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TRANSMISSION LINE INSPECTION METHOD USING HANGING ROBOT

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ABSTRACT

The abstract proposes the integration of robotic platforms and sensor arrays for the real-time monitoring and maintenance of electric power systems. The focus is on enhancing reliability, detecting incipient faults, and estimating the aging status of electrical insulation. The existing manual methods for fault detection and localization are criticized for their time consumption and lack of accuracy, leading to potential disruptions in power supply. The proposed system aims to automate the process by continuously updating the current values through transmission lines without human intervention. This data is monitored through cloud-based systems, enabling easy identification of fluctuations and prompt response to any issues. The system utilizes hardware components such as NodeMCU, motor drivers, and Bluetooth for efficient data collection and communication. Advantages include precise fault localization, classification of fault types, and streamlined repair processes. Overall, the proposed system offers a comprehensive solution for

enhancing the reliability and efficiency of power system maintenance through the integration of robotics, sensing technologies, and cloud-based monitoring.

I.INTRODUCTION

Electric power systems play a critical role in modern society, providing the backbone for industries, infrastructure, and daily life. Ensuring the reliability and efficiency of these systems is paramount to avoid disruptions in power supply, which can have far-reaching consequences on various sectors of the economy and society at large. Preventive maintenance technologies have emerged as indispensable tools in mitigating the risk of faults and breakdowns in power systems, thereby minimizing downtime and associated losses.

In recent years, there has been a paradigm shift towards the use of sensing techniques and robotic platforms for power system maintenance. Sensing technologies offer higher accuracy in measuring parameters of distributed systems, enabling early detection of faults and anomalies. Meanwhile, robotic platforms equipped with sensor arrays can autonomously patrol power cable networks, identify incipient failures, and assess the aging status of electrical insulation.

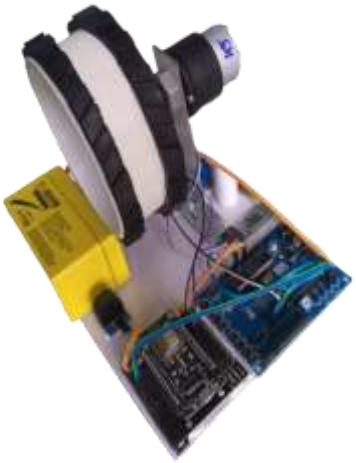
II.PROPOSED SYSTEM

The proposed system represents a paradigm shift in the maintenance and monitoring of electric power systems, leveraging advanced technologies to enhance reliability, efficiency, and safety. At its core, the system integrates robotic platforms with sensor arrays to provide real-time monitoring capabilities, allowing for the early detection of faults and the estimation of insulation aging status. This proactive approach to maintenance is crucial in preventing costly disruptions to

electric power supply and minimizing damage to equipment.

By automating the monitoring process, the proposed system eliminates the need for manual intervention in collecting and analysing data related to current values through transmission lines. This automation not only improves the efficiency of maintenance operations but also reduces the risk of human error, thereby enhancing the overall reliability of the system. Real-time data collection allows for prompt detection of fluctuations in current values, enabling proactive measures to be taken to mitigate potential issues before they escalate into larger problems.

III.KIT PROTOTYPE



IV. BLOCK DIAGRAM DESCRIPTION

The implementation of the proposed system yielded significant results in the enhancement of maintenance and monitoring capabilities within electric power systems.

* Current Sensor: This component is used to measure the current flowing through the transmission line. It helps in monitoring the health of the line and detecting any abnormalities.

2. Relay: Relays are used to control the operation of high voltage equipment. They can be used to switch power to the DC motor or other devices on and off remotely.

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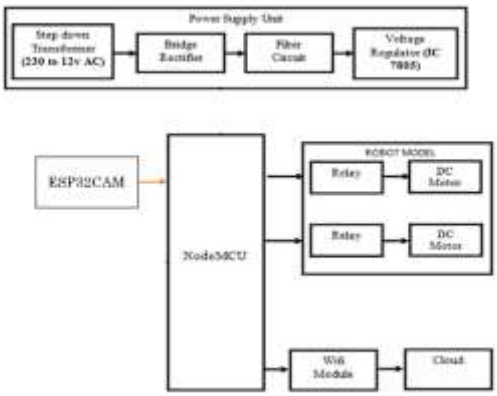
3. DC Motor: The DC motor is used to drive the robot along the transmission line. It is typically equipped with gears for precise control of movement.

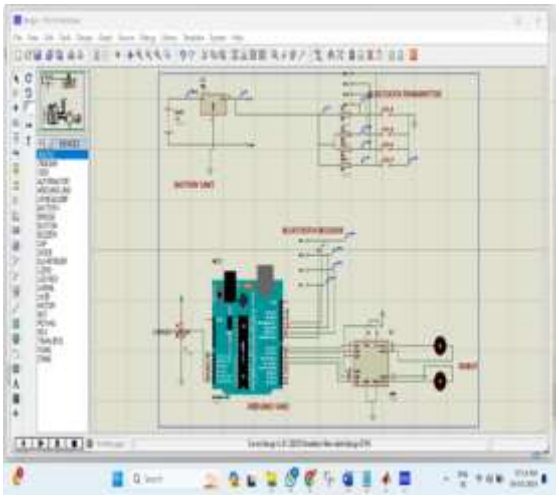
4. WiFi Module: The WiFi module enables the robot to connect to a wireless network, allowing for remote monitoring and control. It can also be used for data transmission to the cloud.

5. NodeMCU: NodeMCU is a development board based on the ESP8266 Wi-Fi module. commonly used IoT projects can be used to interface with sensors, control devices, communicate over Wi-Fi

6. Cloud: The cloud is used to store and process data collected by the robot. It provides a platform for data analysis, remote monitoring, and control of the robot.



V. SIMULATION PROTOYPE



VI. CONCLUSION

In conclusion, the implementation of the proposed system marks a significant advancement in the field of electric power system maintenance and

monitoring. By leveraging robotic platforms, sensor arrays, and cloud-based monitoring solutions, the system has demonstrated tangible improvements in fault detection, localization, and response times. Real-time monitoring capabilities, coupled with automated data collection and analysis, have enabled proactive interventions to be taken in response to emerging issues, thus minimizing disruptions to power supply and reducing equipment damage

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