GSM based electrical line man safety

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ABSRTACT

A GSM based circuit breaker is an automatically operated electrical switch designed to provide security to the line man while repairing the electrical lines. When operated manually we see fatal electrical accidents to the line man are increasing during the electric line repairing due to lack of communication and coordination between the maintenance staff and electric substation staff. In order to avoid such accidents, the circuit breaker can be designed such that only authorized person can operate it with the help of password. Here, there is also a provision of changing the password. The system is fully controlled by the ATMEGA. 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 the microcontroller. By using GSM module operator also can enter the password while he is away from the work station and keypad is used to enter the password when operator is in work station. A relay is used to open or close circuit breaker, which is indicated by lamp. Any wrong attempt to open the breaker an alert will be display on the mobile screen through the GSM and also display the status on the LCD display.

Keywords: *Resistors, Capacitors, Diodes, Transistors, Voltage regulator, Rectifier, Microcontroller, EEPROM, Relay, Relay Driver, GSM module, etc.*

1. INTRODUCTION

Security is more important in our day to day life. Everyone needs more security as much as possible. The GSM based electric line man safety system is designed to control a circuit breaker by using a password for the safety of electric man, the line man can enter the password through using GSM as well as keypad. There are many critical electrical accidents are rises during the electric line repair. These accidents are happen due to lack of communication and co-ordination between the maintenance staff and electric substation staff. In this proposed system the security of the line man is its own hand. The control to turn on or off the line will be maintained by the line man only because this system has an arrangement such that a password is required to operate the circuit breaker (on/off). The system is fully controlled by a microcontroller from ATMEGA328.A matrix keypad and GSM is interfaced to the microcontroller to enter the password. The entered password through GSM or keypad is compared with the password stored in the memory. If the entered password is correct then only then the line can be turned ON/OFF.
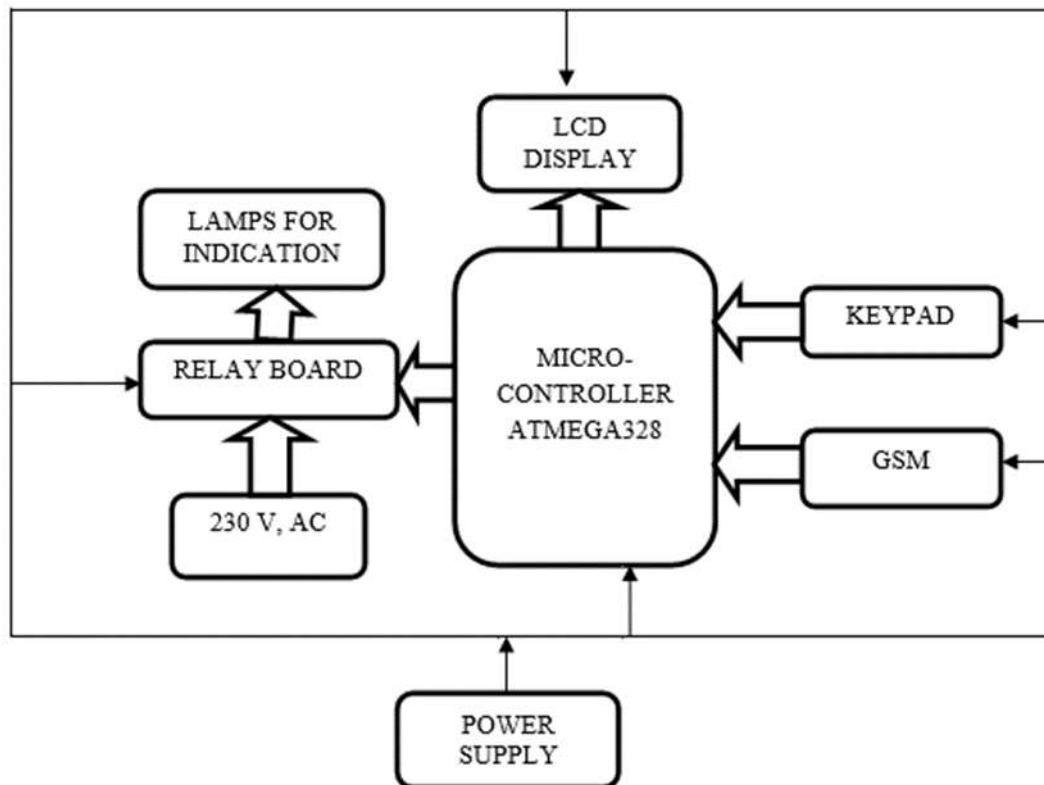
1.1 Existing System

Circuit breaker plays important role in maintaining system security. Since their malfunctioning could results in further component outages and may lead to the insecure operating conditions. During maintenance of distribution lines there is a chance communication gap between the electric line and sub-station operator or staff. This communication gap may risk life of electric line man. The control to turn ON/OFF the line lies with the line man only. During maintenance the entire line is turned off this cause inconvenience to the consumers.

1.2 Disadvantages of existing system

- Continuous monitoring is required.
- There is no any safety.
- Time consuming.
- Automatic control does not exist

2. BLOCK DIAGRAM

3. PROPOSED METHODOLOGY

At present if there is any maintenance work at the distribution the entire line will be turned off which causes trouble to the consumers. The proposed system uses a microcontroller and a rectified power supply. When the proposed system is ON the GSM modem will send the message to the receiver. A matrix keypad is interfaced to the microcontroller to enter a password. The password entered is displayed in the LCD. The entered password is compared with password stored in the ROM of the microcontroller. If the password entered is correct, then only the line can be turned ON/OFF.
A relay is controlled by a relay driver IC, which is interfaced to the microcontroller also it is interfaced with the GSM modem. Whenever there is a maintenance work in the main line, The line can be disconnected only when the password entered will match with the stored password. We can enter the password using two ways one is keypad and another way is mobile through GSM modem. The relay ON/OFF operation will be indicated by the lamps; also it sends a message to the receiver about the line disconnection. As soon as the maintenance work is finished then line man should enter the password to disconnect the line.

