



## **SERVICE MAN PROTECTION TO AVOID ELECTRICAL ACCIDENT**

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### **ABSTRACT**

These day's people are facing problems related to occurrence of accidents related to substation. It is very risky task because it can cause too many health issues. As a stator terminal voltage is going to remain constant the current draws by grid increases. Stator output terminal each phase voltage and current are in phase, it means that the generator is operating approx. at its unity power factor. In this project we are organizing 'How to avoid accidents corresponding to substation in smart way. 'With the appliances of advanced communication and technology modern power system transferred into cyber physical system. Critical infrastructure for modern society or public which has complex dual direction. The information make interaction make cyber physical power system vulnerable to cyber-attacks, resulting in serious extreme cases. Some power system accidents had occurred around the world in recent years, such as Ukraine blackouts or accidents and Venezuela backouts Consequently, it is necessary to analyze electrical accident for substation protection. In this project we are organizing 'How to avoid accidents corresponding to substation in smart way.'

**Keywords**-Smart System, Avoid Electrical Accident, Modern Power System, Cause Many Health Issues.

### **1. INTRODUCTION**

Nowadays electrical engineers are facing incidents linked to hazardous work like getting current due to short circuits, severe burn wounds, etc. Electricity is one of the basic needs in every field of electrical power system, electrical power system is a nonlinear and has complex system which is very difficult to detect regarding electrical line breakage in entire glob. Day by day the ratio of people who die due electrical accident is increasing and the measure reason is by unknowingly stamping on a breaking electrical line which is cause the by natural calamities, accidents etc.

Idea of the proposed system in module is that every pole is designed in such a way that it is connected to each other with use of sensor, consider we are having five poles.

If the fourth pole line is broken , fifth pole since the signal from forth, if there is no signal, it will alerts the public work with a buzzer alarm, so that anyone can get information that some danger aroused.

Once get acknowledges the breakage of the line detect, its send the message to predefined number and also disconnects the power line automatically from substation of the poles one to four in order to insure that no harm or accident occurs to anyone.

Critical electrical accident to line man are on the rise during electric line repair. Due to lack of communication and coordination between maintenance and electric staff

The idea of the modules to provides i.e. line man and control to turn ON/OFF of the line will be maintained by the line man only

Because this system has an arrangement in such a way that a password is required to operate the circuit breaker ON/OFF.

We can use flame resistance clothing and for head protection we use helmets and also we use safety glasses with side shields. In this project we will cover following points:

1. Introduction
2. Working
3. Diagram
4. Existing System
5. Resources and consumables required

6. Conclusion
7. Reference

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## 2. WORKING

These days people are facing problems related to occurrence of accidents related to substation. It is a very risky task because it can cause too many health issues. Fuses, circuit breaker and other devices must protect fuse box and isolator, plugs, socket and fitting must be robust enough.

To avoid electrical accident replace old wire, avoid overloading, reduce attic temperature, stay away from moistened place.

The main reason for the popularity of the doubly fed induction generators connected to the national networks is their ability to supply power at constant voltage and frequency while the rotor speed varies.

And the power converted being used in the system are not required to convert the full rated generation power as in the singly fed induction generators power converters requiring conversion of full generated power.

The stator terminal each phase output voltage remains almost constant, it is clear that the power delivered to the grid from the generators increases with increases in the rotor speed. In this project we have seen how to avoid accidents corresponding to substation in a smart way.

Electricity is one of the basic needs in every field. Day by day the ratio of people who die due to electrical accidents is increasing and their major reasons.

Totally any offices or workplaces setting operates on the electricity. Electrical equipment from computers to machinery can all be potential hazards and can cause shock and short circuit and burn injuries if improperly used or maintained.

Though most personnel don't need any specialization electrical safety training, if work around electricity, but are not qualified to directly handle and electrical components or equipment, it's very important to follow electrical safety related work practices to keep yourself and others safe.

Prevent all potential contact with the electrical current the way to stay is to stay safe away from electrical hazards or the injuries.

Unqualified personnel should not interact close to electrical current get closer than 50v, if work in same area as an electrical injury it hazards equipment operating on maintain a safe distance.

De-energize equipment and use lockout exposed, live electrical parts must be de-energized before work on the or near to the permitted.

Prevent accident and isolate electrical energy by the locking and tagging out electrical system.

Unplug cords by pulling on the head, rather than cords then do not press or overstretch electrical cords, do not fasten cords with staples.

