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Transmission Line Protection System for Increasing Power System Requirements

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ABSTRACT: Nowadays there are so many accidents occur in electrical line. While removing the fuse in the electrical line for any maintenance purposes there may be current flowing through line from inverter or generator. To recognise that current, we are using a current transformer, the current transformer detects the current and given to the arduino for the evaluation. The arduino will break the circuit by using relay and inform the KSEB through GSM module. If peoples are thefting current from the main line, heavy blow of wind and leakage of current are also identifying by this method and inform KSEB.

KEYWORDS: Arduino Nano, Current transformer, GSM module, Relay.

I. INTRODUCTION

Nowadays, electrical accidents to the line man are increasing, while repairing the electrical lines due to the lack of communication between the electrical substation and maintenance staff [1,2]. This project gives a solution to this problem to ensure line man safety. In order to avoid such accidents, the breaker can be so designed such that it can able to cut the main line when any reverse current is coming from the inverter or generators [1]. The system is fully controlled by arduino nano. The electricity is needed to be protected for efficient power delivery to the consumer because electricity is indispensable to domestic and industrial development activity [4]. With a technical view, "Power Theft" is a non-ignorable crime that is highly prevalent, and at the same time it directly affects the economy of a nation. In this system, we also propose that if there any theft has occurs then the line will be cut off, and also we are measuring the wind and if its density is high then the line will be cut off [6]. Leakage of current through mains is one of the major problems, in-order to avoid this we have to measure the leakage through lines and inform to the KSEB by using GSM [3,11].

II. BLOCK DIAGRAM

It consists of main supply, two current transformers, wind sensor, arduino nano, inverter, LCD, GSM, relay and load. Main supply is used to show the current flow from line to the load. Current transformer is used to measure the current in the line and it measures the alternating current. It produces a current in its secondary which is proportional to the current in its primary [2]. Wind sensor is used for measuring the speed of wind [4]. Arduino Nano is a small, compact and breadboard friendly, it is based on ATmega328 or ATmega168. It is a 30 pin module and it consists of 14 digital I/O pins and 8 analog I/O pins. It is mainly used for the programming purpose [12]. Inverter is an electronics device or circuitry that changes direct current to alternating current, here inverter is used to show the reverse current i.e., current came from load to main line. LCD (liquid crystal display) screen is an electronic display module and it is used to display the values. GSM (Global system for mobile communication) replaced the first generation analog cellular network. Here it is used for sending SMS to the KSEB. It is a dedicated modem device that accepts a SIM card and

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operates like mobile phone [11]. Relay is basically a switch based on electromagnetic induction; here it is used to break the circuit [7]. Here load is considered as houses or industry.

