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Linemen Safety and Powerline Broken DetectionSystem

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ABSTRACT: Security is the prime concern in our day to day life while performing any activity. In the current scenarion, accidental death of linemen is often read and evidenced. In this direction, a safety measure to safe guard the operator is found very necessary looking into the present working style. The electric lineman safety system is designed to control the control panel doors and circuit breaker by using a password for the safety. Critical electrical accidents to lineman are on the rise during electric line repair may be due to lack of communication and co-ordination between the maintenance staff and electric substation staff. The proposed system provides a solution that ensures safety of lineman. The control to turn ON or OFF the line is maintained by the lineman. The system has an arrangement such that a password is required to operate the doors of the control panel and circuit breaker (ON/OFF). A secured password is requested and received from the control room by the linemen for the point of repair or service. This request is registered and a password is sent to the lineman's mobile and control panel GSM module for the further work. The password is entered through the matrix keypad which is interfaced to the Arduino Uno microcontroller. The entered password is compared with the password received by the control panel GSM receiver. If the entered password is correct then the circuit breaker ON/OFF and door OPEN/CLOSE feature is enabled for the lineman to take up repair. Any intruder tries to operate the mechanism with the wrong password by three times it will display a message in the LCD display and a message is sent to the control room regarding unauthorized accessing of the system for the safety reasons.

KEYWORDS:
ArduinounoATMEGA32,relay,buzzer,keypad,GSM, sensor,OTP,LCDdisplay.

I. INTRODUCTION

The electrical energyis the clean and cheapest form form of energy for the specific needs of domestic, corporate and industrial consumers. The electric distribution is a very wide network of wires to deliver the supply by incorporating various electrical elements. In current scenario accidental cases of deaths or injuries of linemen is noticed while working on the section of line for the repair or maintenance the present work focuses on regular practice and flaws of line clearance (LC) for the repair request and closing of LC after the repair is done. The drawbacks of current LC system are charging of the line by accidental or by mistake of the operators at substation may be due to lack of communication or criticality has evidenced injuries or even death of working linemen on the line. The use of intelligent micro controllers for various control mechanisms is found in the literature [1]. The use of communication networks increases the efficiency of the remote-controlled objects or devices . The GSM technology connects the end device from remote and provides an opportunity to control [2]. The proposed low cost Arduino controlled GSM message based secured password operated control panel and circuit breaker ON/OFF is the best suited mechanism in preventing the injuries or death of working men on the line by any accidental charging of line un knowingly [3]. The unauthorized access of the secured systems is prevented by authorization password or login for the security purpose. The lack of communication and co-ordination between the maintenance staff and the electric substation staff can be minimized. This

system enables a solution to ensure the safety of the electric linemen [4]–[6].Accidents occurred due to natural disasters or manmade mistakesand other many conditions those outcomes may causes a death of human beings. To avoid such that accidents, preventionis better.These unexpected happening may affects the ordinaryperson and other living things. Such that, to detect these type of faults and make an awareness to all peoples. Apower line breaking is a fault to detect and makeprevention as soon as possible, Otherwise it may causeothers. Different kinds of systems of fault position andlocate the accurate place are exist. Most of the systemsare prevents an accident somewhere. But thisProject mainly focuses to save the human beings atanywhere, anytime. In addition to groups these faultposition of spot aretransmitting to an authority person by the way of sms and calls. At a recent timedifferent kinds of fault position systems are suggest liketravelling wave based system, voltage based systems,knowledge based methods and impedance basedsystems.This system uses 8051 Microcontroller, RF transceiver,a Global system modulation and relay. From using theseessential components to discover a defect position,examine and categories these types of defects and thenauto tripping where the fault are occurred. Thecollections of information are transmitting to controlperson. This system mainly focuses to human carelessmakes anaccident . If the control person not properly acts, the accident will occur. So that using a relay to shut down the whole units before sending a set of details tocontrol person and this can protects to save the humanbeings.

