PROTECTION FOR ELECTRIC LINEMEN USING MOBILE APPLICATION WITH A CODE BASED CIRCUIT BREAKER

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ABSTRACT

This paper provide outline of project which have purpose to provide protection of an electric man, the project is programmed to monitor the circuit breaker using a password. Because of a loss of coordination and an interaction between the maintenance workers and the electric substation staff, serious electrical injuries to linemen are on the rise during an electric line repair.

Keyword : - *Microcontroller, Bridge rectifier, Relays,ULN2003 relay driver, Bluetooth.*

1. INTRODUCTION

Electricians design, operate, and the fix electrical power systems in households and workplaces, as well as electronic devices, transmission lines, and the almost everything else that uses the electricity. It is possible that the lineman would be electrocuted at that moment. The maintenance crew switches off the respective power line in the main station. If the lineman needs to repairs the power grid. The main station and the power lines that have been observed as having fault could be located in different locations. Communication between the linemen and the maintenance workers can be hampered as a result of these factors.

This proposed system offers a solution for ensuring the safety of maintenance personnel, such as linemen. Since this device is set up in such a way that a password is required to operate the circuit breaker (on/off), the line man will be in charge of turning on/off the line.

2. LITERATURE REVIEW

We need be aware of the main academic theories within our selected subject that are relevant to or analyze our study when considering the quality of our critical analysis. Although we should have read literature related to our study goal(s) and the objective(s), is a password-based circuit breaker a good idea? (Tarun Naruka et al., 2017). He developed the device in his article [1], which is completely controlled by 8-bit microcontroller from the 8052 family with 8-KB ROM for the programme memory.

To enter the password, matrix keypad is connected to the microcontroller, and relay driver IC has been used to turn on and off the loads via relays. The entire circuit is powered by an onboard power supply. We will be able to concentrate on more closely related to literature for other subjects where the study has taken several days (Jay kumar et al., 2016 & Ved marale et al., 2017).

3. THE EXISTING MODEL

For a linemen protection, there is already device named the password-based circuit breakers control. It is set up so that the maintenance workers or a linemen must submit the password in an order to turn on or off the electrical line. Then, if there is failure in power cable, the line man can disconnect the power supply to the line by logging into the system and fix the line safely, then return to the substation and turn on the power supply to the line by entering the password. The downside of this method is that the body interaction between the linemen and that unit is necessary. As result, in poor environmental conditions, it can causes electric shocks.
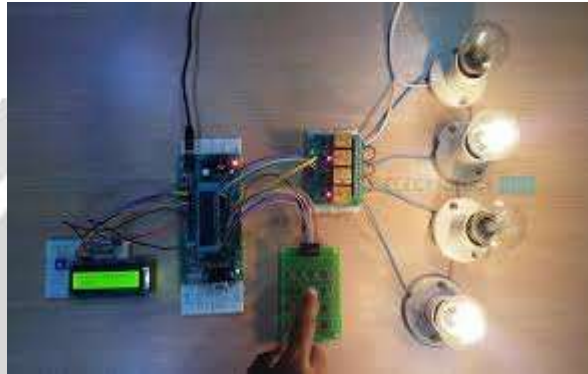

Chart 1-: password-based circuit breakers control

4. THE ADVANCE MODEL

To prevent the weaknesses in the password-based system, the circuit breakers were controlled using Android program. There is no direct interaction between the linemen and the circuit while using the Android program. Inside the Bluetooth range (10m-20m), linemen can monitor and operate the circuit breakers. A lamp that switches on or off indicates whether the circuit breaker is active or inactive, and the voice activation is also available. Besides that, as in a prospect, this device can be improved by incorporating web technologies, which allows for the storage of all details related to electrical restoration, such as the description of the linemen, the lane on which he is operating, the time and the date, and so on.

The lineman's protection is significantly improved by using this tool. The lineman's job is becoming much easier, and a misunderstanding has decreased significantly. Higher officials will use cloud technologies to track the lineman's job, the use of the electricity, and several other data. It's for the sake of the function scope.
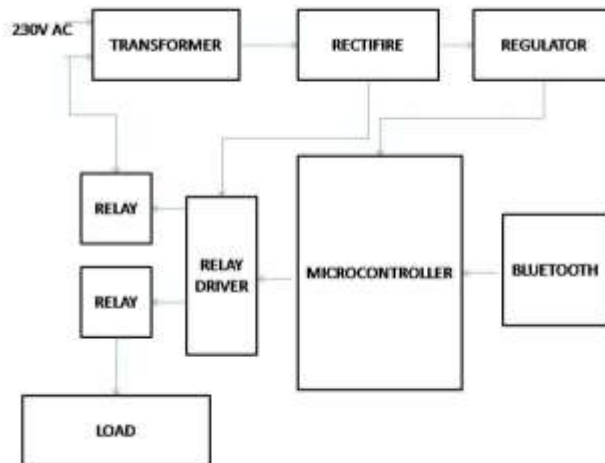
Chart 2-: BLOCK DIAGRAM

5. KEY PARTS

Microcontroller, Transformer, Bridge rectifier, LCD Display, Capacitor, Relays, ULN2003 relay driver ,IC, Bluetooth, Diodes.

