



ICNSCET19- International Conference on New Scientific Creations in Engineering and Technology

Electric Line Man Safety using Android based Circuit Breaker

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Abstract—

Safety of human life is predominantly important. Nowadays electrocution to the linemen are swell up during the electric line rectification, due to the lack of communication between the linemen's workplace and the mainstation or substation. ie the personnel in the mainstation or substation may erroneously switch on the power line without the knowledge of linemen while working on the powerlines. Our endeavor here is to design the system by which powerline can be controlled by linemen themselves. The electric lineman safety system is embedded based system which initiates the new notion of using QR code as a password based circuit breaker to control the powerlines. When the electric linemen spotting the fault in the power transmission system then he power lines can be switched OFF by scanning the QR code with the help of Android APP. The APP check the password 1 and send password 2 to the microcontroller through Bluetooth. Then the microcontroller verifies the password 2 and opens out the relay to switch OFF the powerline. The linemen can rescan the same QR code to switch ON the powerline. The two time verification of password concept provides more secure system.

Keywords—

Electrocution, powerlines, QR code, Circuit breaker, microcontroller, Android APP, Bluetooth, Relay

INTRODUCTION

A world without electricity is hard to imagine. Electricity is now become a part of our daily life. Electricity plays major role in both homes & industries. Almost all devices at homes and industries are running because of electricity. As how, the electricity is important part in our life the electricians' life is also predominant one. They play the many roles in their field.

Electricians install, maintain and repair electrical power system in homes and industries, electrical equipment, transmission lines and almost anything that involves electricity. At that time, the electrocution to the lineman may happen. If the lineman wants to repair the power system then the maintenance staff turns off the respective powerline in the mainstation. The mainstation and the fault detected power lines may in different areas. Due to these the communication between the lineman and the maintenance staff may lack. Any other personnel in the mainstation or substation may mistakenly switch ON the power line without the knowledge of lineman while working on the powerlines. This would tend to fatal electrical accident. This proposed system provides a solution that ensures safety of lineman. The control to turn ON/OFF the transmissionlines will be maintained by the lineman only. The proposed system not only focuses on the safety of electrical lineman but also to provide the feasible system to control powerlines. One may easily control the workbenches or power lines at that instant without went to the mainstation or control units. In this project one who wants switch off the power lines or certain work benches, then he scan the QR code to switch OFF the main line with the help of android app via Bluetooth. When the work has to be done then the circuit breaker is again switch ON by rescan the same QR code. The control actions are performed with the help of Microcontroller and the relay

I. LITERATURE REVIEW

In considering the content of our critical review, we need to be aware of the key academic theories within our chosen topic that are pertinent to or contextualize our research. whilst we should have read the literature that is closely related to our research aim(s) and objective(s), is *password based circuit breaker* (Tarun Naruka et al., 2017). In his article [1], he designed the system is fully controlled by the 8 bit microcontroller from 8052 family which has an 8KB of ROM for the program memory. A matrix keypad is interfaced to the microcontroller to enter the password while a relay driver IC is used to switch ON / OFF the loads through relays. The complete circuit is built with on board power supply. For other topics where research has been undertaken over a number of days we may be able to focus on more closely related literature (Jay kumar et al., 2016 & Ved marale et al., 2017).

II. EXISTING SYSTEM

1. KEYPAD BASED CIRCUIT BREAKER

In the traditional architecture the keypad based password is used to control the powerlines. In the existing project 4×3 keypad is used to enter the password. Keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the predefined password generated. If the password entered is correct, then only the line can be turned ON/OFF. The basic idea behind the existing project is shown in the following fig.1. this system does not much secure. The password can be easily stolen.

III. PROPOSED SYSTEM

In this proposed system, the new idea of QR code is used as the password which can be scanned by using android app to control the power lines. It is the one of the application of embedded domain. Here both hardware and software components are used. The circuit breaker is designed by using 5v power supply, Arduino Nano, Bluetooth module, LCD display and 2-channel DC relay. This system would eliminate the use of keypad, OTP and GSM concepts. More secured safety is provided by verifying the password two times in android app itself and by the microcontroller. It is also gave the easy installation and low cost.

Creating the APP to scan the QR code If the password is correct then send the signal Again check the password and trigger the relay driver Relay driver send control signal to the relay to off the power

line Relay break the circuit Then the power line is OFF After the work is done by the lineman then he again scan the QR code Power line will be turned ON

