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Technical note

IoT-Enabled Earthpit Monitoring System

Table of Contents:

1. Overview

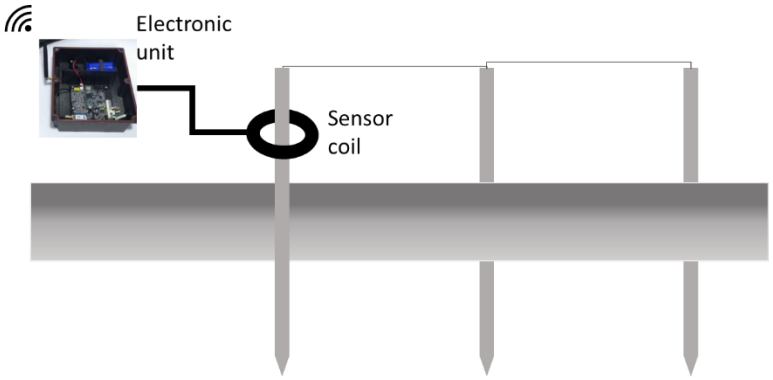
Ground resistance should be kept as low as possible to minimize the risk of equipment failure from fault current. Poor grounding also results in poor power quality. Due to aging, moisture, corrosion, and other factors, ground resistance increases. Therefore, a time-based ground resistance measurement is performed to monitor healthiness of ground rods.

An IoT sensor for earthpit monitoring has been developed by Vadict. Integrated with IIoT platform, the sensor provides real-time earthpit resistance values.

2. Stakeless technique for resistance measurement

Traditional resistance measurement technique with stakes is time consuming and labour intensive. The present technique provides earth ground loop resistance without using stakes. Therefore, it is a fast and easy technique.

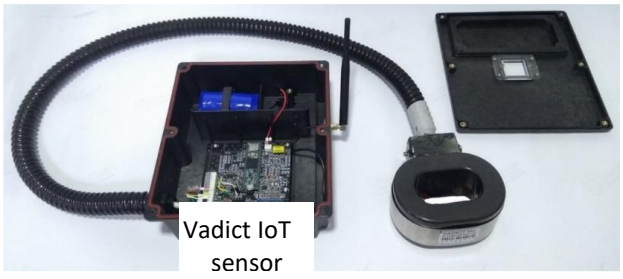
The earthpit sensor used in this technique is made up of two different coils, and it is placed around the ground rod. The primary injection coil injects a small excitation ac voltage and secondary coil measures resulting current flow in earthing loop. Since stakes are not used, the present technique will work for closed circuits. A schematic of measurement system is presented below.

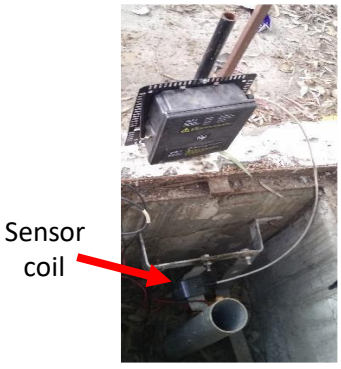


Earthpit sensor unit comprises of two major parts, viz. sensor magnetic coil and electronics processing unit. Both parts are connected through a cable, conduit, and gland arrangement. Electronics processing unit is enclosed with an IP67 plastic enclosure and named as Vadict IoT Sensor unit.

3. Sensor installation

The Earthpit sensor coil is an apparatus to be used along with Vadict IoT Sensor Device for measuring effective resistance of Earthpits using “stakeless” method described in the previous section. The Earthpit sensor coil is mounted on earthing bars near the earth-pits. The data is collected from these sensors at a pre-programmed and configurable regular interval, which is then sent to the nearby router device wirelessly.





4. Data presentation on dashboard

Real-time resistance values measured at pre-defined interval are presented on the dashboard. Following plot presents trends of measured resistance for different earthpits.