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Transformer Protection by Using Arduino with GSM Modem

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Abstract:

Dispersion transformer is electrical hardware which is used to venture down the voltage without change in recurrence. In this venture an assurance framework has been created such that framework is observing the ongoing based, working adaptable of the transformer persistently and these parameters are seen on the LCD show. In this undertaking work a potential transformer is utilized for advance down the line voltage for estimating purposes and current transformer is going about as a present sensor. The C.T. put in arrangement and P.T. is shunt to the transformer. Thermistor is used to quantify the temperature of transformer oil. Transfers are utilized to complete the stumbling instrument. A/D converter changes over the estimations of simple current and voltage incentive to the advanced esteem. At that point as indicated by the code, values are contrasted and the preset esteems in the controller if abundance in any parameter happen a hand-off would trip the transformer surpassing the cutoff of current and voltage. Because of beginning conditions if temperature increments from preset esteem, a fan would be turn on utilizing transfer and circuit. It is likewise has the upsides of critical cost funds, control utilization and more noteworthy unwavering quality. In this system, Arduino microcontroller is utilized to screen instances of electrical blames and convey to a change to detach the transformer from the framework.

Keywords: **Arduino, Transformer, GSM modem.**

1. INTRODUCTION:

Transformer is electrical component that progressions the voltage from one level to other level without change uncommonness. Transformer is more costly gadget in control framework. As the heap increment at auxiliary twisting of the transformer to its appraised esteem. Because of short out or quickly increment in load can cause over-burdening, over-voltages and overheating that can harm the protection of transformer windings and serious harm can be happen on the auxiliary side of transformer. The different kinds of shortcomings that reason the transformer disappointments are winding issues, blames due to over streams, over voltage deficiencies, earthing issues, protection disappointment blames and bushing flashover flaws. In this way, for overcome above issues a solid and speed assurance with more exactness is required.

In this paper an assurance plot is purposed that tends to the above expressed issues. Power framework assurance is a crucial thought in the outline of an electrical power framework. There is have to shield electrical power segments from unsafe issues. This is justified by the need to enhance the life of the parts, keep away from dispersible consumption in visit substitution of outdated segments and to guarantee that there is a constant supply of energy to serve the necessities of the regularly developing economy. This task along these lines tries to plan an Arduino microcontroller based framework that will keenly screen blames and provoke a wellbeing measure to secure the power transformer if there should be an occurrence of over-burden. This data is sent to casualties as message by utilizing GSM modem.

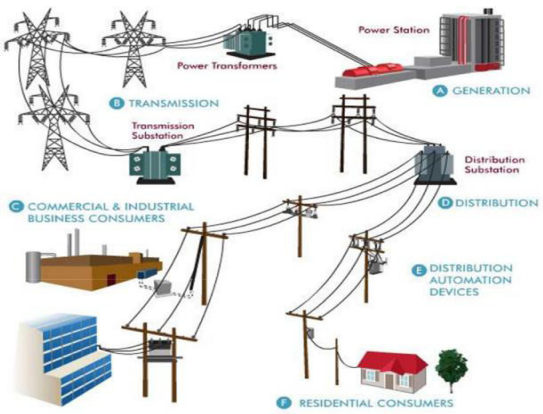

Figure1:- Power system network

2.PROBLEM STATEMENT:

A fundamental worry in transformer security is the high cost of the transformer and the relative long blackout time that happens when an expansive transformer falls flat. The best possible kind of assurance can frequently identify introductory blames previously they end up major, and in this manner forestall major physical harm and long blackout times, transformers encounters deficiencies which prompts decay and increasing speed maturing and disappointment of transformer twisting coming about because of protection disappointments, one of the causes is the over current. Because of over-burden and remotely connected conditions including over present and outside short out causes ascend in temperature of both transformer oil and windings at whatever point the winding temperature raises and surpasses transformer warm restrains, the protection will break down and may bomb rashly. Nonstop warm over-burden (over temperature) may debilitate the protection of a transformer and bringing about fast transformer death toll.

