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Real Time Substation Power Line Auditing Systeam For MSDCL

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ABSTRACT:

This study investigates the incorporation of Substation automation has become essential for all utility companies due to the increasing complexity of distribution networks. Knowing what kind of constraint has occurred is essential to improving the quality of power. Furthermore, if a power system's monitoring, control, and protection are inadequate in any way. As a result, a monitoring system that can automatically identify, track, and categorize the current electrical line restrictions is required.

appears on the screen. When any of the real-time values surpass the pre-established thresholds, it not only updates the display but also sends a problem alarm to the relay and buzzer. The relay isolates the loads from the rest of the system if the fault persists for the predetermined amount of time. Relays reconnect the loads to the rest of the system if the fault is fixed, and comparison continues as before.

INTRODUCTION :

One very practical and helpful energy source is electricity. It is becoming more and more important in our contemporary, industrialized culture. The electrical power systems are very large, intricate networks that are highly non-linear. These electric power systems are combined for operational, reliability, and financial reasons. They are among the most important components of national and international infrastructure, and their failure has a substantial direct and indirect effect on the economy and national security. Generators, wires, transformers, loads, switches, and compensators are some of the parts that make up a power system. Nonetheless, the typical setup of contemporary power systems consists of widely distributed power sources and loads. Due to inadequate utility sight over the grid and a lack of automated analysis, power outages and blackouts still occur in the electrical industry today. By gathering data from the various grid subsystems, WSN will give the utility the necessary perspective. A sensor node will determine whether to tell the sink of this information right away or to postpone it a little. Every utility company now needs to automate its substations in order to boost efficiency and improve the quality of power delivered, as the complexity of distribution networks has increased.

LITERACY SURVEY :

J. L. Velásquez, R. Villafáfila-Robles, P. Lloret, L. Molas-Balada, A. Sumper, S. Galceran-Arellano, A. Sudrià-Andreu, Oct. 2007, "Development and implementation of a condition monitoring system in a substation", 9th International Conference on Electrical Power Quality and Utilisation, EPQU 2007

P. Lloret, J. L. Velásquez, L. Molas-Balada, R. Villafáfila-Robles, A. Sumper, S. Galceran-Arellano, Oct. 2007, "IEC 61850 as a flexible tool for electrical systems monitoring", 9th International Conference on Electrical Power Quality and Utilisation, EPQU 2007

D. Sacerdoțianu, I. Hurezeanu, A. Marinescu, Gh. Manolea and I.Purcaru, "Modern Equipment for Monitoring and Diagnosis of Transformer Substations, Implemented in Electric Retechnologized Substations in Romania", 3rd International Conference on Modern Power Systems MPS 2010, 18-21May 2010,Cluj-Napoca, Romania

D. Pal, R. Meyur, S. Menon; M.J.B. Reddy; D.K. Moha, "Real-time condition monitoring of substation equipment using thermal cameras", Published in: IET Generation, Transmission & Distribution, (Volume: 12, Issue: 4, 2 27, 2018)

EXISTED SYSTEM :

For MSEDCL (Maharashtra State Electricity Distribution Company Limited), a real-time substation power line auditing system can be created to efficiently monitor the electrical infrastructure, guaranteeing effective power transmission and the early detection of any faults or concerns. A basic blueprint for a real-time power line auditing system that can be put into place to satisfy MSEDCL's requirements

PROPOSED SYSTEM :

Because of its potential to improve efficiency, dependability, and cost-effectiveness, the integration of Internet of Things (IoT) technology in power distribution networks—particularly for real-time substation and power line auditing—has attracted increasing attention. IoT has the potential to completely transform the monitoring and upkeep of electricity lines and substations for companies such as MSDCL (Maharashtra State Distribution Company Limited). With an emphasis on IoT applications for real-time power system auditing, this literature review examines important studies, research, and breakthroughs in this field.