Ensure safe use of the electrical equipment can go long way ensure that everyone safety in the room or workplace.

The workplace should be visually inspected for external defects use. Install proper physical barrier should always be used to protect

The wireman from electrical accidents, Panel should not have holes where a wireman could not come into contact with exposed wire.

Beware of conductive tools and cleaning material materials if you are working in an area where an electrical accident is present, always assume that electrical equipment are live, and act accordingly, and don't use the conductive tools in the area.

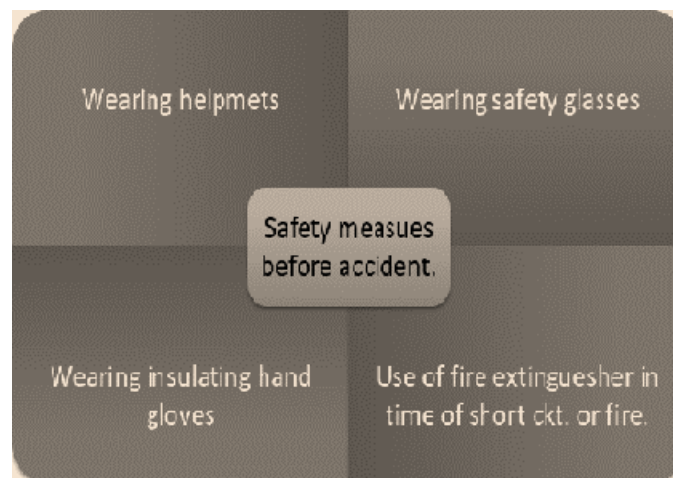
In every situation, treat and electrical components as if it is live. Electrically live parts don't look different from de-energized from the parts. Electricity is a common, but dangerous, offices or workplaces accidents.

Only who are qualified to work with electrical components.

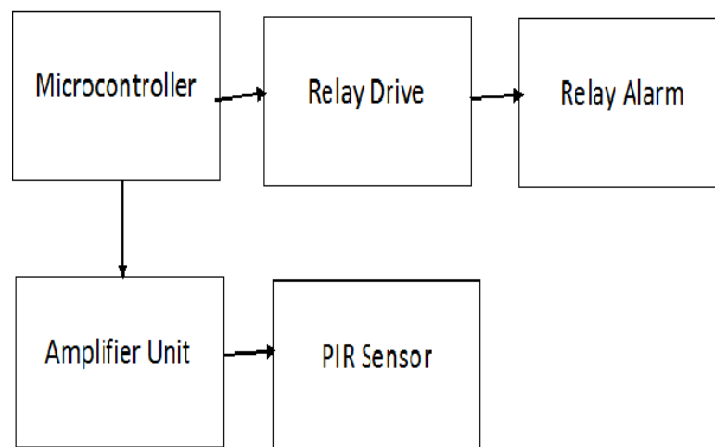
Electrical components or equipment that can cause ignition must not be used where flammable vapors, gases, present when performing any work or the maintenance overhead electrical line. In most of the workplaces, there is the potential for live electrical components above the area of the floor level, which are only accessible.

In this project we have seen how to avoid an electrical accidents and it is also used to detect the line man on the pole to break line the supply voltage for the line man supply. In this project we are organizing how to avoid accident or electrical accidents corresponding in a smart way.

**Diagram:-**



**Figure 1: Safety measures to avoid harmful Accident.**



### 3. EXISTING SYSTEM

To develop sensor based safety relay for protection of lineman from electric shock and accidents while maintenance.

Electricity is one of basic necessary in every field. Electrical power system is non-linear and has complicated system which is very tough to discover and monitor regarding electrical line breakage in entire glob. Day to day the ratio of people who die due to Electrical accidents is rise and in that major reason is by oblivious stepping on a broken electric line which is caused by natural calamities, accidents, etc.

Once it acknowledges the breakage deterioration of the line occurred, it sends message to preconceived numbers and also disconnects

The power line automatically from substation poles 1 to 4 in order to ensure that no loss occurs to anyone.

Electricity is one of the basic needs in every field.in electrical power system is nonlinear and has complex system which is very difficult to detect regarding electrical line breakage glob.

Electrical accident is increasing and in that major reason in by unknowing steeped on broken electrical line which is caused by caused natural calamities, accidents, etc.

