

IOT Based Overload Protection System of Transformer

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Abstract - Transformers are vital for managing voltage and distributing power in today's electrical systems. But there's a risk of overload, which can harm equipment and be dangerous. This abstract talks about a device that protects transformers from overloading by using Arduino technology and temperature sensors. This device blends modern tech with traditional electrical methods to offer strong protection. It uses Arduino's accuracy and flexibility along with temperature sensing to efficiently prevent transformers from overheating. This is important because it not only reduces the chances of accidents but also improves the reliability and lifespan of critical power systems. It's a smart solution for a safer and more reliable power system.

Key Words: Temperature monitoring, Real-Time Data Acquisition, Overload Detection Safety in Precision.

1. INTRODUCTION

This literature review acts as a detailed exploration of the latest research and trends in the field of IoT-based transformer protection, providing a solid groundwork for our unique project. It delves into various studies and inquiries, offering vital background details, insightful perspectives, and a deeper understanding of the subject matter. For our IoT-Based Transformer Overload Protection Relay project, it's crucial to consider a diverse range of research and academic writings. These resources don't just offer historical context; they also provide valuable insights and thoughtful analyses that help shape our project's goals and strategies.

1.1 PROPOSAL

Proposed a machine for transformer monitoring and self-safety primarily based on IoT era. They introduced a device that utilizes IoT generation for monitoring and safeguarding transformers. This device gives cloud-based storage and can be accessed thru a web application, permitting customers to remotely monitor statistics and manipulate transformer masses. The primary purpose of this device is to reduce expenses and decorate reliability

1.2 METHODOLOGY

The have a look at also includes a evaluate of existing studies on smart transformers, emphasizing the want for innovative solutions. The proposed machine is in particular

designed to tackle challenges related to maintaining energy transformers and preventing unexpected energy outages because of delays in protection. The authors carried out this method through growing a clever transformer the usage of IoT generation and sensors to accumulate crucial transformer facts. They enabled faraway tracking via internet-based wi-fi programs and saved facts inside the cloud. This setup no longer simplest saves expenses however additionally will increase the reliability of the machine. Additionally, the paper discusses the results and insights derived from the proposed machine, reiterating its fee-saving and reliability-improving blessings. It highlights the blessings of adopting smart transformers with IoT era, together with higher performance, reduced preservation charges, and greater reliability.

2. WORKING

Proposed a design and implementation of a device for tracking transformer overall performance in actual-time the use of IoT generation, with a focal point on improving protection measures. This device is based on sensors and a PIC6F877A microcontroller to track load currents, oil stages, temperature, and fuel leaks in transformers. The records collected is sent to a cloud-primarily based server for analysis and visualization. In this paper the number one motive of machine is to offer ongoing tracking of transformer performance. This lets in application groups to spot capability problems and take corrective measures earlier than they escalate into fundamental troubles, contributing to progressed safety and performance. The paper emphasizes the benefits of employing IoT generation to enhance the protection and overall performance of transformer systems. It discusses the hardware and software program components used within the system, as well as the demanding situations and boundaries of enforcing this type of gadget in actual-international scenarios. In precise, the look at highlights the capacity blessings of the usage of IoT generation to enhance Safety measures and beautify the overall performance of transformers. [1] By the use of sensors and a PIC6F877A microcontroller to gather data and transmitting it to the cloud, this approach offers precious insights for enhancing transformer structures. The paper additionally suggests the possibility of expanding the machine to encompass a more comprehensive database of distribution transformer parameters, further underscoring the capability of IoT