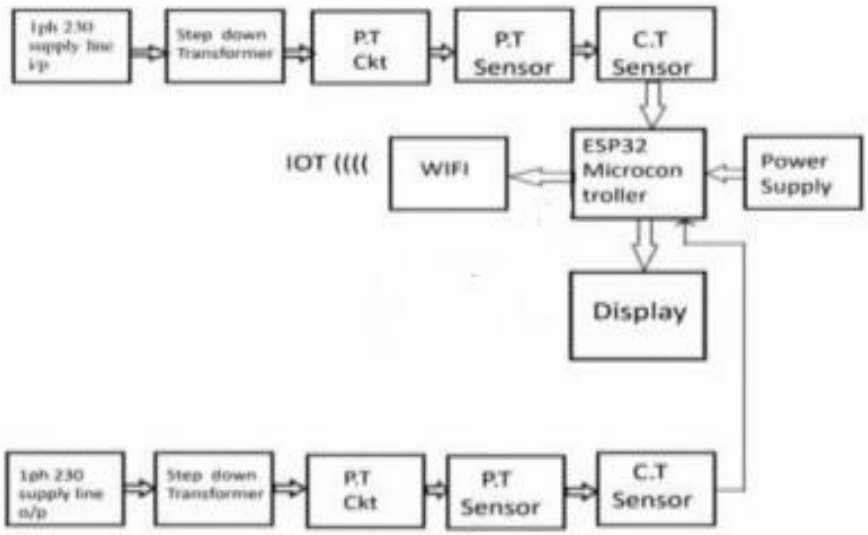


Fig 1: Block diagram of proposed system

This project consists of many hardware components. This proposed technology helps to enable the different types of sensors through the communication with the ESP 232 Micro.

ESP 232 Microcontroller Wi – FI Modul

The *ESP32* is a powerful, low-cost microcontroller with integrated Wi-Fi and Bluetooth capabilities, commonly used for IoT (Internet of Things) projects. It is developed by *Espressif Systems***.**

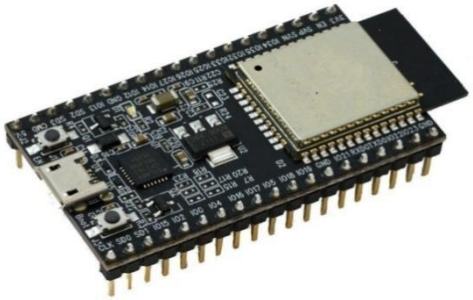


Fig 1: ESP 232 Micro Controller

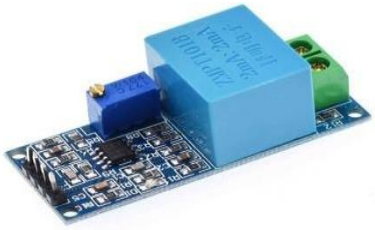
StepdownTransformer:

A *step-down transformer* is used to reduce the voltage from a higher value to a lower value, in this case from *230V* to *12V*. Here's some general information on how to choose or design such a transformer:

1. *Input Voltage (Primary Voltage)*: 230V AC (Alternating Current) — this is the voltage you'll supply to the transformer.
2. *Output Voltage (Secondary Voltage)***:** 12V AC — the desired output voltage after stepping down.
3. *Power Rating***:** The transformer should be rated for the appropriate power (in VA or watts) depending on the load you want to drive with the 12V output.

Voltage sensor:

Easy to use for acquiring AC power signals, this single-phase AC active output voltage mutual inductance module is outfitted with a ZMPT101B series high-precision voltage transformer and high-precision op-amp current.The ZMPT101B voltage transformer is the source of the ZMPT101B voltage sensor module. It can monitor voltage and power up to 250V AC and has excellent accuracy and consistency. It has a multi-turn trim potentiometer for regulating the ADC output and is easy to use. Its most crucial attributes would be,



Current sensor:

offers accurate and affordable solutions for commercial, industrial, and communications systems that require AC or DC current detection. The customer can easily implement the device package. Typical uses include overcurrent fault protection, motor control, switched-mode power supply, and load sensing and management.