It can be used in the remote area and industrial area also. The generated potential differential was the utilized in running components or devices mounted on the motor cycle.

The potential difference generated was sufficient to work automatically, TGS was able to successfully recover energy from the exhaust system the energy.

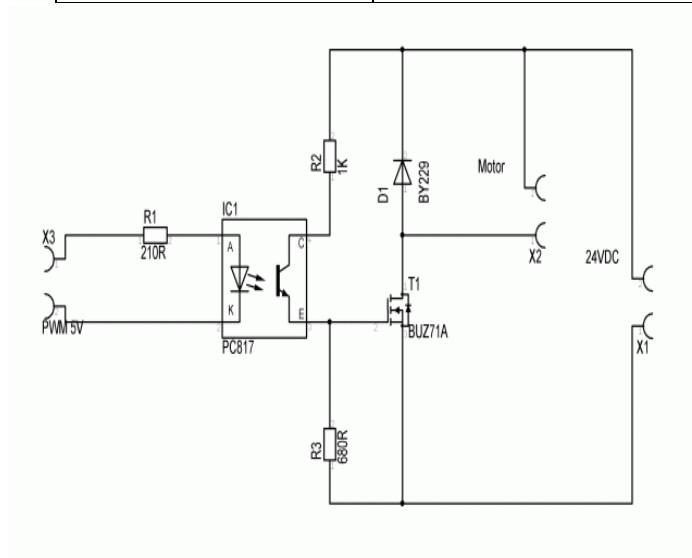
There is portable, no moving or rotating part, less maintenance, operable at elevated. Works on the any alternation, it can be used as an alternative power source, requires less operating cost.

Electric current through the human body can cause electric shock, breath and heartbeat interruption, burns and bodily injury and even death also. The relationship between current through the human body and duration of the current in the human body effect is given, the human body can not actively control the muscles, resulting in the electric shock THE different consequence depends on the voltage contact position of electric shock.

The human body resistance will be different, individual difference or skin wet and dry degree and also which the skin in dry,

### Results:

| Temperature in degree Celsius | Output voltage/current |
|-------------------------------|------------------------|
| 150                           | 9.2v/0.1amp            |
| 200                           | 12.7v/0.3amp           |
| 250                           | 13.5/0.35amp           |
| 300                           | 13.9v/0.5amp           |



Replace the BUZ71A with MOSFET of your choice as above.

### Input:

- Either: X3 is the input from the microcontroller. This is driven high for on or low for off. "PWM5V" is grounded.
- Or: X3 is connected to Vcc. PWM5V is driven by the microcontroller pin - low = on, high = off.

As shown  $R1=270\Omega$

- Current is  $I=(V_{cc}-1.4)/R1$
- or Resistor is  $R=(V_{cc}-1.4)/I$

For  $V_{cc} = 5V$  and  $270\Omega$   $I$  here  $\approx 13$  mA. If you wanted say 10 mA then  $R=(5V-1.4V)/10mA=360\Omega$  - say 330R

### Output:

R3 pulls FET gate to ground when off. By itself 1K to 10k would OK - Value affects turn off time but not too important for static drive. BUT we will use it here to make a voltage divider to reduce FET gate voltage when on. So, make the R3 the same value as R2 - see next paragraph.

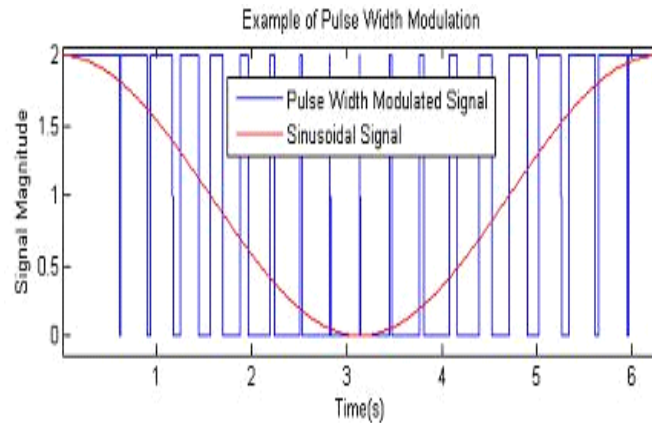
R2 is shown go into +24 DC but this is too high for the FET maximum gate rating. Taking it to +12 DC would be good and +5Vdc would be OK if the logic gate FETs mentioned are used.

