POWER SYSTEM MONITORING AND CONTROLLING BY USING SMART PHONE

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Abstract: The complication of power systems network has grown-up, automation of power systems has develop into a need of each service company to raise its efficiency and to improve the excellence of power being distributed. The idea of this project is to attain the remote electrical parameters like voltage, current and these actual values are transmit over GSM network using modem or phone at power system network. The proposed system is also intended to protect the electrical circuitry by functioning on electromagnetic relay. This relay gets activated whenever the power system parameters go beyond the predetermined values and also used to drive a circuit breaker to switch off the main supply. Operator is able to post instructions in the type of sms messages to study the remote power system parameters. This system can be constructed to transmit sms alarm when the circuit breaker trips and also when the voltage or current exceeds the predetermined values. This work makes use of microcontroller with certain interior memory to hold the code. The controller is programmed using embedded c language.

Keyword: GSM Modem, ADC module, PIC-C compiler for Embedded C programming, Microcontroller, Relay, Proteus for hardware simulation.

1. INTRODUCTION

Transmission of electricity in Tamilnadu is controlled by different substation those are placed near the consumer place. Substations are connected with GRID network. Group of power transformer was connected in the single substation and group of substation are connected with the single GRID network. The distance among the power station and consumer might be in terms of thousands of miles therefore the quantity of massive power exchange over long transmission have turned out as a outcome of the lack of quality of the power supply. The power system may turn into unstable, if there is some insufficiency in the protection, monitoring and control of a power system network. Therefore it is essential to monitoring the power network that is capable to automatically sense, monitor, and categorize the existing constraints on the transmission lines. Whenever the supply fails from the consumer side then the circuit breaker will disconnect the output of power transformer. In [1], it is proposed to acquire the remote power system parameters like voltage and current and post these actual values over GSM network using GSM Modem/phone along with temperature at power

station. The information collected in an electric substation about the state of its components and the flow of electricity will give the electrical utility provider as discussed in [2]. The new monitoring and signal processing solution in substation based on a synchronised sampling technology and multi-functional IED's is proposed in [3]. In this work is designed to protect the connected load by functioning electromagnetic relay. This relay gets activated whenever the power system parameters go beyond the predetermined values.

2. PROPOSED SYSTEM

As discussed earlier, maintenance of a transformer is one of the biggest problems in the Electricity Board (EB). Also the oil temperature is increased due to the increase in the level of current flowing through their internal windings. This results in an unexpected raise in voltage, current in the distribution transformer. Therefore, it is proposing the automation of the transformer from the EB substation. In the automation, it should be consider the voltage, current and temperature as the parameters to be monitored. Hence, design the automation system based on microcontroller which continuously monitors the transformer. The information from the sensor will be stored by microcontroller and used for the calculation for the output based on the predefined algorithm which is programmed in it. The microcontroller will use the data from the sensors and process it for the calculation in order control and monitoring the parameters.