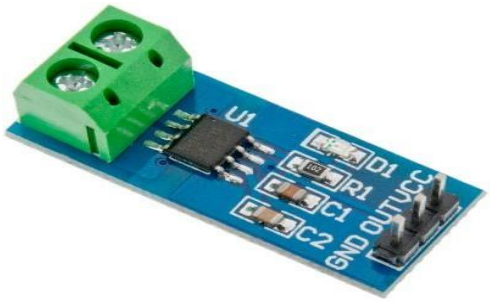


Fig 4: Current sensor

Display Unit:

The data register and command register are two registers found in a 16x2 LCD. The primary function of the register select (RS) is to switch between registers. The register set is referred to as a command register when it is set to "0." Likewise, a register set that has a value of 1 is referred to as a data register.

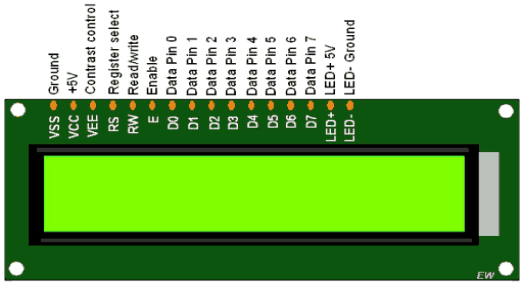


Fig 5: Display Unit

VI. SYSTEM METHODOLOG :

Fig 6: Flow of system operation

VII. EXPERIMENT AND ITS RESULT :

An experiment can be created to assess the efficacy and performance of MSDCL's (Maharashtra State Electricity Distribution Company Limited) Real-Time Substation Power Line Auditing System. The major goals of this experiment are to evaluate the system's fault-detection capabilities, real-time power line condition monitoring, and predictive maintenance efficacy. A suggested experiment framework with anticipated outcomes is shown below.

VIII ADVANTAGES :

1. Real-Time Monitoring: By continuously detecting objects on tracks, possible dangers can be addressed quickly, lowering the chance of accidents.
2. notifications and Warnings: Operators or other persons in the vicinity can be alerted to impending threats by automated notifications (such as buzzers or visual indications).
3. Automated Systems: Makes better use of staff and resources by eliminating the need for manual monitoring.
4. Data-Driven Decisions: By analyzing detection data, maintenance scheduling and operational strategies can be enhanced.
5. Compatibility: For improved functionality, the detecting system can frequently be connected with current railroad or vehicle monitoring systems.

IX . LIMITATION :

Although the MSEDCL Real-Time Substation Power Line Auditing System has many advantages, it also has several built-in drawbacks that may affect how it is used, how well it works, and how effective it is overall. The main restrictions are listed below.

APPLICATIONS :

1. AC Voltage measurement
2. Sensing Overload Current
3. Ground fault detection .

CONCLUSION :

Monitoring entails gathering important metrics from the relevant assets. It is possible to use the collected data to analyze and diagnose the assets' state, which is very helpful for scheduling maintenance, managing failures, and regulating systems. This approach also reduces the amount of time that people spend in close proximity to high-voltage devices. It is well known that the majority of substation equipment produces electromagnetic radiation and high voltage, both of which are harmful to human health. This suggested method is specifically made to keep an eye on the state of substation transformers that are placed in various locations. Numerous parameters need to be measured and routinely observed. Monitoring the parameters by assigning a person to each place is very expensive and challenging, and if the monitoring is done by hand, the data would also be prone to errors. When the data is gathered manually, the biggest problem is having all of the transformers' data at one sink. All of the aforementioned issues can be somewhat mitigated by our suggested system.

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1. J. L. Velásquez, R. Villafáfila-Robles, P. Lloret, L. Molas-Balada, A. Sumper, S. Galceran-Arellano, A. Sudrià-Andreu, Oct. 2007, "Development and implementation of a condition monitoring system in a substation", 9th International Conference on Electrical Power Quality and Utilisation, EPQU 2007

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