BUT here I will use 24 DC and use R2 + R3 to divide the supply voltage by 2 to limit Vgate to a safe value for the FET.

R2 sets the FET gate capacitor charge current. Set R2 = 2k2 gives ~10 mA drive. Set R3 = R2 as above.

Also, add a 15V Zener across R3, cathode to FET gate, Anode o ground, this provides. Gate protection against over voltage transients.

The motor connects as shown.



D1 MUST be included

- Open Circuit voltage ( $V_{oc}$ ) = 5.29V
- Current ( $I$ ) = 0.93A
- Electrical resistance ( $R_e$ ) = 3.85 $\Omega$
- Seebeck ( $\alpha$ ) = 0.056V/k
- Number of PN couple( $N$ ) = 127N
- Air temperature ( $T_{air}$ ) = 30 degree C
- Max temp ( $T_{max}$ ) = 100 degree C
- Thermal conductance ( $k$ ) = 0.35 W/k
- Resistance junction to case ( $R_{jc}$ ) = 2.45 k/W
- Resistance case to source ( $R_{cs}$ ) = 1 k/W
- heat flow on hot side ( $Q_{hot}$ ) = 53.1
- Temperature difference ( $\Delta T$ ) = 50degree C

First I calculate the heat flow on the hot side,

$$Q_{hot} = (R_e/2 \times I^2) - (\alpha \times I \times T_{max}) - (k \times \Delta T) = (3.85/2 \times 0.93^2) - (0.056 \times 0.93 \times 100) - (0.35 \times 50) = 20.39 \text{ degree C/W}$$

Now I find the, Resistance surface to air

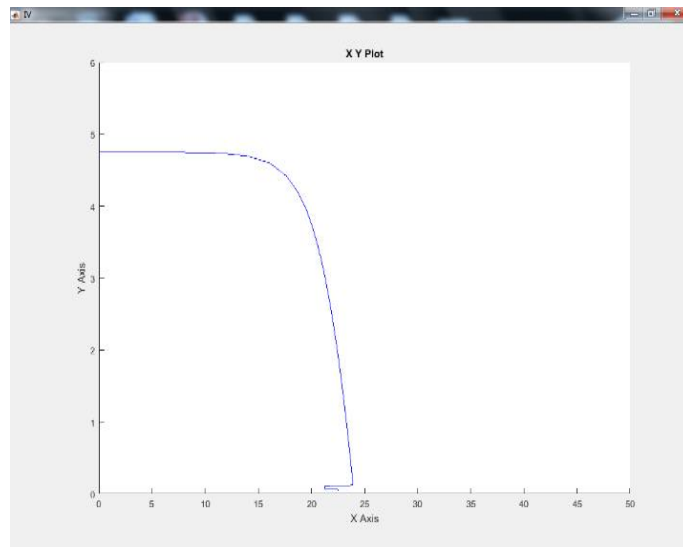
$$R_{sa} = ((T_{max} - T_{air}) / Q_{hot}) - R_{jc} - R_{cs} = ((100 - 30) / 20.39) - 2.45 - 1 = 0.0192 \text{ degree C/W}$$

Now i calculate the Rmodule,

$$R_{module} = R_{cs} + R_{jc} + R_{sa} = 2.45 + 1 + 0.0192 = 3.46 \text{ degree C/W}$$

Now using the formula for power,

$$P = (N * \alpha^2 * \Delta T^2) / (4 * R_{module}) = (127 * 0.003150^2 * 50^2) / (4 * 3.46) = 71.1 \text{ Watts}$$

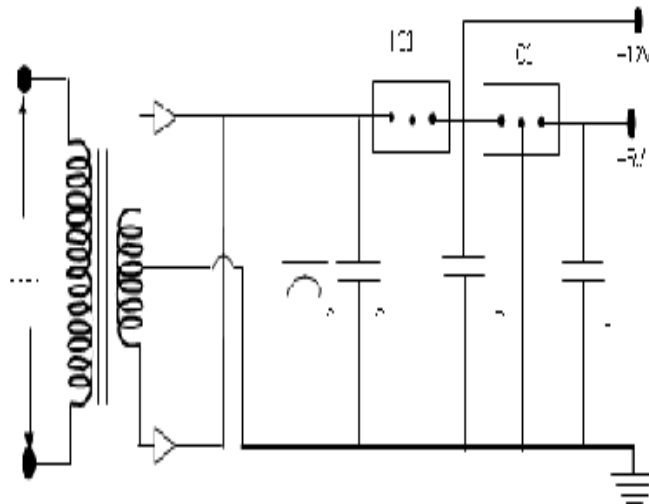


The test results are shown in figure 9 to 12. Here, test results are taken in the form of output voltage output current and harmonics in load current with compensation and total harmonics in load. The harmonics content without compensation is shown.