5.1 Microcontroller IC: (89c51)

The AT89C51 would be a CMOS 8-bit microcomputer with 4 KB of Flash Programmable and Erasable Read Only Memory that is low-power and high-performance (PEROM). The computer is designed with Atmel's high-density nonvolatile memory technology which includes the industry-standard MCS-51 addressing system and pinout. Because of the on-chip Flash, the memory space may be cloned in-system or with a nonvolatile memory program. The Atmel AT89C51 is an efficient microcomputer that combines a compact 8-bit CPU with Flash on a monolithic chip to provide such a highly modular and cost-effective alternative to many embedded process control.

FEATURES OF Microcontroller

- ❖ well-matched with MCS-51 Product
- ❖ 4 KB Reprogrammable Flash Memory.
- ❖ Static Operation: 0 Hz to 24 MHz
- ❖ Memory Lock of 3 Level Program
- ❖ 128 x 8-Bit Internal RAM
- ❖ 32 Programmable I/O Lines
- ❖ Two 16-Bit Timer/Counters
- ❖ Six Interrupt Sources
- ❖ Programmable Serial Channel
- ❖ Low Power Idle and Power down Modes

5.2 VOLTAGE TRANSFORMER :

One of the main factors we using alternating AC currents and voltages in our domestic and industry is that AC supply can be effectively produced at a suitable voltage, converted it into high voltages , and then transmitted. Higher distribution voltages mean lower currents with the same power, and hence lower I2R losses in the networked grid of cables, which is why the voltage is converted to a much greater level. This higher AC transmitting voltages

and currents will then be lowered to a much smaller, simpler, and functional voltage range for powering electrical appliances in our living spaces

5.3 BRIDGE RECTIFIER

In electronic power supplies a bridge rectifier circuit is widely used. Almost all electronic circuits needs rectified Dc supply for supplying the various electronic essential components from available AC power source. This rectifier can be used in wide range of an electronic AC Power supply instruments, including household appliances, motor controls, modulation processes, welding applications, and so on. A bridge rectifier is AC to DC converter that converts the mains AC input to DC output. Bridge Rectifiers are often used in power supplies to provide the required DC voltage for electrical parts and machines.

They can be made with four or maybe more diodes or some other form of operated solid state switch. an appropriate bridge rectifier is chosen based on the load current specifications. When choosing a rectifier power supply for a suitable electronic circuit's use, take into account component ratings and measurements, the breakdown voltage, temperature levels, the transient current level, forward current rating, mounting criteria, and other factors.

5.4 RALAY DRIVER IC ULN2003

A 3-phase solid-state relay system is the objective of this project. It consists of 3 single-phase modules, each of which is independently operated by a power TRIAC with an RC snubber network for zero-voltage switching (ZVS).

In each step, opto-isolators are being used to collect control signal from an 8051 family microcontroller, and loads are connected in series with a collection of TRIACS powered by an opto-isolator. The microcontroller is programmed to produce output pulses after a zero voltage pulse, ensuring that the load is turned on at the source waveform's zero cross. The TRIAC driver's zero crossing feature (an opto-isolator) provides lower noise creation, preventing rapid current inrush on resistive and inductive loads. Two limit switches have been used in this project to generate random output pulses from the microcontroller, away from the ZVS (i.e. not coinciding with zero voltage supply voltage of the waveform).

5.5 BLUETOOTH MODULE (HC-05)

The aim of Bluetooth in this setup is to allow contact between the Android app and the Bluetooth Module board. Through using Bluetooth, connectivity can be achieved around 10-20 metres. This technique can be conveniently accessed by looking for the closest unit, similar to how a cellular phone operates.

HC-05 Specification:

Bluetooth protocol: Specification v2.0 EDR
Frequency: 2.4GHz ISM ban
Modulation: GFSK
Emission power: ≤4dBm, Class 2
Sensitivity: ≤-84dBm at 0.1% BER
Speed: Asynchronous: 2.1Mbps (Max) / 160 kbps, Synchronous: 1Mbps/1Mbps
Power supply: 3.3VDC 50mA