generation in this context. This paper describes a machine that continues a near eye on distribution transformers. These Transformers are important for strength distribution. The device uses technology like mobile phones and GPS to look at over them. Sensors are placed on the transformer to degree such things as how plenty electricity is passing through, the voltage, how lots oil is in it, and the encompassing temperature. If something uncommon occurs, like a problem with those measurements, the device sends a message to a significant tracking middle. This message consists of the information of what's going wrong and the precise region of the transformer. The aim of this gadget is to make certain the transformers paintings properly and to seize any issues before they emerge as primary problems. [1] This paper talks about how they made a device to look at over distribution transformers. These transformers are essential for sending power to homes and organizations. They put sensors at the transformers to continually check such things as how a great deal power is flowing thru, the voltage, how tons oil is inside, and the way warm it is across the transformer. All this records is stored and shown on a screen. If something goes wrong, like if the voltage is too low or there is not sufficient oil, the system sends a message to an imperative vicinity the usage of cell telephones and GPS. This message tells them what's wrong and wherein it's occurring. The gadget also can stop the transformer from inflicting greater problems if something is truly incorrect. It can communicate to a couple of man or woman if needed. The paper also talks approximately the problems with the vintage machine and the way this new you can still prevent the transformers from breaking down so often. In simple phrases, the paper's end is that the gadget they created to look at over distribution transformers the usage of cell telephones and GPS is truly properly. [4] This paper consists of the information of what's going wrong and the precise region of the transformer. The aim of this gadget is to make certain the transformers paintings properly and to seize any issues before they emerge as primary problems. This paper talks about how they made a device to look at over distribution transformers. These transformers are essential for sending power to homes and organizations. They put sensors at the transformers to continually check such things as how a great deal power is flowing thru, the voltage, how tons oil is inside, and the way warm it is across the transformer. All this records is stored and shown on a screen. If something goes wrong, like if the voltage is too low or there is not sufficient oil, the system sends a message to an imperative vicinity the usage of cell telephones and GPS. This message tells them what's wrong and wherein it's occurring. The gadget also can stop the transformer from inflicting greater problems if something is truly incorrect. It can communicate to a couple of man or woman if needed.[6] This paper talks approximately about the problems with the vintage machine and the way this new you can still prevent the transformers from breaking down so often. In simple phrases, the paper's end is that the gadget they created to look at over distribution transformers the usage of cell telephones and GPS is truly properly.[3] This

paper talks about a device that uses synthetic intelligence to preserve a watch on distribution transformers. These transformers are vital for strength, and this device tries to forestall them from breaking down. Here's the way it works: Sensors are placed on the transformers to check things like temperature, oil degrees, and humidity. These sensors ship this information to a unique pc machine inside the cloud. This laptop makes use of smart algorithms to discern out if something goes incorrect or approximately to move wrong. If it detects a trouble, it sends a message to the preservation human beings using text messages or emails. The device is built in a way that makes it clean to installation, check, and preserve it operating. The paper additionally talks approximately the best and now not-so-good components of various approaches to watch over transformers and a number of the technical challenges they confronted. This paper describes how they made a clever device to maintain an eye on distribution transformers. These transformers are vital for strength, and this gadget targets to prevent them from breaking down. [5] They used a small laptop known as a microcontroller and put sensors on the transformers to measure such things as temperature, oiltiers, and humidity. These sensors ship this information to a laptop gadget within the cloud. This cloud computer makes use of clever algorithms to parent out if something goes incorrect or would possibly move incorrect in the destiny. If it senses a trouble, it sends a message to the renovation crew using text messages or emails. They built the device in components, which makes it simpler to installation, test, and hold. The paper also talks about the advantages and drawbacks of various ways to display transformers and some of the technical demanding situations they faced. [2] This paper introduces a smart manner to look at over distribution transformers the use of a unique pc and smart algorithms. The machine is meant to catch issues early, that can prevent big failures and save cash on protection., this paper gives us good thoughts about a way to make electricity distribution systems greater reliable and green via the usage of superior generation. This task become all about making big green packing containers that deliver energy to our homes— called distribution transformers— smarter and more secure the use of the Internet of Things, or IoT for quick. Basically, using the internet to maintain an eye on those transformers to ensure they may be operating proper and now not approximately to interrupt down or cause any trouble. The paper is all about the tale of ways this assignment become made, tested, and the good outcomes it confirmed. The task observed a systematic method that involved several stages, inclusive of gadget design, hardware implementation, software development, and trying out. The hardware additives used inside the task covered a transformer, a contemporary sensor, an oil level sensor, a temperature sensor, and a Wi-Fi module.[1] In this paper we describe about how software components covered an internet server, a database, and a user interface. The device turned into designed to screen the transformer's operating parameters together with contemporary cost, oil stage, and temperature, and file at the same. The system was also