By comparing the total harmonic distortion of with compensation system and without compensation system we can observe that there is almost 10% reduction in THD by using proposed decoupling method.

Due to the very low capacitance, the dc link requires high ripple voltage and input current control is influenced by this ripple voltage.

The PFC voltage control loop has second order notch filter, the voltage harmonic disturbance is still not adequate to attenuate and the internal current control loop has no clear references. The grid current is thus strongly biased by the third order harmonic by 25.25%.



#### Parts:

|     |                        |
|-----|------------------------|
| IC1 | 7805 Regulator IC      |
| IC2 | 7805 Regulator IC      |
| IC3 | IN4008 Rectifier Diode |

#### Capacitor

|    |                         |
|----|-------------------------|
| C1 | 1000 µf/25 electrolytic |
|----|-------------------------|

C2 to C4            0.1 $\mu$ F

### Resources and consumables required

### LCD INTERFACED IN 4 BIT MODE

#### • 8 data pins D7:D0

Bi-directional data/command

Alphanumeric characters are sent in ASCII format.

#### • RS: Register Select

RS= 0 -> Command Register is selected

RS=1->Data Register is selected

### Internal circuit of Relay

There are various kind of relays. You can select 1 according to your needs. The various things to consider when selecting a relay are its size and voltage and current capacity of the contact points, drive voltage, impedance, number of contacts, resistance of the contacts, etc. The resistance voltage of the contacts is the max. Voltage that can be conducted at the point of contact in the switch. When the maximum is exceeded or increases, the contacts will spark and melt, in that sometimes fusing together. The relay will fail. The value is printed on the relay.

### Automatic switchover to battery:

An uninterrupted power supply it is necessary for a main operated clock. This facility is very useful in transistors and 2 ones for recording or listening to news programs. A relay can do this job with a battery backup. But the relay takes several in milliseconds before it makes contact. Moreover

The same task can be achieved with a single diode. Just connect a germanium diode DR50 (D1) as shown in fig 1.when the power is available

### DC Motor:

The direct current motor is 1st of the first machines devised to convert electrical power into mechanical power. Permanent magnet dc convert electrical energy into mechanical energy through the interaction of two magnetic fields. One field is produced by a permanent magnet assembly other field is produce.

In general, users select brush-type DC motors when low system cost is a priority, and brushless motors to fulfil other requirements .Brush type DC motors are used in very many battery powered appliances.

Brushless DC motors are commonly mostly used in appliances like DC powered fans and disk drive rotation motors.

### Arduino Uno:

Segmenting code into functions allows a programmer to create the modular pieces of code that perform a defined task and then return to the area of code from which the function was defined.

Arduino consists of both a physical programmable circuit board and a piece of software, or Integrated Development Environment that runs on your computer, used to write and upload computer code to the physical board.

### Integrated Circuits

All modern digital systems rely on the use of integrated circuits in which hundreds of thousands of devices are fabricated on a single chip of silicon. A relative measure of the number of the individual semiconductor components within the chip is given by referring to its 'scale of integration'.

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## 4. CONCLUSION

This day people are facing various problem due to electrical accidents it causes bodily injury, damages or death also. The maximum potential difference PD generated by the TEG was 1.58Volt. The generated potential difference was consumed in running auxiliary devices mounted on the motor cycle. The potential difference generated was efficient to run the auxiliary device. TEG setup was able to successfully recover energy from the exhaust system of engine. The potential difference generated wasn't sufficient to charge a battery. The utilization of multiple TEGs in series could

result in generation of higher potential difference which necessary to be studied further. T Waste heat, woods or candle fumes can be used as the heating source and chilled water, ice or nitrous oxide can be used as the cooling source. Which temperature difference between two dissimilar semiconductors produces? The generated voltages are proportional to the number of Peltier modules and the temperature difference between surfaces. Later generated voltages are stabilized with the helpful of a buck-boost converter. It can be uses in remote areas, domestic areas and in industrial areas also.

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