Electric Line Man Safety using MicroController with GSM Module
Mr. Pravinkumar N.Mahadik¹ Mr. Pratik A.Yadav² Mr. Suraj B. Ghotpaga³ Harsha P. Pawar⁴
¹,²,³Department of Electronic & Telecommunication Engineering
²,³,⁴Dr.Daulatrao Aher College of Engineering, KARAD

Abstract—Critical electrical accidents to line men are on the rise during electric line repair due to lack of communication and co-ordination between the maintenance staff and electric substation staff. This proposed system provides a solution that ensures safety of maintenance staff, i.e., line man. on detecting a fault in electric line the line man sends sms and the main line is switched off which is again switched on after solving the fault it can also prove a boon to save power thus it saves the life of lineman working on electric line. The proposed system is fully operated on microcontroller.

Key words: GSM MODULE, Microcontroller, LCD

I. INTRODUCTION

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. The main objective of this project is to save life man by making such a protective system controlled through sms In this proposed system if there is any fault in line the lineman sends the password due to which main line is switched off after that he works on online solution and after that send sms and switch on the electrical line. 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. This project gives a solution to this problem to ensure line man safety. Its maintenance is a very low due to this it is very useful for the line man. now a days there are various product which is available in the market but they are very costly and also they are very time consuming devices. Our devices reduces the time which is required for the line man for repairing. the parts which is required for our model is easily available in the market. the main concept of our project is to reduce the time of the line man. the main part of our project is the GSM module which is required for sending a sms.

II. PROPOSED SYSTEM

A. The Information Of The Pin In The Microcontroller

1) Microcontroller

The AT89C51 is designed with static logic for operation down to zero frequency and supports two Software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer / counters, serial port and interrupt system to continue functioning. The contents of RAM are saved in power down mode and thereby freezes the oscillator until hardware resets.

2) RST

Reset input. A high on this pin for two machine cycles while the oscillator is running resets the device.

3) ALE / PROG

Address Latch Enable output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming. In normal operation ALE is emitted at a constant rate 1 / 6 the oscillator frequency, and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external Data Memory. If desired, ALE operation can be disabled by setting bit 0 of SFR location 8Eh. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE disable bit has no effect if the Microcontroller is in external execution mode.

4) PSEN

Program Store Enable is the read strobe to external program memory. When the AT89C51 is executing code from external program memory, PSEN is activated twice each cycle, except that two PSEN activations are skipped during each access to external data memory.
5) EA / VPP
External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. The pin also receives the 12-volt programming enable voltage (VPP) during Flash programming, for parts that require 12-volt VPP.

6) XTAL1
Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

7) XTAL2
Output from the inverting oscillator amplifier.

B. GSM Module
The microcontroller used for the implementation of this system is ATmega32. It is an 8-bit microcontroller with 32KB on-chip programmable flash memory. Based on the program stored in the microcontroller, it will generate the OTP. And if the passwords are matched or not, it will switch a relay also. The GSM modem helps to send the generated OTP. OTP generation is the main part of this project. This is done by the microcontroller. The RISC based microcontroller consists of four ports. In which port A is dedicated for ADC.

C. Max232
For long distance communication parallel data communication is faster. But for this there may be more channels are necessary. Therefore the cost of the communication system also increases. So here prefer the UART serial communication. Here the baud rate used for data transmission is 9600. The MAX 232 converts the signals from RS 232 serial port to signals suitable for use in TTL compatible digital logic circuits. It provides a connection between a serial port device to a serial port that uses RS 232 a standard

D. LCD Display
For ease of interaction with the user, this system uses an electronic display module. Here a 16x2 LCD is used. This means in 2 lines it is possible to display 16 characters per line. A 5x8 pixel matrix is used for display one character. Two registers are associated with an LCD, such as data and command. These modules are preferred since it is easily programmable. For providing visual assistance to the lineman this module is unavoidable.

E. Power Supply
For the working of the system a power supply is needed. The microcontroller needs only 5 volt DC for its working. Therefore the incoming AC will be rectified filtered and regulated by 7805 IC.

F. Relay Driver
A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays.

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H. Resistor
A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law V=IR. Resistors are used as part of electrical network and electronic circuits. They are extremely common place in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire.

I. Capacitor
A capacitor or condenser is a passive electronic component consisting of a pair of conductor separated by a dielectric. When a voltage potential difference exists between the conductors, an electric field is present in the dielectric. This field stores energy and produces a mechanical force between the plates. The effect is greatest between wide, flat, parallel, narrowly separated conductors.
J. Diode
Diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. When used in its most common application, for conversion of an alternating current (AC) input into a direct current (DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and weight as compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.

K. Transistor
A transistor is a semiconductor device used to amplify and switch electronic signals and electric power. It is composed of semiconductor material with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals changes the current through another pair of terminals. Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits.

L. Rectifier
A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), current that flows in only one direction, a process known as rectification.

a) Operation
GSM modem is an important factor in proposed work. The ‘AT’ commands which are received by the microcontroller through level shifted IC Max232. When the program is executed, it drives relay from the microcontroller through relay driver IC ULN2003. Load’s or electrical lines are switched ON and switched OFF based on the corresponding command sent from the user’s cell phone to GSM modem being received after establishing connection from a cell phone. As per the program, an acknowledgement is received by a SMS being sent depending on status and acknowledgement sent and received. LCD screen is used here for displaying complete operation.

III. Future Scope
The project can be interfaced with the GSM modem for the remote control of circuit breaker via SMS. We can also use EEPROMS than can be interfaced to system. So the circuit breaker can, not only operate from the substation, but also from distance through wireless communication. SCADA can also be implemented to know where the fault is occurred in the system directly and so a lineman can directly locate the fault location and can rectify it.

IV. Advantages
Avoids electrical accidents to line man. Uses commonly available components.

V. Conclusion
Thus the system can be used in electrical substations to ensure line man safety also in the buildings, houses, hotels, colleges and shopping malls to save the power. The electric line man safety system is designed to control a circuit breaker with help of a password only.

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