designed to discover parameters which might be over the regular preset stage and warn the person of the need to disconnect the transformer from the distribution line. The method used in the task become primarily based on the Internet of Things (IoT) era, which allowed for actual-time tracking and protection of the transformer. The method concerned simulation and hardware trying out to validate the gadget's overall performance. The device may be capable of speaking in each directions, which means that that it will be capable of get hold of instructions from the person and send feedback on the transformer's repute. The gadget could be able to predict the transformer's health and performance primarily based at the facts collected over time. This will assist in identifying potential troubles before they turn out to be vital and take preventive measure. This paper might be capable of integrate with different smart grid technologies, including renewable energy sources, electricity garage structures, and demand response systems, to optimize the transformer's overall performance and reduce electricity charges. The system may be able to provide real-time records analytics and visualization tools to assist the consumer make informed decisions about the transformer's operation and maintenance. The machine could be able to comprise artificial intelligence and device studying algorithms to improve its accuracy and performance in detecting faults and predicting the transformer's performance. Overall, the destiny scopes of the challenge intention to make the machine more dependable, powerful, and sustainable, and to contribute to the improvement of a smarter and greener electricity grid. The paper describes an AI-powered machine designed to oversee the fitness of distribution transformers. It capabilities by means of collecting statistics through sensors that display essential signs like temperature, oil degree, and humidity. This statistics is then transferred to a cloud platform wherein machine gaining knowledge of strategies are applied to become aware of any irregularities that would indicate drawing close problems. If any ability faults are detected, alerts are sent out to the renovation groups via SMS or e-mail notifications. The device's modular design helps easy meeting, examination, and upkeep. The discussion additionally extends to the advantages and barriers of different transformer tracking techniques, as well as the demanding situations faced in implementing fiber-optic tracking technologies in energy transformers. The paper talks approximately a new system that watches over electric transformers[2] This paper uses a easy computer called a microcontroller and sensors to test such things as temperature, oil, and dampness. The machine sends this statistics to an area on the internet in which it uses clever packages to search for any signs and symptoms of troubles. If it reveals something incorrect, it tells the folks that repair the transformers with a text or electronic mail. The system is made in easy-to-handle components so it may be put together, checked, and fixed without a lot problem. The writers additionally examine the good and terrible factors of various methods to hold a watch on transformers and why it

is difficult to use positive technologies like fiber optics for this activity. They mixed computer work with sensible checks to make certain the machine works right. The paper affords a smart manner to maintain an eye fixed on electrical transformers with a machine that makes use of a basic laptop chip and clever gaining knowledge of software program to Spot troubles and warn of possible troubles earlier than they get worse. This ought to help prevent extreme breakdowns and cut down on repair fees. The authors additionally compare extraordinary monitoring techniques and give an explanation for why it's tough to use superior tech like fiber optics on this vicinity. They made the device in separate portions for clean constructing and fixing. In summary, the paper gives critical facts about making clever tracking systems for transformers and indicates how modern-day tech is key to making electricity distribution greater reliable and efficient. The paper discusses the significance of distribution transformer safety in the distribution machine. It highlights that failure of distribution transformers causes capital loss and sales loss to the nation. With the growing masses, voltages, and short-circuit responsibility of the distribution substation feeders, distribution overcurrent protection has come to be extra important. The paper underscores the need for protective devices that not most effective restriction the quantity of harm in the course of disasters but additionally reduce the downtime of service interruptions [2]. This paper additionally mentions that the loading at the secondary facet of distribution trans- formers increases occasionally because of increased energy intake. It also notes that sometimes the demand on the transformers goes up due to the fact humans are the usage of extra power. But the paper does not deliver particular recommendation on precisely what sort of defensive gadget have to be used. The paper makes it clear that shielding distribution transformers inside the power network is vital to keep away from monetary losses. It stresses the importance of getting protective gear in place to lessen the effect of any failures and to maintain strength outages as short as feasible. It additionally notes that on occasion the demand at the transformers goes up because human beings are the usage of extra electricity. The PDF outlines the creation of a tracking machine for electric substations, better by way of Internet of Things (IoT) era. [6] This paper focuses on the usage of a microcomputer to music and control diverse parameters of a transformer, inclusive of modern, voltage, frequency, and winding temperature. The machine is designed to transmit the amassed records to the Thing Speak cloud via a Wi-Fi connection, which facilitates on the spot monitoring and facts evaluation. To validate this concept, a prototype is built within a laboratory environment to emulate a real power station, allowing the generation of facts for graphical representation. The data is then used to plot graphs and analyze the device's effectiveness. The paper Additionally mentions the want to design a warmth detection and alarm device, as well as an automated electricity component adjustment technique. [3] This paper concludes that using an IoT-based totally device to screen distribution transformers is incredibly useful for electrical utilities. This

