



IOT Based Substation Monitoring System

¹Rumana Padasalage, ²Diksha Sulambe, ³Prachi Mali, ⁴Manasi Kambale, ⁵P.S. Chougule

^{1,2,3} Student Department of Electrical Engineering, Sharad institute of Technology Polytechnic, Yadrav, India

⁴ Lecturer Department of Electrical Engineering, Sharad institute of Technology Polytechnic, Yadrav, India

ABSTRACT:

In this era of automation, keeping an eye on and managing the substations is crucial to ensuring that customers receive safe electricity. However, because substations are outdated and lack automation technologies to keep an eye on critical substation system conditions, the risk of blackouts, brownouts, and fires is rising quickly. Diverse electronic parts, including relays, breakers, and transformers, are part of the substation. Problems with internal insulation breakdown or transformer fluid leaking might result from overheating. The manual system checking method used in the past required irregular, imprecise system checks. Moreover, it takes longer to complete equivalent tasks at substations in metropolitan locations because they are harder to physically inspect.

1. Introduction:

Substation plays an integral role in the electrical generation, transmission and distribution system. Substation technology is continuously evolving to accommodate with the challenges presented by the more digitized and decentralized power distribution systems. The evolution of Distributed Energy Systems is also a reason why the substations need technology. The deregulation of the power industry has led to an increased emphasis on Substation Automation for the emerging Smart Grid Environment.

Objective

The monitoring of substations using IoT will assist the distribution network in diagnosing the local faults and displaying them on a web server for remote monitoring and a power station on an LCD. This will help prevent faults and damage to power system equipment from unfavourable conditions and thus maintain the power supply.

In that one of the technology that helps to reduce the efforts of the human beings is Internet of Things (IoT) that uses the Wi-Fi module that helps to connect the hardware and the software.

Organization Report

- The report of auditorium automation with smart security system includes total five chapter the very first chapter contains introductions of project and how we get motivated to do this project.
- The second chapter contains literature survey. Which include the previous work done.
- The third chapter is system module in which the block diagram is explained along with each separate block. Each block of the block diagram is explained with their feature, specifications, advantages, application etc.
- The fourth chapter is the conclusion of the project

Library survey

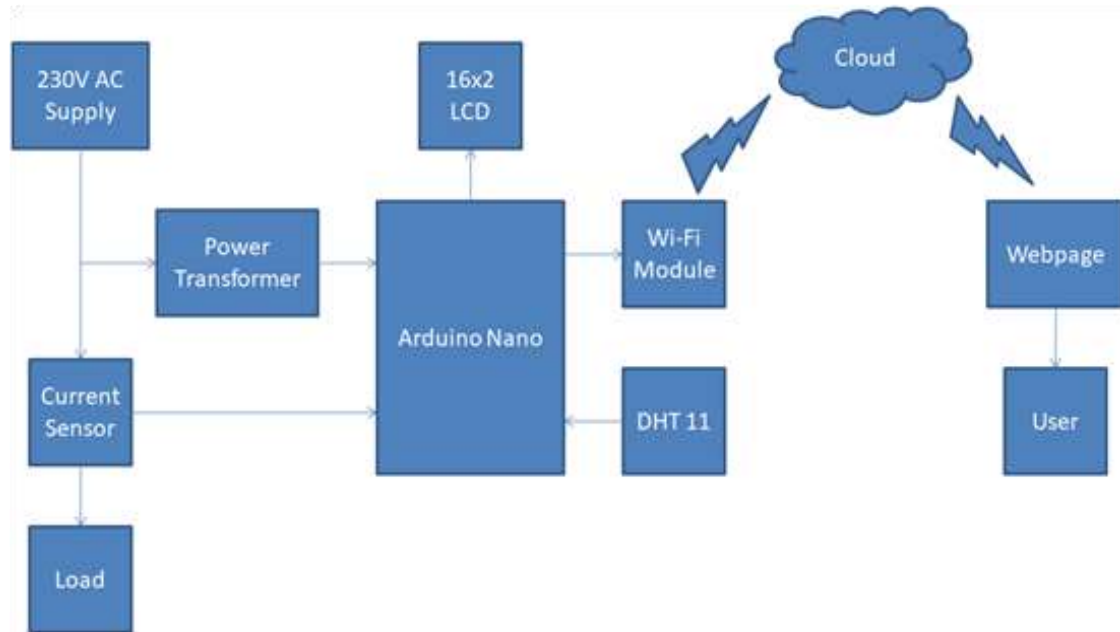
A framework depends on dependably demonstrated electronic innovation to measure temperature and current and the correspondence media they utilized was optical strands. Life expectancy and upkeep cost of the wired media is more than remote media. One more framework depends on RF innovation. RF innovation incorporates a ton of commotion issues when there is a significant distance correspondence.