Over excitation (an expansion in framework voltage), inward blames can prompt crumbling, increasing speed maturing and blame excursions in

transformer security work also, transformers must not be subjected to draw out overvoltage. For most extreme productivity they are worked close to the knee of their immersion bend, so at voltages over 110% of appraised, the energizing current turns out to be high. Only a couple of percent expansion in voltage brings about a vast increment in current. These expansive streams can devastate the unit in the event that they are not diminished expeditiously. However architects and researcher have worked out different manners by which the transformer can be ensured; one of such courses is by utilizing a transfer. In this manner keeping in mind the end goal to ensure the transformer utilizing hand-off, a control framework thought is created using arduino microcontroller.

3. HARDWARE COMPONENTS:

3.1 Arduino Microcontroller:

The Arduino microcontroller is a simple to utilize yet capable single board PC. The Duemilanove board includes an Atmel ATmega328 microcontroller working at 5 V with 2Kb of RAM, 32 Kb of blaze memory for putting away projects and 1 Kb of EEPROM for putting away parameters. The clock speed is 16 MHz, which means about executing around 300,000 lines of C source code every second. The board has 14 advanced I/O pins and 6 simple info pins. There is a USB connector for conversing with the host PC and a DC control jack for interfacing an outer 6-20 V control source, for instance a 9 V battery, when running a program while not associated with the host PC. Headers are given to interfacing to the I/O pins utilizing 22 g strong wire or header connectors.

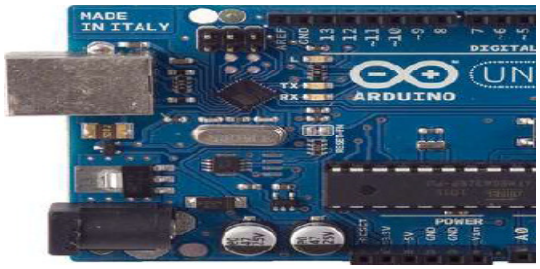

Figure: 2.Arduino microcontroller

3.2 Transformer:

Venture down transformer is the gadget for which we plan the insurance circuit. The progression down transformer having evaluations of 230/12 V. Transformer is the fundamental gadget which utilized as a part of electrical power framework consequently insurance of transformer is vital.

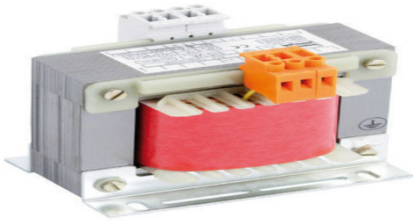

Figure: 3.Transformer

3.3 Current sensor:

The security of the transformer against over current is worried about the discovery and estimation of blame, where the estimation can be risky and surely difficult to quantify if the real load and blame streams are expansive. An expert method for maintaining a strategic distance from these challenges is to utilize the present sensor. Thusly in the square chart, current transformer is utilized to gauge the heap current.

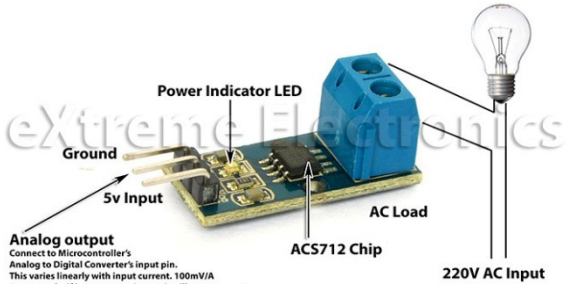

Figure:-4. Current sensor

3.4 Thermistor:

Thermistor is shoddy and effectively possible temperature sensors. It is anything but difficult utilize and versatile. Circuits with thermistor can have dependable yield voltages not the mV yields thermocouples have. On account of these properties thermistor are typically utilized for simple estimation of temperature. Thermistors are not utilized for high temperatures. Resistor of 10 k-ohms is utilized to linearize the yield of thermistor..