era enables them to quickly stumble on and file problems at nearby substations, thereby minimizing the length and severity of power disruptions. With its capability for stay tracking and records assessment, alongside the function that Robotically corrects the energy component, the system can substantially beautify the operational performance and reliability of the power community. The paper promises into current methods for overseeing transformer situations and highlights the mixing of IoT for actual-time supervision and control of electrical characteristics. Given the excessive voltage and contemporary worried with transformers, ongoing surveillance is essential to prevent decline in each overall performance and structural integrity. The report describes the application of diverse sensors to tune essential Aspects of transformers, such as temperature tiers, oil presence, winding irregularities, and electrical parameters. It also highlights using superior era which include micro-controllers, microprocessors, and Arduino structures inside the method of records collecting and monitoring [3] The paper categorizes the data based on chronological order, the methodologies employed, and the educational or professional boards in which these studies have been offered, providing a review of the brand new technological improvements in the field of transformer tracking. The PDF record concludes that non-stop tracking is crucial for transformers due to their excessive voltage and modern day that may appreciably damage their overall performance and bodily country. The use of various sensors and cutting-edge technology like micro- controllers, microprocessors, and Arduino can help in facts series and monitoring of transformers. [2] The paper affords an analysis of recent technologies for tracking transformers, with a focus on IoT-based electrical parameter monitoring and manage. Various sensors can be used to display critical residences of transformers which include temperature of the middle, oil, and winding defects, as well as electrical parameters like number one and secondary winding currents, load energy, etc. Additionally, different sensors which include electric, mechanical, optical, chemical and acoustic sensors can be used to monitor the critical properties of the power transformer This paper introduces a actual-time machine for monitoring the fitness of transformers using IoT (Internet of Things) technology. The setup involves sensors and an unmarried- chip Arduino microcontroller positioned directly on the distribution transformer website online. The sensors measure various parameters, and the collected records is processed and saved within the device's reminiscence. The gadget is ready with predefined instructions to constantly check for strange situations. In case any irregularities are detected, the details are automatically dispatched to the internet through serial communication. This proactive approach permits the gadget to identify capacity troubles earlier than they improve into catastrophic events, offering utility groups with the possibility to control transformers greater efficiently .The number one recognition is on monitoring temperature facts over the years. By accumulating and reading this statistics, the device can apprehend uncommon styles or situations that

could result in serious screw ups. This early identity complements reliability and may bring about widespread price savings for utilities. In simple terms, the gadget acts as a watchful dad or mum, helping to avoid transformer issues earlier than they become main troubles, ultimately making sure an extra reliable and cost-powerful operation. The provided The supplied Project record explores the application of "Transformer Protection Using Microcontroller Based Relay and Monitoring Using IoT" at Sonargaon University in Bangladesh. The file outlines the significance of using a microcontroller-primarily based relay for transformer safety and highlights the critical function of IoT era in monitoring the performance of transformers. The microcontroller- primarily based relay gives several advantages, which include more advantageous adjustability, excessive accuracy, improved flexibility, a broader range of settings, and a compact size. Notably, it comes at a minimal value at the same time as incorporating functions inclusive of self-monitoring and GSM technology for conversation. The Machine provides actual-time information monitoring, the functionality to locate odd conditions hastily, speedy processing pace, reduced set up charges, and low preservation charges, contributing to an extra bendy and fee-Effective answer.[5] The record encapsulates the cause, method, and results of the undertaking, providing insights into the combination of microcontroller-based totally relay era and IoT for green transformer protection and tracking. The usage of a microcontroller-primarily based relay for transformer safety serves the purpose of enhancing diverse essential aspects of the gadget. By incorporating this era, the purpose is to provide a relay with extra adjustability, high accuracy, improved flexibility, and prolonged range of settings, and a compact size. Additionally, it targets reaching value efficiency with capabilities along with self-monitoring and checking facilitated with the aid of GSM technology. Microcontroller-based totally structures result in numerous blessings, along with real-time data monitoring, speedy detection of peculiar conditions, rapid processing speed, and reduced installation cost. The era is designed to limit protection costs whilst offering extended flexibility in its software. Overall, the mixing of a microcontroller-primarily based relay ambitions to elevate the overall performance and performance of transformer safety, ensuring a reliable and value-effective solution. IoT technology performs a vital function in remodeling how we monitor the performance of Transformers. It introduces a faraway monitoring gadget especially designed for distribution transformers, using the existing IoT infrastructure. This implementation boasts a low investment and operational value. The system operates seamlessly with the aid of robotically updating important information about the transformer on a devoted webpage. Notably, it goes a step further by way of directly notifying stakeholders whilst the transformer exhibits odd conditions. This innovative method eliminates the need for regular human supervision, because the machine can be accessed remotely from any region. In essence, IoT technology revolutionizes transformer tracking, making it greater green,