2. Review of Literature:

The study of "IOT" Was comprehensive and montages relations and constraints. The main goal of "IOT" is to ensure that, in conjunction with "electronic sensor" devices, Internet-based. In a report "28.4 billion IoT users in 2017 and by 2020 they are going up to 50.1 billion" remained the result of one report. "IoT", according to scientific charity, provides a range of services. "Wi-Fi, mobile phone, NFC, GPS etc." is continuity of contact. The IoT main aim, though, is to incorporate organizations, mechanization so that messages can be transmitted without interruptions, compared to software creation; the start of the programmed is the most frequently recycled sensors with accelerometers, compression-embedding camps such as the "MCUS, MPUs".

3. System Modeling

3.1 Block Diagram



3.2 Block Diagram Description

3.2.1 Audino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source. The Arduino Nano can be programmed with the Arduino software. Select "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). The ATmega328 on the Arduino Nano comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer.

3.2.2. Relay

In IOT Based Substation Monitoring System we can use 1 relay because 2 lamp loads are connected. The relay is content 1 input and 2is output. The relay 1st terminal of relay is connected to the main AC supply and 2nd terminal of the relay is connected to the load. In this circuit we are used small range relay it operate 12v supply and provide signal to lamp load at that time when load is increased above rated value then relay get signal from Arduino nano. The overcurrent occurred in the system then the relay is operating under the ON load condition and the relay can trip or OFF the system.

3.2.3 LCD

In the IOT Based Substation Monitoring System we can measure voltage, current, frequency and temperature of the transformer coil. All the parameters like as voltage, current, frequency and temperature will be displayed on LCD.

3.2.4 Step down Transformer

Step Down Transformer is a general-purpose chassis mounting mains transformer. Transformer has 230V primary winding and non-center tapped secondary winding. The transformer has flying colored insulated connecting leads (Approx 100 mm long). The Transformer act as step down transformer reducing AC - 230V to AC - 12V. The Transformer gives outputs of 12V and 0V.

3.2.5. Current Transformer or Sensor

The use of a CT is advantageous compared to designing instruments and electronic circuits to operate at high currents which is impractical and costly. The CT used in electrical circuits measures the current under normal conditions, spikes and power outages, providing greater control over the system. CT's also have another big advantage which is the insulation between the meter and the circuit being measured.

3.2.6 DHT 11

DHT11 is a Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low-cost temperature sensor which provides high reliability and long-term stability. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and outputs a digital signal on the data pin (no analog input pins needed). It's very simple to use, and libraries and sample codes are available for Arduino.

3.2.7 Wi Fi Module

Wifi modules or wifi microcontrollers are used to send and receive data over Wi-Fi. They can also accept commands over the Wi-Fi. Wi-Fi modules are used for communications between devices. They are most commonly used in the field of Internet of Things.

Performance Analysis



Working Methodology

The present work proposes an Internet of Things (IoT) based system for the monitoring, visualization, storage and analysis of sensor data in an easy, cost effective and reliable manner. In the proposed concept, the system measures the five parameters of Substation namely Voltage, Current, Frequency, Temperature and Humidity. To measure these parameters the sensors are placed at Substation. Outputs of these sensors are fed to Arduino. Arduino sends these parameters to the web page through the Wi-Fi module and also display on LCD. So, the parameters of substation can be observed from any place through the internet

Proposal:

The Proposed system represents Iot based substation monitoring system. In this system we are using Power Transformer, DHT11, Relay, CT and PT's, LCD Display, WiFi Module to get IOT based substation monitoring system. Like Arduino nano (14 digital pins, 5v DC supply). This Substation is monitoring the load and also measuring the voltage, current, temperature, frequency. We are using CT it's measure the current of another circuit. PT is used for measure voltage level and measure voltage in the circuit. Like voltage, current, frequency and temperature send these real time values over network along with temperature at power station. It increase the efficiency of the system.

The reduce human efforts with the automation of the substation. For the Iot based substation monitoring system to work effectively.

RESULT:

To provide knowledge of automation technology with increase transformer life.

To save the time of monitoring substation.

This operation accurate and reliable.

Result of substation it will provide fast and easy operation of the system.

FUTURE SCOPE:

1. Primarily the IOT based substation monitoring system can be monitored through the SCADA and PLC system itself. Which required more manpower.
2. The IOT based substation monitoring and controlling offers a promising solution with fully automated system.

Advantages

1. TO provide reliable operation.
2. Measure current, voltage in circuit also measure load in KV.
3. Easily handle and operate.
4. Unnecessary load is off and save electricity.

Applications

1. Process control industries
2. Hostels
3. Hotels, function hall
4. Office's
5. College, school

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