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Patent Search

Invention Title	Cost Effective Solution for Detecting the Breakage of Low-Voltage Overhead Conductors
Publication Number	05/2026
Publication Date	30/01/2026
Publication Type	INA
Application Number	202641006289
Application Filing Date	22/01/2026
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	ELECTRICAL
Classification (IPC)	G01R31/54, G01R31/08, G01R31/52, G01R19/165, H02H7/26

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Abstract:

Low-voltage overhead distribution systems form the backbone of electrical power supply in rural, semi-urban, and developing regions due to their simplicity and low cost. However, these systems are highly vulnerable to conductor breakage caused by environmental factors such as strong winds, tree falls, corrosion, aging of condu mechanical stress, and accidental human or animal interference. A broken overhead conductor poses severe safety risks including electric shock, fire hazards, prolon outages, and damage to electrical equipment. Existing protection mechanisms for detecting such faults are often expensive, complex, or unsuitable for low-voltage n project presents a cost-effective, compact, and reliable solution for real-time detection of low-voltage overhead conductor breakage using current-based monitoring a embedded control. The proposed system employs current sensors installed on each phase line to continuously monitor the flow of current under normal operating c An ESP32 microcontroller processes the sensor data and detects abnormal conditions such as sudden current drop or complete loss of current, which indicate possib breakage. Upon fault detection, the system immediately activates a servo motor-driven mechanism to mechanically isolate the affected line by breaking the circuit, th preventing hazardous live-wire situations. In addition to local protection, the ESP32 utilizes its wireless communication capability to transmit instant alert notifications device, enabling rapid fault awareness and faster maintenance response. The proposed system emphasizes affordability, ease of installation, low power consumption scalability, making it suitable for widespread deployment in existing low-voltage distribution networks. By enhancing safety, reducing downtime, and minimizing main costs, this solution contributes significantly to improving the reliability and operational efficiency of low-voltage power distribution systems.

Complete Specification

Description:The proposed system consists of current sensors, an ESP32 microcontroller, a servo motor-based circuit breaker mechanism, and a wireless alerting mc integrated within the ESP32 as shown in Figure-1 and 2. Each low-voltage overhead conductor is equipped with a current sensor that continuously measures the line current. These sensor outputs are fed to the ESP32, which processes the data in real time.

Under normal operating conditions, the measured current remains within a predefined range. When a conductor breaks, the corresponding current drops abruptly becomes zero as in Circuit flow diagram. The ESP32 detects this abnormal condition and identifies the affected line. Immediately, the microcontroller triggers a serv to mechanically open the circuit, isolating the faulty conductor from the supply. This prevents the possibility of electric shock or fire hazards caused by live broken conductors.

Simultaneously, the ESP32 uses its built-in Wi-Fi or communication capability to send an alert notification to a registered mobile device. The alert contains informati about the fault occurrence, enabling rapid response from maintenance teams. The system is designed to be compact, energy-efficient, and adaptable for single-pha three-phase low-voltage distribution lines.

, Claims:We Claim

1. Breakage Detection through Real-Time Current Monitoring

We claim a system that continuously monitors current in each low-voltage overhead conductor using current sensors, identifying conductor breakage by detecting s current drops or complete loss of current, thereby enabling reliable real-time fault recognition.

2. Embedded Intelligent Control Using ESP32

View Application Status

**Department of Industrial
Policy and Promotion**
Government of India