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An Overview on Electric Switching Circuit for the Safety of Electrical System

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Abstract: ***The regulating and monitoring of circuit breakers using internet of things (IoT) is the topic of this study. Circuit breakers are a crucial component of the power system and play a significant role in the generation and transmission of electricity. When this action needs to be done online, maintaining reliable operation and monitoring of the high voltage circuit breakers is a significant problem. This paper outlines the design of an electrical equipment online monitoring and diagnosis system that collects, transmits, and processes data regarding the equipment under observation. The system is created with an interface on top of which various local and system applications can be recorded. The Microcontroller near the circuit breaker section will continuously communicate all the parameters of the circuit breaker to control room and it will be shown on screen of computer. Additionally, following a C.B trip, it sends a signal to the GSM module so that only registered numbers can get text messages with fault descriptions thanks to GSM.***

Keywords: Electrical System, Wi-Fi Module, Smoke Sensor, Temperature Sensor, Relay, Cloud Server, Hazard, IoT, Electrical Switching Circuit, Safety Automatic break, manual break.

I. INTRODUCTION

The globe is becoming mobile as wireless communication has made a major stage announcement. We desire total control over every aspect of life without ever moving. Through embedded systems, this appliance remote control is made possible. The application of "Embedded System in Communication" has /provided various intriguing applications that guarantee the safety and comfort of human life. To prevent expensive outages and loss of production, it is crucial to carefully monitor the behaviour of the circuit breakers while they are in use. It is common knowledge that a circuit breaker must be used to safeguard a system from various abnormality conditions, or faults, in order to ensure system reliability. Distribution If used according to their specifications, circuit breakers have a long service life. However, if they are overloaded, their life is dramatically decreased, leading to sudden failures and supply loss to several equipments, which affects system reliability.

The utilities can use this information to make the best use of their circuit breakers and maintain the asset's functionality for a longer period of time by conducting online monitoring and control of the critical operational parameters of distribution circuit breakers.

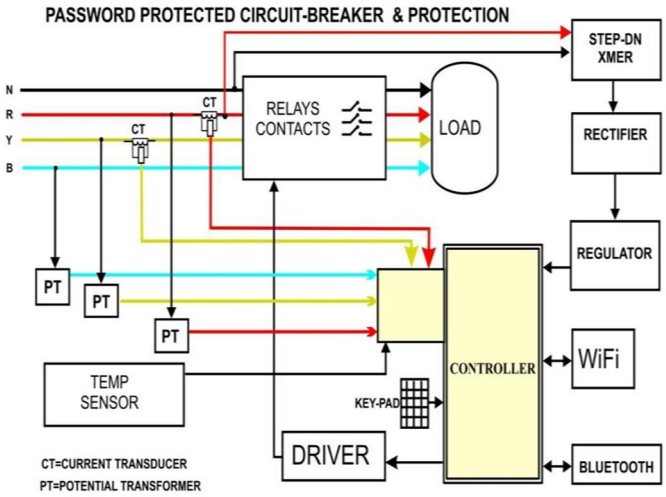
This will also aid in the early detection of issues, which can save money and increase reliability by preventing catastrophic failures. A crucial component of the transmission and distribution system is the circuit breaker. Online circuit breaker condition monitoring can stop problems before they become expensive to fix and cause service interruptions. In this project, we created a system that continuously monitors and regulates the substation's load and transmits that data to the control room over Wi-Fi. This technology can be used to monitor circuit breakers online. Information can then be used to optimise maintenance schedules, prevent dangerous and expensive failures, and increase the lifespan of your circuit breakers. Our solution uses a microcontroller to continuously monitor the circuit breaker's numerous properties, including output current, output voltage, and temperature. This data is updated on your PC on a regular basis using VB-based software. Changes to the parameters' set points are made using a keypad. by displaying the parameters on a monitor or a phone. We have also included a protection relay so that the power to the circuit breaker can be remotely removed in the event of a problem.

II. METHODOLOGY

Throughout the entire time the line is in operation, the system is built to keep an eye on the voltage and current. The LCD screen periodically updates the voltage and current values. The relay trips if the voltage or current value exceeds the predetermined limit, indicating an unhealthy condition. Power is switched off to the part of the line where the anomalies are. The three-phase supply features a dedicated relay mechanism to run each line independently. The operator must first press the key to move the control to the password display portion if the supply needs to be shut off during repair. The operator then enters the necessary password, which is subsequently checked against a previously specified password. The system will ask you to specify which line needs to be cut if both passwords match. The relevant line can be switched on or off by choosing the appropriate instruction as indicated in fig. 2.

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III. EXPERIMENTAL SET-UP (BLOCK DIAGRAM)



A. Microcontroller

A microcontroller is a tiny computer on a single integrated circuit that has programmable input/output peripherals, memory, and a processor. An analogue signal, such as voltage, is converted to a digital form by an analog-to-digital converter microcontroller (ADC) so that a microcontroller can read and interpret it. ADC converters are now found inside the majority of microcontrollers. Any type of microcontroller can also be connected to an external ADC converter. Unlike the microprocessors used in personal computers or other general purpose applications, microcontrollers are designed for embedded applications.

B. Rectifier

An electrical device called a rectifier changes alternating current (AC), which occasionally flips direction, into direct current (DC), which only flows in one direction. The inverter handles the reverse process.