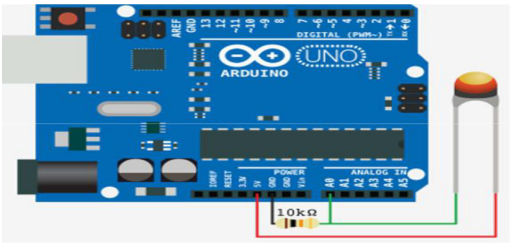

Figure: 5. Themocoupler

3.5 RELAY:

It is an electrically worked switch. In recent years strong state transfers are utilized for insurance reason, yet because of progression in innovation microcontroller based transfers are utilized for securing the gadgets. All hand-off contains detecting unit, electric loop fueled by AC or DC current. Whenever current and voltage surpass their cutoff points, curl impels which work either to close open contacts or to open close contacts. Electromechanical transfers are electrically worked change used to seclude circuit and recognize blame in the transformer. It gives high dependability, relative straightforwardness, safe disengagement from the primary supply. It has longer life.

Figure: 6 Relay

3.6 GSM MODEM:

GSM/GPRS Modem-RS232 is worked with Dual Band GSM/GPRS motor SIM900A, takes a shot at frequencies 900/1800 MHz The Modem is accompanying RS232 interface, which permits you associate PC and additionally microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT summon. The GSM/GPRS Modem is having inward TCP/IP stack to empower you to associate with web through GPRS. It is reasonable for SMS, Voice and in addition DATA move application in M2M interface. The locally available Regulated Power supply enables you to associate wide range unregulated power supply. Utilizing this modem, you can make sound calls, SMS, Read SMS, go to the approaching calls and web act through straight forward AT commands.

Figure: 7. GSM MODEM

3.7. LCD Display:

LCD is utilized to demonstrate all outcomes on screen. In investigate 16pin (LMB162AFC) LCD is utilized to show the parameters of transformer, for example, voltage, current and temperature. Arduino Platform speaks with the LCD utilizing serial correspondence convention.

Figure: 8. LCD Display

BLOCK DIAGRAM:

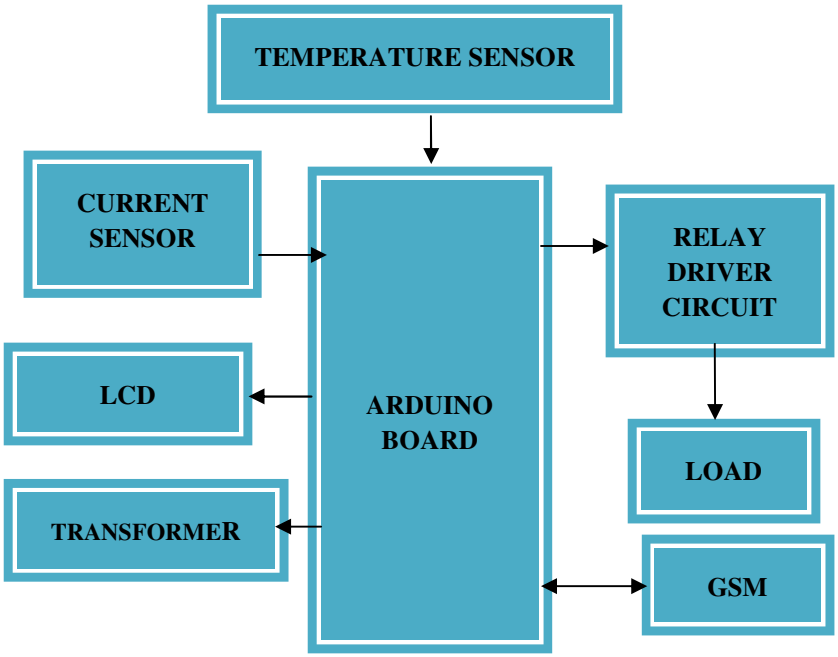

Figure: 9 Block diagram

4. RESULTS

Testing is performed on 1A present, 190Vmin to 265Vmax voltages and 45C temperature settings. At the point when the rating of current and voltage is achieves its characterized esteem, at that point the heap is cut-off. Additionally the temperature achieves it constrains then fan would be turn on for cooling the transformer. In the event that current would or voltage would over's its characterized constrains then load would be cut-off and as far as possible reaches gsm modem send the sms to cell phone.

5. CONCLUSION:

An arduino board based system that will intelligently monitor faults and prompt a safety measure to protect the transformer in case of overload**.**

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