IOT Based Distribution Line Monitoring System

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ABSTRACT

Locating fault locations is the primary goal of power system engineers in transmission and distribution networks. Electricity distribution in India is now much more important than ever thought, it depends on high voltage power lines which sometimes have to traverse kilometers of jungle or mountains to reach certain areas and it has to be preventive as even a single breakdown can stop the electricity flow supply. This proposed solar energy model uses Ohm's Law concept to detect fault locations quickly, realistically and inexpensively. In this way, IoT makes energy efficiency and continuous monitoring possible. The AC voltage is usually 230 V RMS and is connected to a transformer which reduces this AC voltage to the desired AC voltage level. This generated DC voltage usually has some variation of ripple or AC voltage.

Keyword: *AC, DC*

INTRODUCTION

Transmission and distribution of electric power is an integral part of the electric power system. It mainly focuses on delivering electricity to the end user. Most of them have a radial topology, with the generators located in remote areas from the end users. Transmission and distribution systems often do not provide real-time monitoring of service providers, operators and end users. Intelligent grid systems allow utility companies to control electricity consumption. It is an intelligent process that allows utilities to improve overall efficiency and stability, and make electricity transmission and distribution more precise. In recent years, researchers have been working to make power systems smarter by monitoring energy transmission and distribution using the Internet of Things (IoT) for smart grids. IoT is a communication network for connecting, exchanging and communicating with the Internet all kinds of sensor information devices using temperature sensors and the Atmega328Psecure gateway protocol. Intelligent monitoring, management and identification of specific systems can be achieved through the use of IoT. Smart network is a new technology paradigm for power supply to meet the above challenges. The term smart grid is widely used with different meanings and definitions. In general, the definition of a smart grid is the integration of information technology (IT), IoT, smart devices and advanced methods of managing the existing power grid to enable the generation, transmission and distribution of electricity, making it more efficient and stable, attractive, responsive and communicative. . One of the most important achievements of the Smart Grid is the integration and all-in-one communication between the energy system infrastructure such as hardware and information that is reported, processed, analyzed and controlled as an intelligent system. The integration of this system requires new information about the data processing and collection method known as Internet of Things (IoT) technology. IoT is the right answer to solve all-in-one integration and smart grid communication.

LITERATURE REVIEW

The main benefits of implementing smart grids in terms of utility services include lower maintenance and operational costs; increased use of renewable energy on a large scale; reduce interruptions; minimal power loss; activated energy management system; and real-time power flow monitoring. The advantages of implementing smart grids in terms of customer benefits include active monitoring of electricity consumption and customer-side energy management systems. One of the most important achievements of the Smart Grid is the integration and all-in-one communication between the energy system infrastructure such as hardware and information that is reported, processed, analyzed and controlled as an intelligent system. Integrating these systems requires a new method of information processing and data collection known as Internet of Things (IoT) technology. IoT is the right answer to solve all-in-one integration and smart grid communication. Currently, most of the research in Indonesia currently focuses only on the broad theoretical concept of smart grids, and there are few detailed studies on power transmission and distribution monitoring.

COMPONENTS USED

1. Transformer (12-0-12, 1A)
2. Diode (IN4007)
3. Capacitor, (470,220µF, 16V)
4. Regulator (7805)
5. Potentiometer Pin Configurations
6. LCD Display 16×2
7. Temperature sensor

TRANSFORMER

12-0-12 1A Center Tapped Step down Transformer is a general purpose chassis mount power transformer. The transformer has a 230V primary winding and a central secondary winding. The transformer has colored insulated connecting wires (approximately 100 mm long). The transformer acts as a step-down transformer, reducing AC-230V to AC-12V. The transformer provides 12V, 12V and 0V outputs. The transformer design is described below with a solid core and winding details. A transformer is a static electric device that transfers energy by inductively connecting a series of windings. The alternating current in the primary winding creates a different magnetic flux in the transformer core and thus a different magnetic flux through the secondary winding. This alternating magnetic flux causes a differential electromotive force (EMF) or voltage in the secondary winding. The transformer has a core made of highly permeable silicon steel [9]

DIODE

1N4007 is a rectifier diode specially designed for circuits that need to convert AC to DC. Can conduct current up to 1A and has a peak reverse voltage (PIV) of 1000V

1N4007 CHARACTERISTICS:

Maximum repeated peak reverse voltage 1000V Maximum RMS voltage 700V Maximum DC reverse voltage 1000V Average forward current: 1.0A Peak overvoltage current: 30A Maximum forward voltage: 1.0V Maximum RV DC reverse current: C DC reverse current at 5° B5 Typical Terminal Capacitance: 15pF Typical Recovery Time: 2 Operating Temperature: -55°C ~ 150°C