5.6 LCD DISPLAY

The primary feature of an LCD monitor is to show the state of all of the circuit's functions.
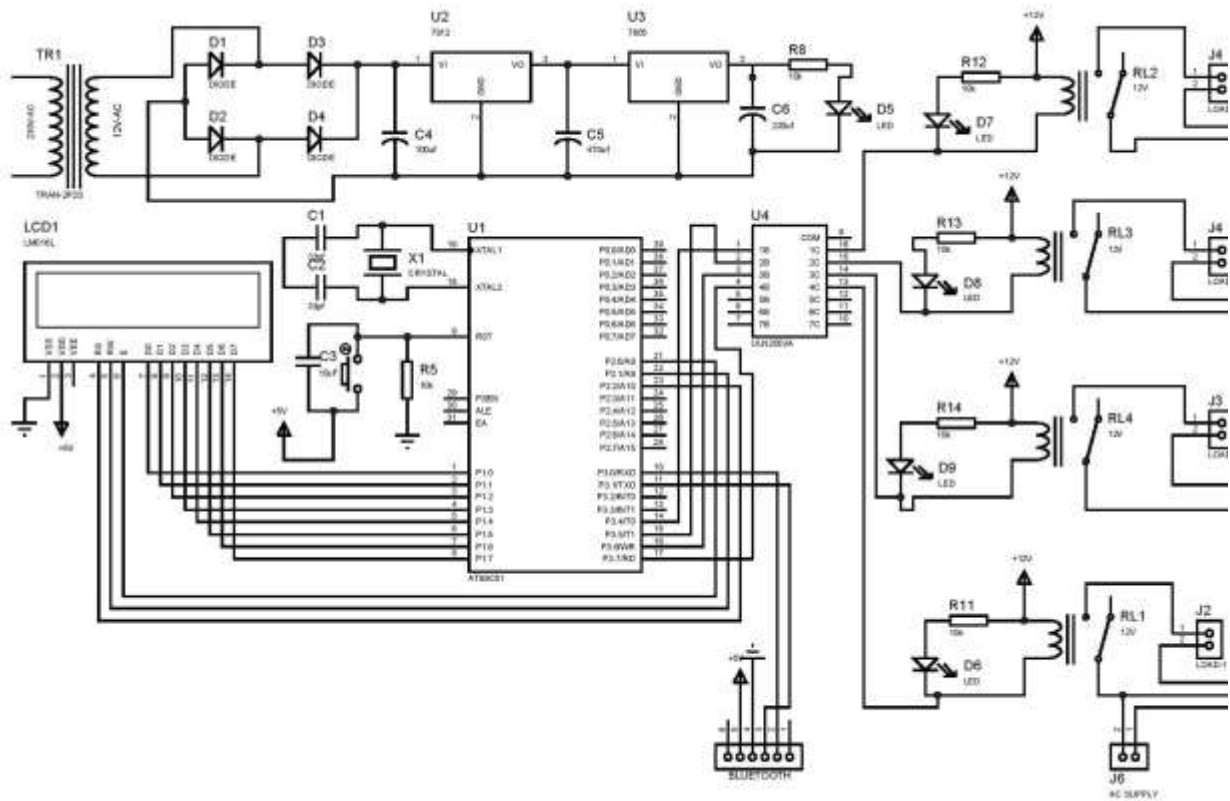
6. CIRCUIT DIAGRAM

Chart 3-: Circuit Diagram

This circuit diagrams show the connections between all the modules that are used, as well as the pin descriptions for each device. The pin connecting between microcontroller and realay driver, microcontroller and bluetooth, microcontroller and LCD, and so on was shown here.

7. WORKING

Login process, Bluetooth connecting point, and working page are the three stages of the programme. These three are essential in the project's operation since the login process requires a unique username and password for each lineman, allowing just a select few to access the software.

The Microcontroller receives the accompanying signal and switches on the residential power supply as we reach the indicator signal for switching off the residential power supply. The whole status is shown on the Display screen.

8. ADVANTAGES OF THIS PROJECT

1.   Keep linemen safe from electrical injuries.
2.   The project's operation is plain and straightforward.
3.   Makes use of readily available materials.
4.   It is beneficial in promoting the safety of the workers.
5.   It is simple to set up.

9. DISADVANTAGES OF THIS PROJECT

In the event of a power outage, devices that are powered by electricity will not work properly. Currently, the device cannot be reached if the personal identity number is forgotten.

10. APPLICATIONS

1. Used in electrical substations to ensure the safety of linemen.
2. This device is found in large structures and homes.
3. Used to save energy in hotels and shopping centres.
4. It can also be used as a password-protected load control system or a password-protected electrical appliance control system.

11. FINAL RESULTS:

This proposed scheme offers a solution for ensuring the safety of maintenance personnel, such as linemen. Just the line man has authority of whether or not the line is turned on or off. This device is set up such that operating the circuit breaker (ON/OFF) requires a password. The lineman will easily switch off the supply and fix it before returning to the substation and turning on the line with the right password. Since it helps you to change the password, you can use whatever password you want and the job would be safer.

.12. CONCLUSION

A circuit breaker can be enabled with a single password. The operating password can be modified, and the device can be used effectively with the new password. Other than the person who changed the password, no one else will reclose the breaker until it has been entered into the device. It eliminates the possibility of password theft. It is successful in ensuring the protection of the staff. It is cost-effective and easy to use.In most cars, a conventional ABS is mounted to avoid skidding and to achieve reliable braking efficiency. The characteristic of the braking depends on both the wheel slip and the ground condition.

13. ACKNOWLEDGMENT

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