C. Regulator

A system created to automatically maintain a constant voltage is known as a voltage regulator. Negative feedback or a straightforward feed-forward architecture can be used in a voltage regulator. It might make use of electronic parts or an electromechanical mechanism. It may be used to control one or more AC or DC voltages depending on the design.

D. Relay

While solid-state relays are one type of operating principle, a relay is an electrically driven device that uses an electromagnet to mechanically move a switch. Relays are employed when a low full electrical isolation between the control and the controlled circuits, or when multiple circuits need to be controlled by a single signal, is required. The early relay long distance telegraph circuits served as amplifiers by repeating and retransmitting the signal from one circuit. Relays were widely used in early computers and telephone exchanges to carry out logical functions.

IV.CONCLUSION

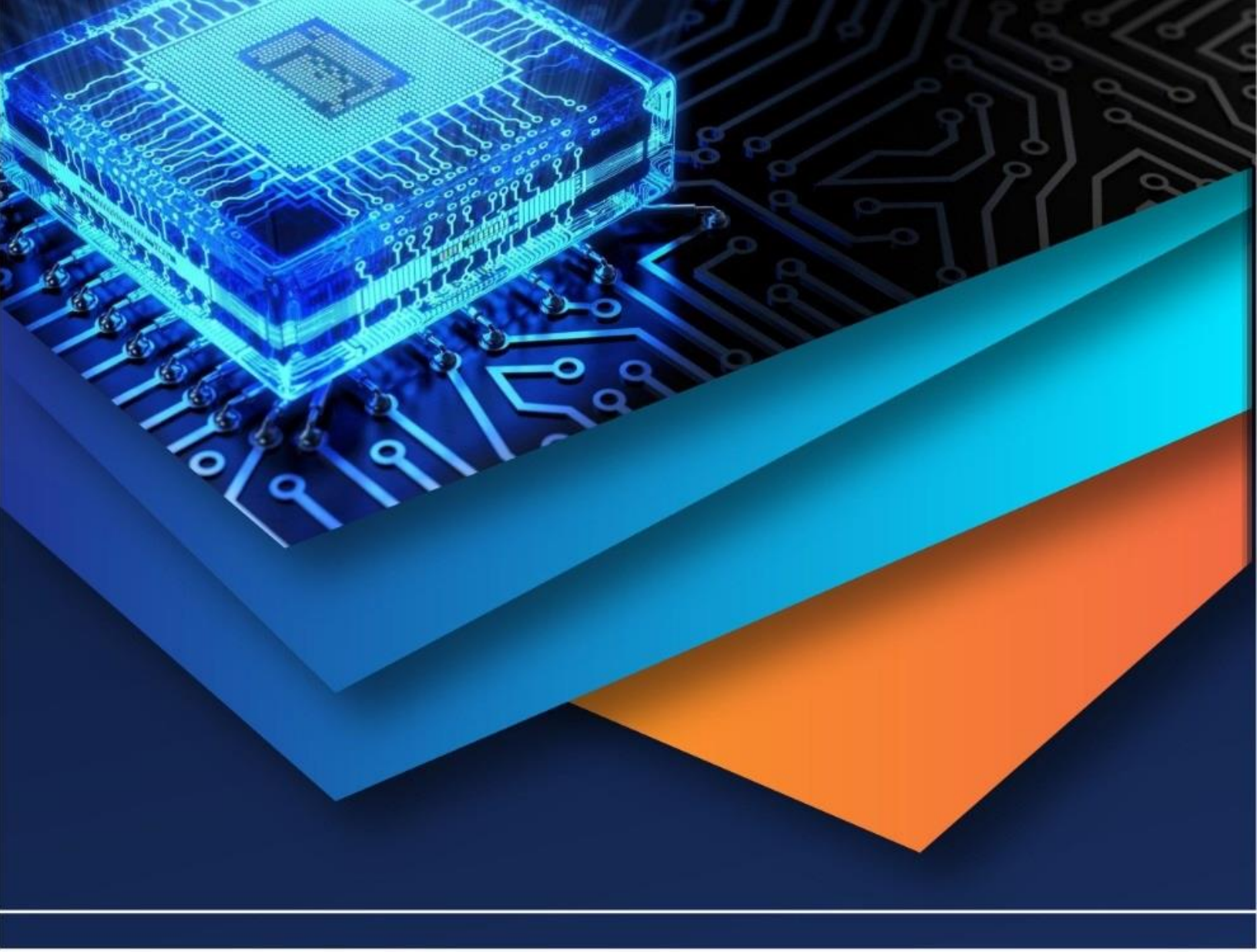
System operators in contemporary control centres receive alarm notifications in real time from a variety of devices. It is still exceedingly difficult to determine the location and nature of a potential equipment malfunction from alarms. To determine whether equipment operating sequences followed the anticipated patterns, one needs an automated method of analysing the events. The operators should only receive one report with succinct information regarding the success or failure of a switching sequence rather than numerous alert messages. If a breaker is involved, the report will provide additional specific information about whether the breaker failure logic successfully disconnected the faulty portion. This type of analysis makes it possible to follow each CB operation and recreate a whole series of events. In our study, we looked into ways to control and monitor circuit breakers in real time. To prevent overloading and extend the lifespan of the entire system, measure and record the loading of your C.B output.

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