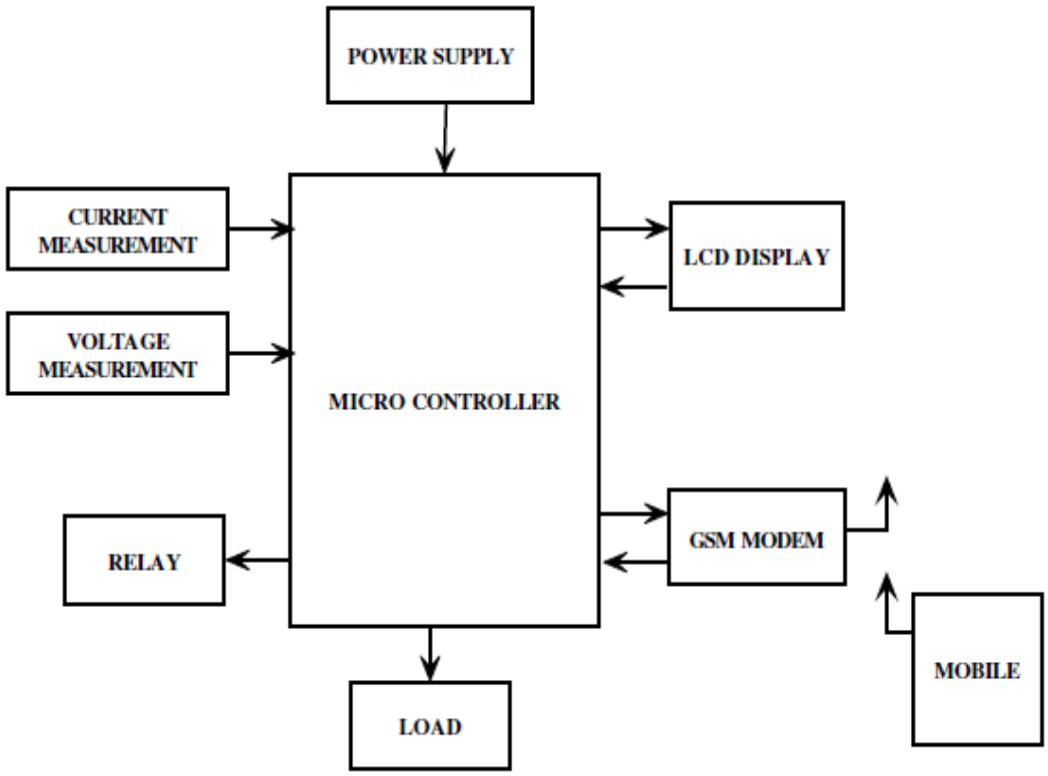

Figure 1. Block Diagram of the Proposed System

A GSM module or a GPRS module is a chip that will be used to establish communication between a mobile device or a computer machine. All the parameters from the microcontroller will be indicated through the LCD. Relay is an electrical switch it open and close the circuit under control of electric current. The block diagram representation of the proposed system as shown in figure 1.

2.1 System Design

Modulation:

Modulation is a form of change process where change the input information into a suitable format for the transmission medium. It also changed the information by demodulating the signal at the receiving end. The GSM uses Gaussian Minimum Shift Keying (GMSK) modulation method.

Access Methods:

GSM prefer a combination of TDMA/FDMA. The FDMA part involves in division of frequency of the total 25 MHz bandwidth into 124 carrier frequencies of 200 kHz bandwidth. One or more carrier frequencies are then assigned to each BS. Each of these carrier frequencies is then divided in time, using a TDMA scheme, into eight time slots. One time slot is used for transmission by the mobile and one for reception. They are separated in time so that the mobile unit does not receive and transmit at the same time.

Transmission Rate:

The total symbol rate for GSM at 1 bit per symbol produces 270.833K symbols/second. The gross transmission rate of the time slot is 22.8 Kbps. GSM is a digital system with an over-the-air bit rate of 270 kbps.

Frequency Band:

The uplink frequency range specified for GSM is 933 - 960 MHz (basic 900 MHz band only). The downlink frequency band 890 - 915 MHz (basic 900 MHz band only.

Channel Spacing:

This indicates separation between adjacent carrier frequencies. In GSM, this is 200 KHz.

2.2 Design consideration

The values of voltage and current of the transformer is directly applied to one of the input ports of the microcontroller. Along with this, a display is connected in the input port of the microcontroller. The GSM transmitting section and the load variation control are connected

to the one of the output ports in the microcontroller. The microcontroller at the substation monitors and captures the current and voltage values for a particular period of time interval. The captured values are stored in the data register and displayed using the LCD display. The monitored voltage and current values of the transformer are transmitted using the transmitter for each and every time interval. Any antenna tuned for the selected RP eauency can be utilized Tor the transmission of the RF signal but the antenna has to exhibit a unidirectional radiation pattern. In the receiver side, the receiver antenna converts the RF signal into electrical signal and acquires the information which has been transmitted by the transmitter. Based on the received information, controlling operation is performed.

3. RESULT AND DISCUSSION

The project was designed such that the devices can be monitored and also controlled from anywhere in the world using GSM modem connected to mobile phone. Also real time monitoring of different parameters is done which can provide safety to the power system and its equipment's.