REGULATOR

The monolithic 3-pin positive voltage regulator LM140/LM340A/LM340/LM78XXC uses internal current limiting, thermal stop and safe zone compensation, which is essentially indestructible. With suitable heat sinks, they can produce more than 1.0A of output current. They are designed to be stable voltage regulators in a variety of applications, including local (on-board) regulation to eliminate noise and distribution problems associated with single point regulation. Apart from being used as a stabilized voltage regulator, this device can be used with external components to provide adjustable output voltage and current. Considerable efforts have been made to make the entire controller circuit easy to use and to minimize the number of external components. There is no need to pass the output, although this improves the transient response. The input bypass is only required when the controller is away from the line filter capacitor. 5V, 12V and 15V regulator options are available in the TO-3 steel power supply package.

POTENTIOMETER PIN CONFIGURATION

As the symbol indicates, a potentiometer is nothing more than a resistor with a variable tip. Let's assume a 10k potentiometer; here if we measure the resistance between terminal 1 and terminal 3, we get a value of 10k because both terminals are fixed ends of the potentiometer. The diagram shows the parts that are in the potentiometer. We have a resistive line whose total resistance is equal to the nominal value of the POT resistance. As the symbol indicates, a potentiometer is nothing more than a resistor with a variable tip. Let's assume a 10k potentiometer; here if we measure the resistance between terminal 1 and terminal 3, we get a value of 10k because both terminals are fixed ends of the potentiometer. Now let's set the wiper to exactly 25% of terminal 1 as shown above and if we measure the resistance between 1 and 2 we get 25% of 10k i.e. 2.5k and a measurement through Terminals 2 and 3 will give a resistance of 7.5K. So terminals 1 and 2 or terminals 2 and 3 can be used to obtain a variable resistance and a knob can be used to change the resistance and set the test event to the required value.

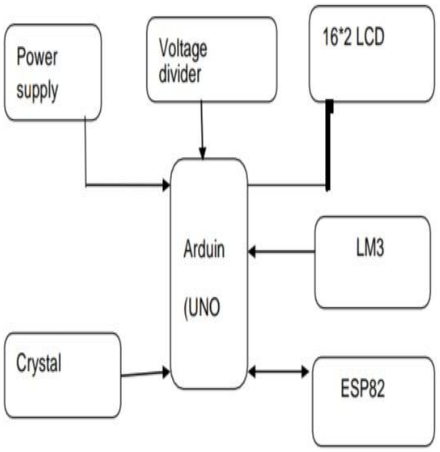
LCD DISPLAY

Figure: LCD (Liquid Crystal Display):

Many microcontrollers use" smart LCD" display to display visual information. The LCD display designed around the Hitachi HD44780 LCD module is inexpensive, easy to use, and readable even with 8 x 80 pixels on the screen. They have the standard ASCII character set and mathematical symbols.

TEMPERATURE SENSOR

There is a wide variety of integrated temperature sensing sensors available to simplify various temperature monitoring challenges. These silicon temperature sensors differ significantly from the above types in several important ways. The first is the operating temperature range. The IC temperature sensor can be operated in the nominal IC temperature range from -55°C to +150°C. The second major difference is functionality.



WORKING

According to this system, the precise and automatic transmission line system uses IOT technology, when there is an open circuit, the system will automatically detect the change in voltage and current, and the system will automatically display the problem.

A power supply is an electrical device that supplies electricity to electricity consumers. Its main function is to convert the electric current from the source to the correct source form into the correct voltage, current and frequency to power the load.

Crystal is a general term used in electronics for a frequency determining component, a quartz crystal or ceramic substrate whose electrodes are connected via a voltage divider circuit. A voltage divider is a passive linear circuit that produces an output voltage that is part of its input voltage. A voltage divider is a simple circuit that converts a large voltage into a smaller voltage.

Each of the Nano's 14 digital pins can be used as input or output, with pin modes, digital write and digital read capabilities, they operate at 5 volts, each pin can provide a maximum reception of 40 amps and has an internal pull register of 20 -50 kOhm

The 16*2 LCD display is a very simple module and is very often used in various devices. 16*2 can output 16 characters per line and there are two such lines.

The LM35 series is a precision integrated circuit, the LM35 is used to measure the accurate Celsius temperature. The ESP 8266 is a low-cost Wi-Fi microchip with built-in TCP/IP networking software.

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