3.1 Advantages of proposed system

- Save the life of line man.
- User friendly operation of main line.
- Easy to install and operate.
- Cost effective.
- Easy to maintain and repair.

4. HARDWARE DESCRIPTION
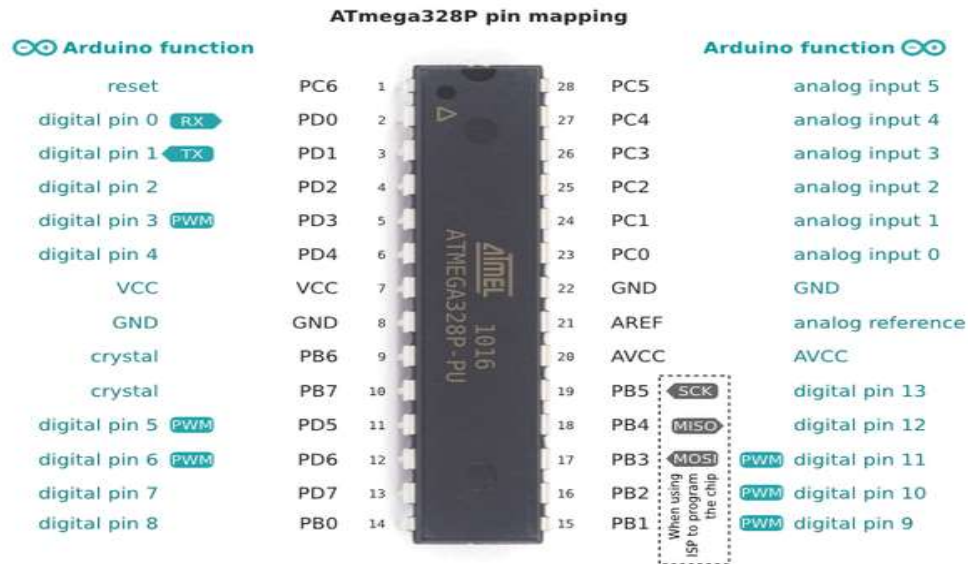
4.1 Mains Supply

Supply coming from MSCB (single phase) i.e. 230 V, 50 Hz is fed to the electromagnetic relay.

4.2 DC Power Supply

The microcontroller and associated circuitry requires 5V & 12 V supply while the relay requires a 12 V supply. Single phase power supply (230 v, 50 Hz) is given to the 12 V, 1 A step down transformer. Then it is rectified by the bridge rectifier (1N 4007) and filtered by capacitor input filter (1000 μf, 63 V). Filtered output is fed to the voltage regulator (7812) to obtain 12 V DC output.

4.3 Micro-Controller

The ATmega is micro-controller. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator.

ATmega328P pin mapping

Arduino function						Arduino function
reset	PC6	1	28	PC5		analog input 5
digital pin 0 RX	PD0	2	27	PC4		analog input 4
digital pin 1 TX	PD1	3	26	PC3		analog input 3
digital pin 2	PD2	4	25	PC2		analog input 2
digital pin 3 PWM	PD3	5	24	PC1		analog input 1
digital pin 4	PD4	6	23	PC0		analog input 0
VCC	VCC	7	22	GND		GND
GND	GND	8	21	AREF		analog reference
crystal	PB6	9	20	AVCC		AVCC
crystal	PB7	10	19	PB5	SCK	digital pin 13
digital pin 5 PWM	PD5	11	18	PB4	MISO	digital pin 12
digital pin 6 PWM	PD6	12	17	PB3	MOSI PWM	digital pin 11
digital pin 7	PD7	13	16	PB2	PWM	digital pin 10
digital pin 8	PB0	14	15	PB1	PWM	digital pin 9

When using ISP to program the chip

4.4 Relay

Relays are devices which allow low power circuits to switch a relatively high current/voltage ON/OFF.The relay is work as a electromagnetic switch.

4.5 Keypad

HEX keypad is a standard device with 16 keys connected in a 4x4 matrix, giving the characters 0A-F. Interfacing of the key pad to ADUINO is essential while designing embedded system project which requires character or numeric input or both. In this project we are going to use entering the numeric password for turn ON/OFF the supply.

4.6 Liquid Crystal Display (LCD)

We are going to use 16×2 LCD display & it is used for displaying various alerts used in project. It will be decided during coding.

4.7 GSM

It is used to send various alerts. In this project SIM300 module used.

5. CONCLUSION

The project titled 'GSM BASED ELECTRIC LINEMAN SAFETY SYSTEM' gave the following conclusions.

- It can work on a single given known password.
- The password to operate can be changed and system can be operated efficiently with the changed password.
- No other person can reclose the breaker once the changed password is given into system other than the person who had changed it.
- It gives no scope of password stealing.
- It is effective in providing safety to the working staff.
- It is economical.
- It can be easily installed.

6. APPLICATIONS

- Most useful to operate in public area.
- It can also be used as password based electrical appliances control or password based control system.
- Used in hotels and shopping malls, industrial purpose to save power.

7. REFERANCES

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