II. LITERATURE SURVEY

[1].Electric line man safety using micro controller with gsm module: 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. Password based circuit breaker: A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see fatal electrical accidents to the line man are increasing during the electricline repair due to the lack of communication and coordination between the maintenance staff and theelectric substation staff. In order to avoid such accidents, the breaker can be so designed such that only authorized person can operate it with a password. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit microcontroller of 16f877A family. The password is stored in an EEPROM,interfaced to the microcontroller and the password can be changed any time unlike a fixed one burnt permanently on to the microcontroller.

A keypad is used to enter the password and a relay to open or close circuit breaker, which is indicated by a lamp. Any wrong attempt to open the breaker (by entering the wrong password) an alert will actuated, indicated.

[2]. A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see fatal electrical accidents to the line man are increasing during the electric line repair due to the lack of communication and coordination between the maintenance staff and the electric substation staff.

In order to avoid such accidents, the breaker can be so designed such that only authorized person can operate it with a password. Here, there is also a provision of changing the password.The system is fully controlled by the 8 bit microcontroller of 8051 family. The password is stored in an EEPROM, interfaced to the microcontroller and the password can be changed any time unlike a fixed one burnt permanently on to the microcontroller. A keypad is used to enter the password and a relay to open or close circuit breaker, which is indicated by a lamp. Any wrong attempt to open the breaker (by entering the wrong password) an alert will be actuated, indicated by another lamp.

[3]. A fault detection and locate the exact spot where the line has occurred is also the main abstract of the previoussystem. A system only identity where the fault hasoccurred and may not auto trip the whole units. If theauto trip is not present, the control persons come to faultarea and repair the post as soon without making anyhazards

for others and themselves. These are the maindrawbacks for the previous system. The human beingsare also affected even when the prevention system asimplemented. The maintains of component are notpossible in previous systems. Somehow the componentsare affected due to natural disasters or artificially. Thelong distances of street are not suit a low level radiofrequency. Such that, move to high level radio frequencytransmission are better to use. The peoples can't able tounderstand the situation in which the power has broken.

The previous systems are not introducing a display adefect to the moderate people. Here this system using aliquid crystal display to broadcast a collection ofinformation in which the types of faults and accuratespot. The previous systems are also utilizes a globalsystem modulation to telecast the message of the set ofdetails in which kinds of faults, defect position orparticular post and area to the control room. But thissystem is also doing the same steps and further makes acall to higher authority when the control person are nottake a decision to repair the fault as soon.

[4].Electric lineman protection using user changeable password based circuit breaker: A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation. When operated manually we see fatal electrical accidents to the line man are increasing during the electric line repair due to the lack of communication and coordination between the maintenance staff and the electric substation staff. In order to avoid such accidents, the breaker can be so designed such that only authorized person can operate it with a password. Here, there is also a provision of changing the password. The system is fully controlled by the 8 bit microcontroller of 8051 family. The password is stored in an EEPROM, interfaced to the microcontroller and the password can be changed any time unlike a fixed one burnt permanently on to themicrocontroller. A keypad is used to enter the password and a relay to open or close circuit breaker, which is indicated by a lamp. Any wrong attempt to open the breaker (by entering the wrong password) an alert will be actuated, indicated by another lamp.

III. PROBLEMS FORMUATION

1. Accidents to the line man are increasing during the electric line repair due to the lack of Communication and co-ordination between maintenance staff and the electric substation staff.
2.The overhead power transmission and distribution system is not safe, when it is damaged. Due to this many people die due to electric shock hazards.
3.the electrical shock accidents to the line man are increasing during the electrical line repair.
4.There is a flow of very high value of current above normal value due to factors related to nature like lighting, wind and natural disaster etc. causes many electrical apparatus get affected.

IV. OBJECTIVE

1.The control to turn ON/OFF the line lies with the linemen.
2.This project gives better awareness about the possible hazards caused by electricity shock.
3.This project also detects the line breakage and notify people around with the help of buzzer and alert staff about line breakage with sms.

