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Fault Detection System for GSS

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Abstract: ***The efficiency of power systems is largely determined by the effectiveness of the inbuilt power equipment. Monitoring transmission parameters for faults and quick isolation of the system from faults helps to improve the efficiency of the power systems reliability.***
Current conventional method has its own limitations due to the reliance on technical team to carrying out visual inspection in order to identify any fault. The functions of the protective systems are to detect, then classify and finally determine the location of the faulty. This project presents some techniques that helps to find, determine and diagnosing faults in GSS. This project will review the type of fault that possibly occurs in an electric power system, the type of fault detection and location technique that are available together with the protection device that can be utilized in the power system to protect the equipment from electric fault.

I. INTRODUCTION

The thought of developing this project comes to do some good things towards the society. We had seen many time that our system are affected by faults and after seeing towards our power plants and Electricity management systems it's difficult for them to supply the required demand.
In this project we designed a system which will tell the operator about faults using Arduino and sensor to detect the fault. That will be helpful for both of the consumers and for electricity suppliers. So by which their load also not gets affected.
Fault Definitions and Taxonomy Power grid faults are defined as physical conditions that cause a circuit element to fail to perform in the required manner.
This includes physical short circuits, open circuits, failed devices and overloads. Practically speaking, most faults involve some type of short circuit and the term fault is often synonymous with short circuit. A short circuit is some form of abnormal connection that causes current to flow in some path other that the one intended for proper circuit operation. Short circuit faults may have very low impedance (also known as "bolted faults") or may have some significant amount of fault impedance. In most cases, bolted faults will result in the operation of a protective device, yielding an outage to some utility customers.
Faults that have enough impedance to prevent a protective device from operating are known as high impedance (high Z) faults. Such high impedance faults may not result in outages, but can cause significant power quality issues, and can result in serious utility equipment damage. In the case of downed but still energized lines, high impedance faults also pose a safety hazard.
The IEEE also recognizes so-called open phase faults, where a conductor has become disconnected, but does not create a short circuit. Open phase faults can be the result of a conductor failure resulting in disconnection, or can be the side effect of a bolted phase fault, wherein a lateral phase fuse has blown, leaving that phase effectively disconnected. Such open phase faults can result in loss of service to customers, but can also result in safety hazards because a seemingly disconnected phase line may still be energized through a process called backfeed.
Open phase faults are often the result of a wire connection failure at a pole-top switch. Any fault may change into another fault type through physical instability or through the effects of arcing, wire burndown, electromagnetic forces, etc. Such faults are called evolving faults and the detection of evolution processes and fault type stages are of interest to utility engineers. We wish to detect faults, to classify them, and to locate them as precisely as the instrumentation will permit.

A. Objective

The object of this project is to design a system which detects the faults in power system.
1) To make it happen combination of sensor and Arduino is used
2) To design a circuit which can inform about faults to the operator.
3) To contribute into society.

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II. COMPONENTS

A. Arduino

Aurdino nano is a small, complete and breadboard friendly board based on ATmega 328. It has more or less the same functionality of the aurdino duemilanove, but in a different package. It It lacks only a DC power jack , and works with a mini –B USB cable instead of a standard one.

*B. LCD 16*2*

16 X2 displays mostly depend on multi-segment LEDs. There are different types of displays available in the market with different combinations such as 8×2, 8×1, 16×1, and 10×2, however, the LCD 16×2 is broadly used in devices, DIY circuits, electronic projects due to less cost, programmable friendly & simple to access.

C. Fire Sensor

A Flame Sensor is a device that can be used to detect presence of a fire source or any other bright light sources. There are several ways to implement a Flame Sensor but the module used in this project is an Infrared Radiation Sensitive Sensor.This particular flame sensor is based on YG1006 NPN Photo Transistor. The black object at the front of the module is this Photo Transistor. The YG1006 Photo Transistor looks like a black LED but it is a three terminal NPN Transistor, where the long lead is the Emitter and the shorter one is the collector (there is no base terminal as the light it detects will enable the flow of current).This photo transistor is coated with black epoxy, making it sensitive to Infrared radiations and this particular Photo Transistor (YG1006) is sensitive to Infrared Radiation in the wavelength range of 760nm to 1100nm.Using this particular type of Flame Sensor, you can detect Infrared Light up to a distance of 100cm within its 60 degrees of detection angle.