3.1 Case 1: Relay ON mode

When opening the message application in mobile phone type "LN to start the connected load or glow bulb. The figure 2 shows the sms is send to the phone by the kit connected GSM module. Instantly the bulb will glow via the relay.

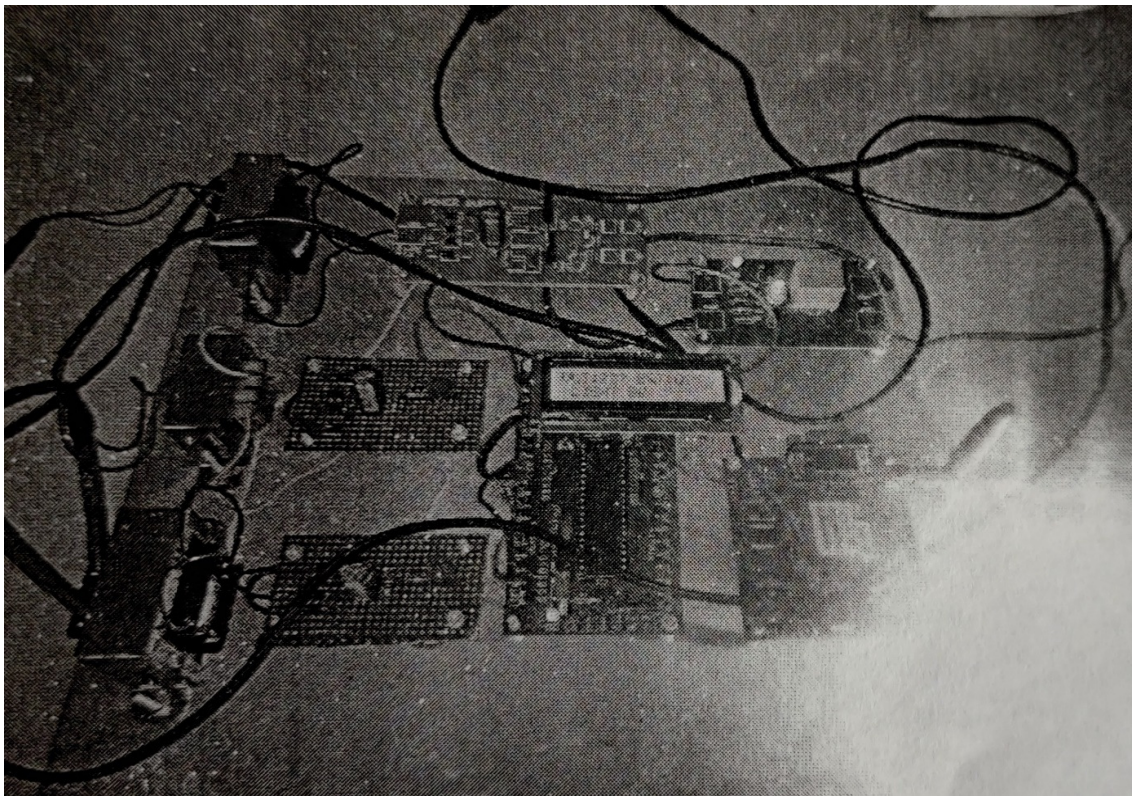

Figure 2. Relay ON Mode Operation

3.2 Case 2: Relay OFF mode

When opening the message application in mobile phone type “LF to stop the connected load or glow off the bulb. The figure 3 shows the sms is send to the phone by the kit connected GSM module. Instantly the bulb will glow off via the relay.