V. PROPOSED METHODOLOGY

PRINCIPLE:

The main component is ATMEGA328 controller.Keypad is used toenter the password. The password which is entered is compared with the predefined password. If entered password is correct then the corresponding electrical line is turned ONor OFF. In this project a separate password is provided to each electrical line.

OPERATION

For the operation of linemen safety and broken line detection detectionsystem , program is written in Atmel studio6.0 software and created into a .hex file that is further burnt onto the controller. Connections are given as per the circuit diagram. While giving theconnections, it should be made sure that there is no common connection between AC and DCsupplies. 5V power supply circuit is to be used to provide regulated 5V DC to the controller.Now both the AC and DC supplies are switched on. Relay output pins gets 230V, so theyshould not be touched. LCD displays "enter password". Enter the password with the help ofkeypad, you can see „*" for each digit. Now if the password is correct then the circuit breakerstate changes and displays status line on the LCD screen. If the password is wrong then itdisplays "access denied". Since this is a user changeable one, to change the password click on„*", „#". It will display „enter password", In addition to this we have included a sensor which sense the voltage and on buzzer to make sound in Case a power line is broken ,so the human beings around that place will stay away.

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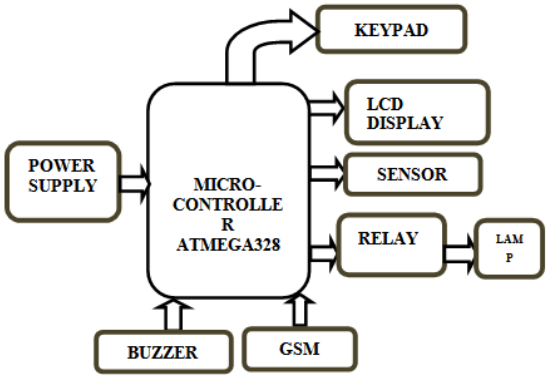
Fig 1 Block Diagram Of Proposed Model



HARDWARE COMPONENTS
ARDUINO UNO ATMEGA328

The Arduino Uno is a microcontroller board based on the ATmega328 . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

PHYSICAL CHARACTERISTICS:

The maximum length endwidth of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Fig 2 . ArduinoUno(Micro-Controller ATMEGA328

GSM SIM800L

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Low cost and small footpath and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting module boots up, searches for cellular network and login automatically. On board LED displays connection state (no network coverage - fast blinking, logged in slow blinking)

Fig 3. GSM

The basis of the GPS is a constellation of satellites that are continuously orbiting the earth. These satellites, which are equipped with atomic clocks, transmit radio signals that contact their exact location, time, andother information.

RELAY

Relay is an electrically operated switch. Current flowing through the coil of the relay creates s a magnetic field, which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switches positions and they are double throw (Change over) switches.

KEYPAD

Another major peripheral used in the project. However unlike the LCD, this is an input peripheral. A 4×4 Keypad is used to input the numbers or string patterns that are all displayed on the LCD. It is also connected directly to the micro controller.The keypad settings are configured within the code which is programmed into the microcontroller. It sends an 8 bit binary value for each button pressed which is processed and converted into a character displayed on the LCD screen.

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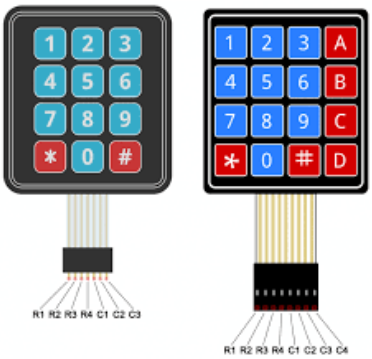

Fig 4. Keypad

LCD DISPLAY

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following issues:

1. The declining prices of LCDs.
2. The ability to display numbers, characters andgraphics . This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controllersinto the LCD, thereby relieving the CPU of the task of refreshing the LCD. Incontrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that theycannot be activated by standard IC circuits. They are used for writing different message on a miniature LCD.