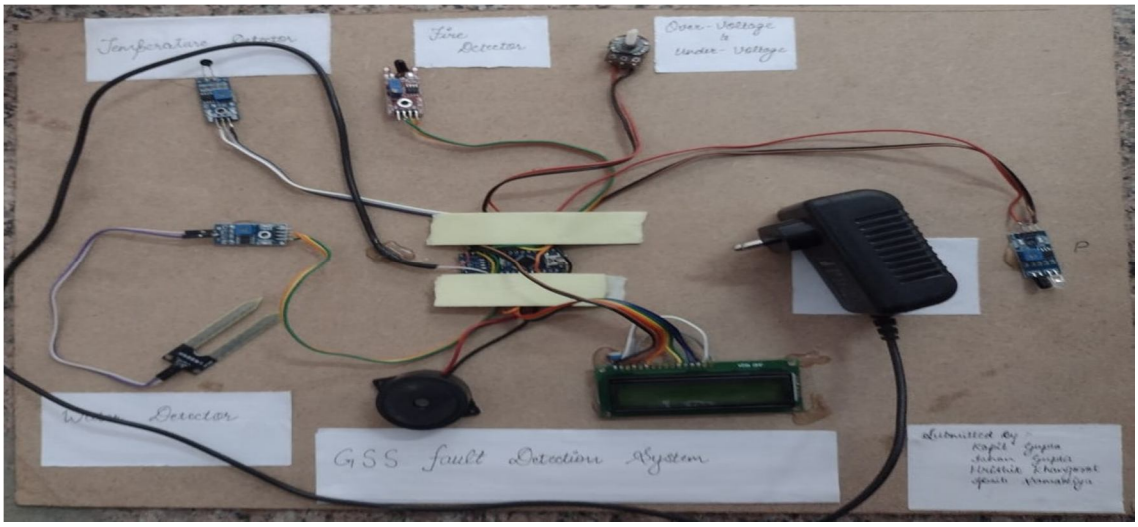
D. Temperature Sensor

A temperature sensor is an electronic device that measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes. There are many different types of temperature sensors. Some temperature sensors require direct contact with the physical object that is being monitored (contact temperature sensors), while others indirectly measure the temperature of an object (non-contact temperature sensors).

E. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

III. PROJECT OVERVIEW



IV. RESULT

As any fault comes in the power system. The system detects and the correct information will be delivered to the operator within no time and power system life will increase.

V. CONCLUSION

The schematic distribution of load can help in increase the life of power system by allowing them not to work on overload conditions. The system tells the operator about the different faults like fire, temperature, overvoltage, undervoltage so that system is unaffected. This will also help in reducing the installation cost of transmission line and as well as other equipment like transformer, circuit breaker etc.

VI. FUTURE SCOPE

In future everything will become smart even our grid as well. So we are trying to make our electrical system to work smartly with consumer help. This project can be reduced into size and can be implemented on any required locations to provide benefit to power supply operator.

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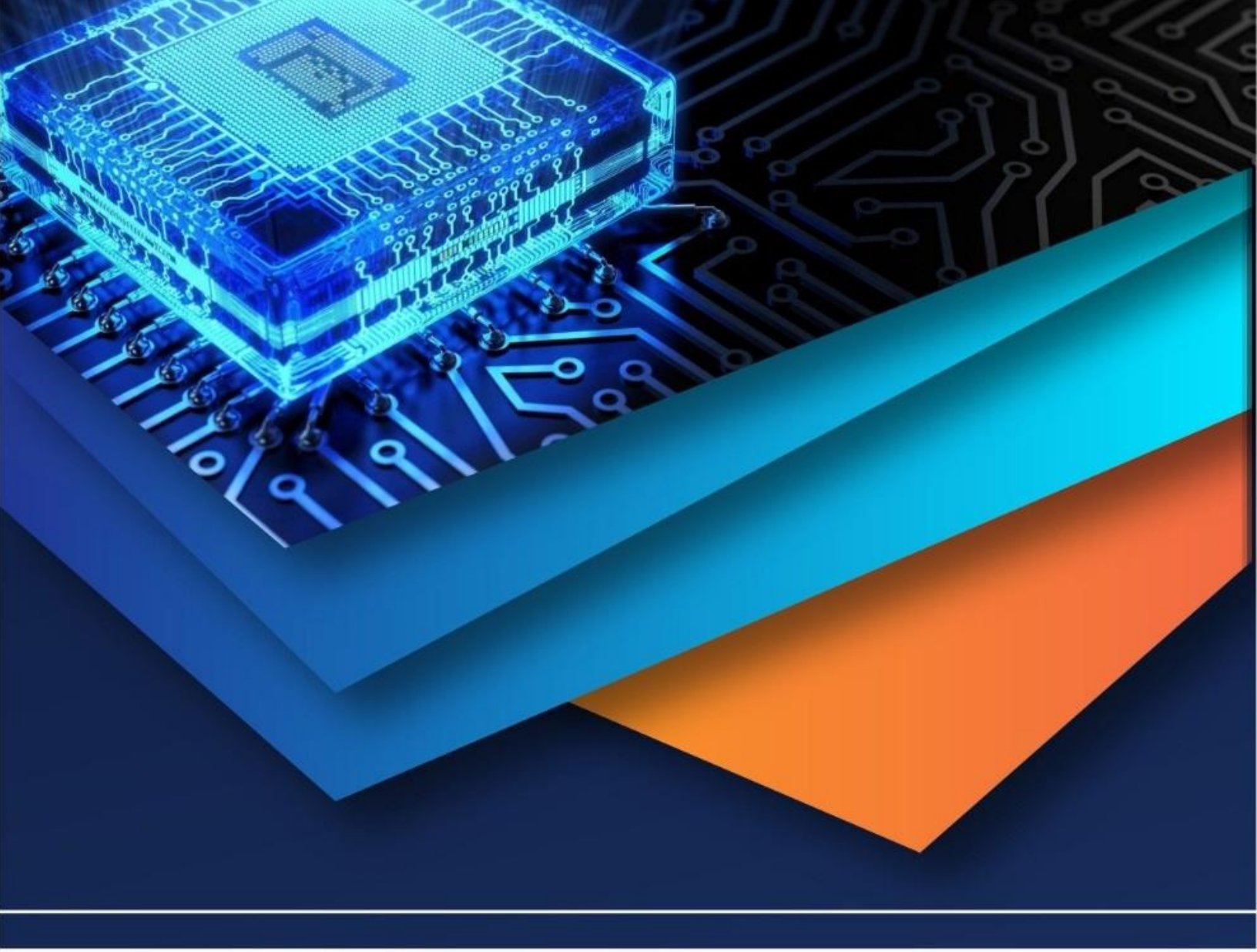

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