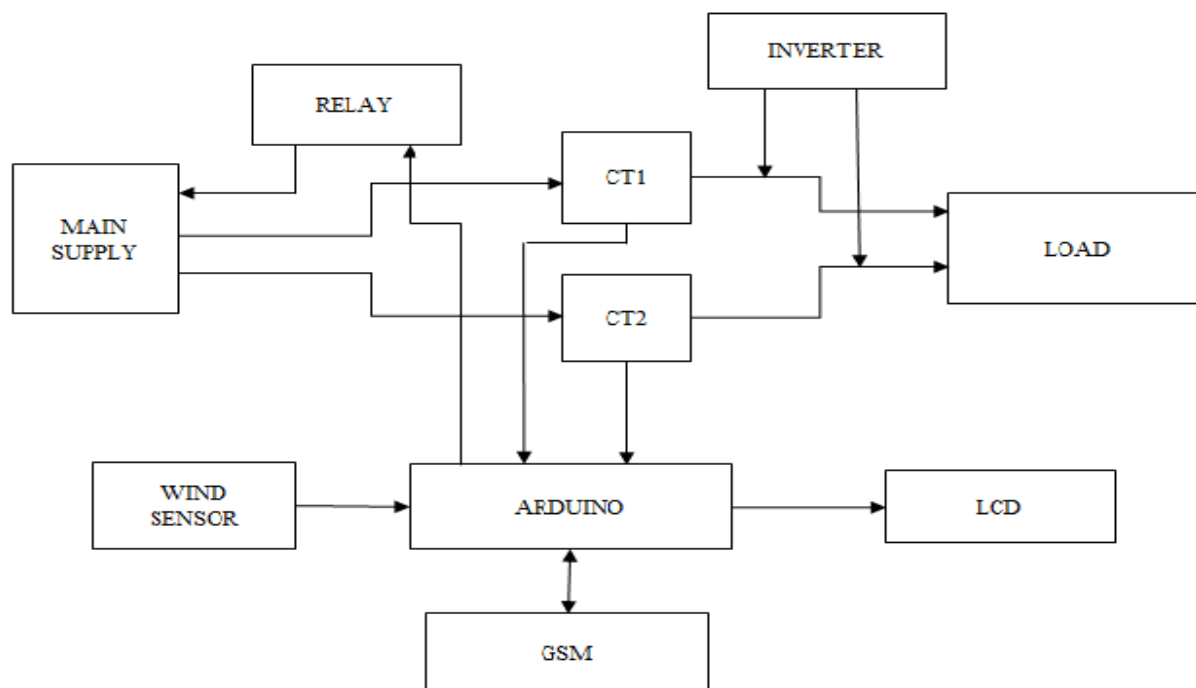


Fig. 1 Block Diagram

III. CIRCUIT DIAGRAM

From the main line/supply the current is going to load, in between that current transformer is placed. One current transformer(CT) is placed at the phase and another at the neutral. The current transformer detects the current in the line and measures the value and it is given to the arduino [1]. Arduino compares the values of the CT's, if two CT values are same or it is greater than a threshold value it is considered as the theft [2]. When the difference of two CT is greater than other threshold value it is considered as leakage in the line [3]. The neutral line CT detects the current from the load as considered as reverse flow of current. During heavy flow of wind, the wind sensor detects and it is given to arduino, it will compare with a threshold [4]. For the circuit breaking, arduino gives a signal to the relay and it breaks the circuit then informs KSEB through the GSM [8]. LCD providing the visual assistance to the user also used to display the values which we measure and display the line is on/off [10]. Transformer is used to step-down the current from 230V to 12V and it is given to the battery. When battery is fully charged, then the arduino stops charging by using a relay. Battery gives power supply to all the components.

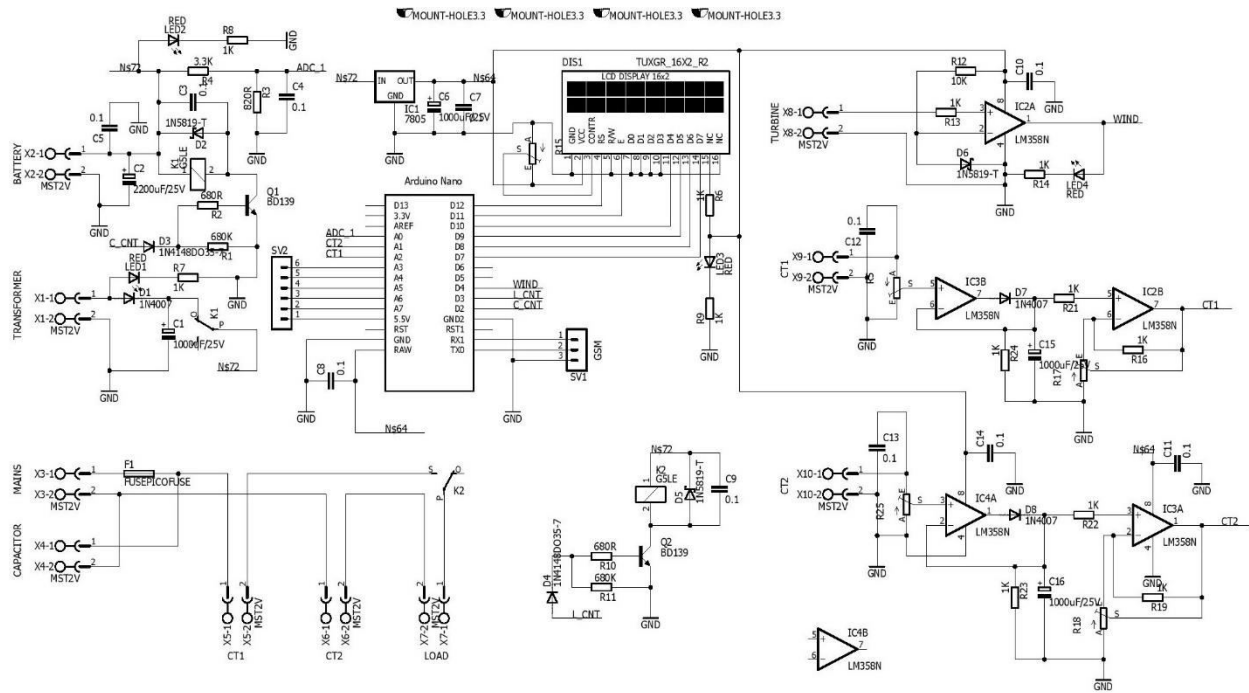


Fig. 2 Circuit Diagram

IV. RESULT AND DISCUSSION

This proposed system provides a solution, which can ensure the safety of the maintenance staff, e.g. line man [1]. The control to turn ON/OFF the line will be automatically and also will notify the KSEB by using a GSM module [5]. Whenever the preset threshold is crossed by current or density of wind, the interfaced GSM modem will receive the signal and send data from distribution side to the substation and the relay will turn off the line and it will have displayed in LCD [11]. When reverse current flow occurs then then the system will turn off and will notifies the KSEB [9]. But the network problems will affect the proper working of the system. Since it contains a GSM modem, there should be sufficient balance in the SIM also [7].

Conditions	Threshold values	Operations
Theft	3.3V	Line off
Leakage	1V	Line off
Wind	Logic high level	Line off
Reverse	0.3V	Line off

Table.1 Threshold values

V. CONCLUSION

A GSM based type of wind, leakage, reverse current, theft detecting system has been developed. This model sends information to the KSEB via SMS and will reduce the man power [7]. Efficiency of the system will improve in all aspects. It provides a new approach to the security of the lineman and completely eliminates the accidents to the lineman due to electric shock during the electric line repair [1].



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