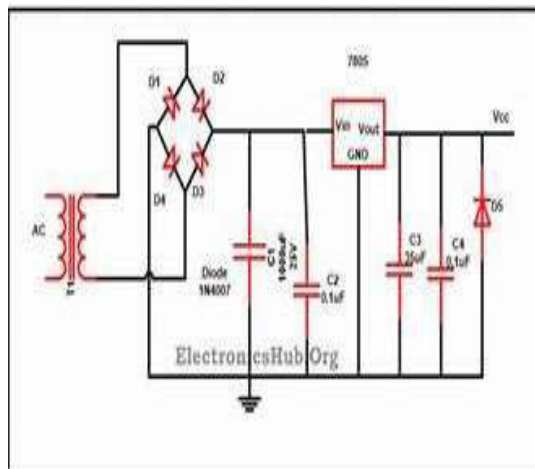
PH is estimating oil insulation. The gained information is sent to the cloud. Working of principle of PH sensor electrode and PH meter used in quality control and manufacturing area. A PH meter is used to determine the acidity or alkalinity oil.

TEMPERATURE SENSOR

It is a device which consists of a thermocouple, thermistor, which sense the temperature. The widely utilized type of sensor are used to detect temperature or heat. It varies from a normal ON/OFF thermostatic device which is mostly utilized for domestic water heaters to highly sensitive types that are for industrial use. There is

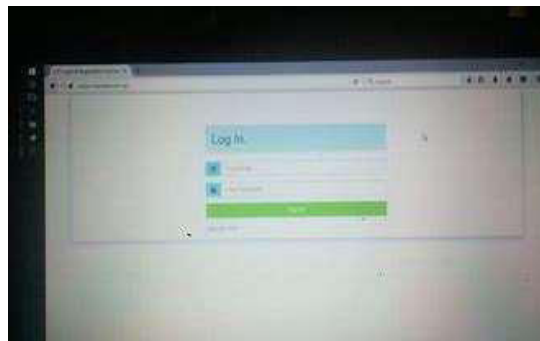
variety of these sensors available in the market with different applications and characteristics. The real time temperature is continuously monitoring the microcontroller.

7805 Voltage Regulator:



A voltage regulator is mainly used in the circuit to maintain the exact voltage which is followed by the power supply. A regulator is mainly employed with the capacitor connected in parallel to the input terminal and the output terminal of the IC regulator. IC 7805 is a DC regulated IC of 5V. This IC is very flexible and is widely employed in all types of circuit like voltage regulator. It is a three-terminal device and mainly called input, output, ground. The input voltage range is 7-25V. The ground pin is neutral for equally the input and output.

Web server cloud interface:



Login id page

A smart micro-miniature arduino ESP8266 internet web server device. The smart micro device is about the size of a quarter and can

fit into the smallest spaces in your equipment. The arduino tron micro-miniature web server allows you to get alerts on equipment failures, faults or service conditions .

This keeps you in constant contact with your equipment, employees, assets and field equipment status providing you with instant alerts and status conditions. IOT device control and management with a very small, inexpensive and lightweight IOT device cloud internet-connected solution.

V. HARDWARE REQUIREMENTS

- Input and output Current Transformers
- Input and output Voltage Transformers
- Temperature Sensor
- Earth fault detector
- PH sensor
- ESP8266
- LCD Display
- PIC Microcontroller
- 7805 Voltage regulator
- Solid state relay (SSR)
- Diodes, resistors, capacitor.

VI. SOFTWARE REQUIREMENT

- Embedded C
- PIC C Compiler

VII. CONCLUSION

The IOT integrated realtime data acquisition and controlling of power transformer is economically cost is low compare SCADA system. It is reliable to work and high accuracy. This paper proposed that offers advanced protection and control features. This system also eliminates the requirement of man power and user friendly. We do not need 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 insignificant cost saving as well as improving system reliability. In upcoming future generation this proposed system is a chance to be installed in our government.

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