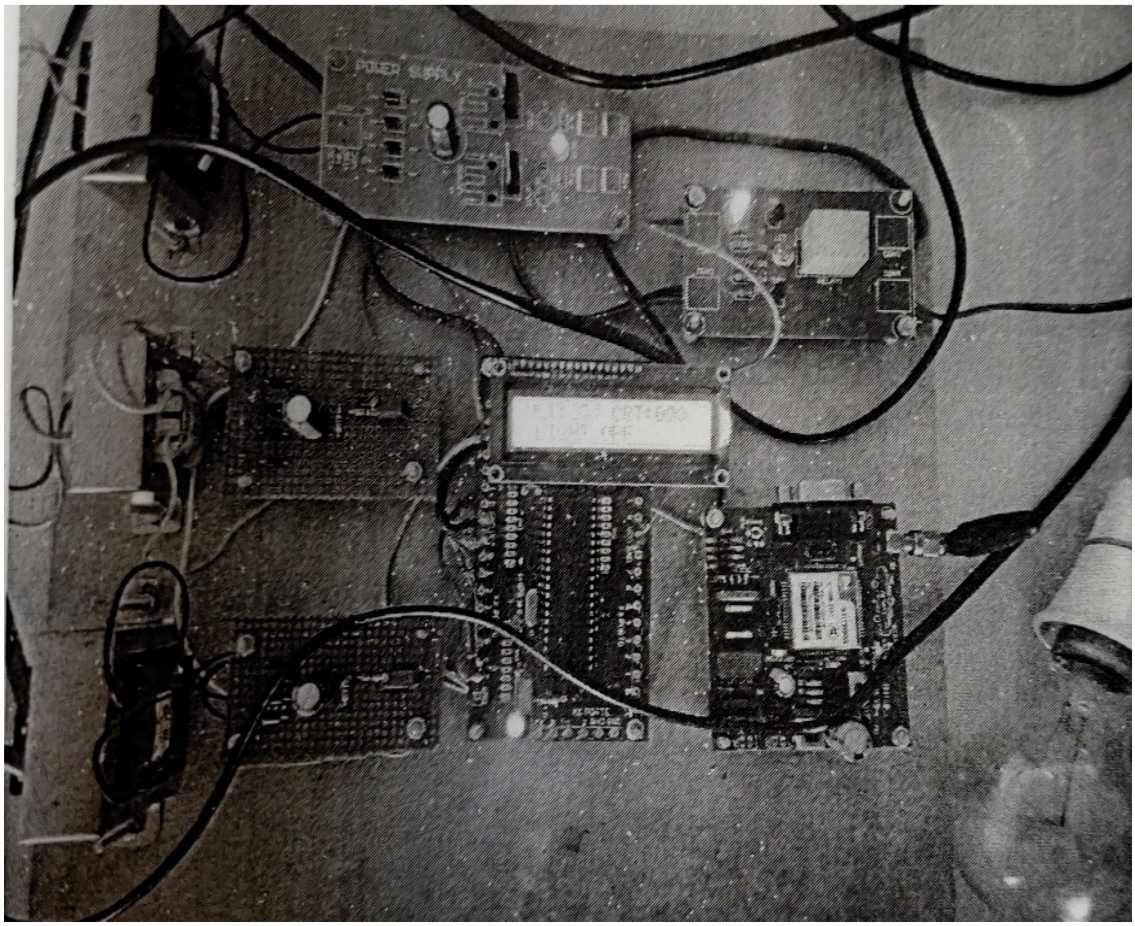

Figure 3. Relay OFF Mode Operation

3.3 Case 3: Monitoring the Parameters

When opening the message application and type *MS to know the instant current and voltage state of the connected load. Once the GSM get this sms then it is responds by the format to the mobile phone. Here the bulb was connected as load so we get voltage as 230V and current as 0.27A.

4. CONCLUSION

This project can be done by using GPRS technology, which helps in sending the data for monitoring and controlling the power system network. The monitoring and controlling of the devices be done from mobile phone and user can handle any situation. Real time monitoring and controlling of different parameters is done which can provide secure to power system network and its equipments integrating features of the all the hardware components have

been developed. Presence of module has been reasoned out and placed carefully thus contributing to the best working of the unit. Using highly advanced IC' with help of growing technology. Thus the project work has been successfully designed and tested. This project can be extended by connecting temperature sensor using GPRS technology, which helps in sending the monitored and controlled data to any place in the world.

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