fee-effective, and on hand across numerous geographical places.

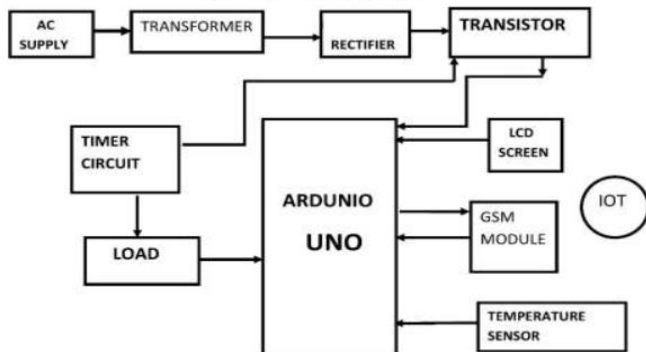


Fig. 1: BLOCK DIAGRAM.

The approach advanced for IoT-based totally transformer overload safety relay combines microcontroller-based totally relay era with IoT for powerful transformer safety and tracking. This gadget integrates numerous transformer parameters through sturdy design monitoring and management, consisting of contemporary, voltage, frequency and winding temperature. Alternatively, the accumulated facts is transmitted through a Wi-Fi connection to the cloud, enabling actual-time viewing and analysis of statistics. To make certain efficiency, accurate validation of the device was finished through each simulation and hardware checking out. An interesting characteristic of this system is the two-manner verbal exchange — receiving instructions from users and reacting to transformer reputation. Reading records amassed over the years, the machine can command a transformer fitness and performance forecasts, proactively perceive capability troubles before they increase and allow for preventive measures. It has the flexibility to seamlessly combine with different clever grid technology, from power garage structures to call for response systems. The aim of this mixture is to improve transformer efficiency and assist reduce strength prices. Real-time facts evaluation and visualization tools empower customers to make informed decisions on transformer operation and protection. In an effort to maximize its capabilities, the machine makes use of artificial intelligence and system gaining knowledge of algorithms within the. This integration will increase the accuracy and efficiency of fault detection and complements the predictive capability of the gadget for transformer overall performance. Nevertheless, this new machine no longer most effective ensures protection and reliability of transformer.

3. CONCLUSIONS

In end, IoT-based transformer overload safety relay represents a new protection device well matched with modern-day generation and traditional electric practices that allows green economy pleasant protection for transformers. System predictive talents derived from records accrued over time discover potential issues early and

enhance the of preventive measures. Strongly demonstrated through simulation and hardware testing, the device reinforces tremendous upgrades to the electricity grid, ensuring reliability and cost-effectiveness. The IoT-based transformer overload protection relay takes a proactive approach, which provides they may be able to spot ability issues early before they change into primary troubles. This dynamic environment allows utilities to better reveal the transformer, and acts as an alert reveal to prevent troubles and ensure dependable and value-powerful electricity performance. Designed to connect seamlessly to the wider strength grid, the device is intelligent. It helps to build a safe constructing, and guarantees its durability. Data management ensures that the strength grid remains operational even beneath changing conditions.

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