Fig1: Overview of Proposed System

IV. IMPLEMENTATION HARDWARE DESIGN OF PROPOSED SYSTEM

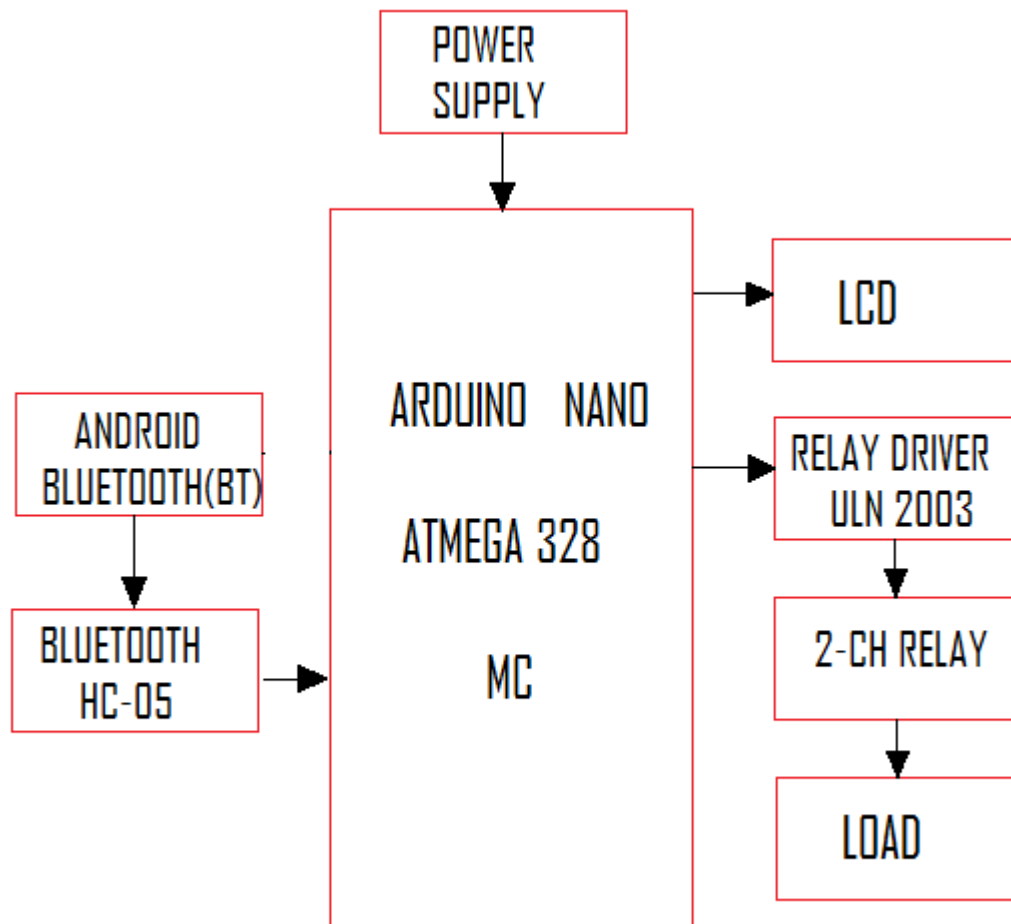


Fig 1:Hardware block diagram of proposed system

V. WORKING OF PROPOSED SYSTEM

The provided circuit uses standard power supply of 5V. An ATmega328 Series Microcontroller is interfaced with relay driver, relay, LCD and Bluetooth module HC 05. Out of 14 digital pins of this series microcontroller the pins D0(RX0) and D1(TX1) which is connected to the Bluetooth HC 05 are used to transferring and receiving the data between the Bluetooth module and Arduino Nano connected to the Bluetooth module HC-05 and upper digital pins D11 and D12 are act as the control lines for relay driver IC of pin IN1 and IN2. A16x2 LCD is used to display the information which is connected to the digital pins D4,D5,D6,D7,D8 and D9 pins of ATmega 328 microcontroller.

For the operation of circuit breaker through a password, program is written in Arduino IDE software that is burnt onto the controller with the help of mini USB. Now DC supply is switched ON. LCD displays “POWERLINE STATUS” then we have to scan the password1 with the help of created Android APP.

Now if scanned password is correct then the android app will send the password 2 to the Arduino Nano. Atmega 328 receive the password 2 and again it verifying the password to provide the more

secure system. If the password 2 is checked with the predefined one then it send the control signal to the relay module. The circuit breaker state changes and displays 'POWER OFF' status line on the LCD screen. If the password is wrong then it displays "INCORRECT PASSWORD". The power lineman be again turned ON by rescan the same QR code and the LCD displays 'POWER LINE ON' the separate QR code are provided for the each transmission line or work benches. Thus the line man can control the status of circuit breaker only by using his own QR code and android APP.

VI. RESULT AND DISCUSSION

This project can be used to ensure the safety of the lineman or electrician in transmission lines or in industries. The powerlines can be only turned off/on by the line man. This system provides an arrangement such that a password is required to operate the circuit breaker (ON/OFF). The designed system power line status can be displayed with the help of the LCD display. When the device is activated it initially displays the "POWERLINE STATUS"

After scanning the QR code it displays the condition of circuit breaker as shown



Fig 2: LCD DISPLAY for powerline status after scan QR code

To turn ON the power lines, the QR code is rescanned and the status of the powerline will be changed to ON which is shown



Fig 3: LCD DISPLAY for powerline status rescan QR code

VII.CONCLUSION

The proposed safety system is successfully designed . It provides a new approach to the security of the lineman and completely eliminates the fatal electrical accidents to the lineman due to electric shock during the power line repair. This system can also implement in many other public areas.It can work on a single given QR code. No other person can reclose the breaker until the stored QR code is scanned. The concept of two times verification of password provides the more secured system. It gives no scope of password stealing. It is also economical and it can be easily installed

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