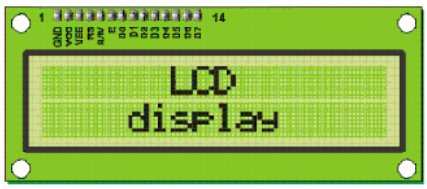

Fig 5.LCD

BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical , or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click.

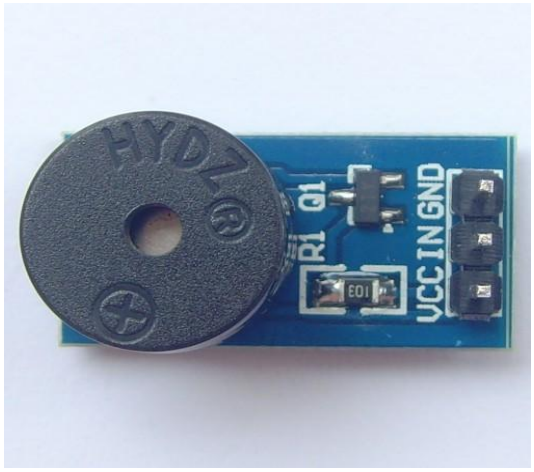

Fig 6.buzzer

VI. ADVANTAGE

- No need to go to power station for switch off the circuit.
- Easy to use
- Gives fast response
- Save the life of line manfrom electrical shock.
- User friendly operation of main line.
- Easy to install and operate.
- Cost effective.
- Easy to maintain and repair.
- Avoids electrical accidents to lineman and also electrical equipment's.
- Ease of operation, maintenance and repair.
- Concept works on a secured password which can be modified easily.

VII. DISADVANTAGE

- On the loss of password system cannot be operated and need a change in password request to the control substation.
- Increased dependency of the concept. A failure or malfunction of the components leads to interruption of service.

VIII. APPLICATION

- As a measure to prevent losing of many lives modernization of existing power transmissionsystem has to be established all over the state in a phased manner.
- It avoid accidents due to conductor snapping and thereby preserve life andcredibility of utilities, and improve reliability and revenue stability.
- Can be used to operate in public area.
- It can also be used as password based electrical appliances control or password based control system.

This system is mainly utilizes for the subsequent cases:

- A people can protect ourselves from the power line breaking and also understand the reason for power cut.
- At natural disaster time, the workers can struggle to do their work. By applying this system, the workers burden is reduced as possible. A relay as auto trip the whole units, this can also reduce the works for authority.
- This system can move into next level generation of power line safety and protection. This prevention system also considered the workers of electrical power repair/installer. The co-workers can also identify the problem.

IX. CONCLUSION

It can work on a single given known password. No other person can reclose the breaker until the stored password is entered. It gives no scope of password stealing. It is effective in providing safety to the working staff. It is economical and it can be easily installed. Sensor provides safety to human/animal by sensing their presence and alerting through a buzzer**.**

The protection sequence activates in real time to cut off the transmission and the buzzer gets activated when the breakage in power line occurred.

The password to operate can be changed and system can be operated efficiently with the changed password. Finally the aim of the project is to avoid the fatal accidents for line man and people from power line breakage.

FUTURE SCOPE

As the future enhancement, the following possible radvancements like controlling the transmission line of whole city from a single control unit and as per the requirement it can be used to provide current to particular area. Multiple IoT hardware's from different areas can also be combined on a single webpage so that it could become much convenient to monitor and control from remote locations.

Similarly, the status of different transmission lines can be monitored and if they get damaged, automatically information should be notified through the webpage.

In future we can send an SMS to switch on the power circuit.

We can for each and every line to detect the fault and automatic send fault SMS to lineman for repair of line.

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