

GPRS based SCADA implementation for multisensory security with SMS alerts.

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Abstract: This paper we have created on SCADA framework for observing and getting to the execution of gadget parameters, for example, voltage, temperature, frequency and current on continuously. These real time values send to GPRS technology using GPRS modem. We can secure the electrical circuitry utilizing the electromagnetic relay. Relay get initiated if any values of voltage, temperature, frequency, current cross the limit of predefined value. Relay is used as circuit breaker to switch off the main electrical supply. This system automatically sends the values of parameters periodically into predefined website. We can monitor and control the parameters on the internet. Central heart of this project is microcontroller. This microcontroller communicates with sensors and also provided some internal memory to hold the code. Here programmed using embedded C language. The appropriately composed SCADA system spares cash and time by disposing of the administration individual to visit every site for review, logging or information gathering or make alterations.

Keywords: SCADA (supervisory control and data acquisition), SMS, sensors, GPRS, Remote monitoring system, microcontroller, GSM.

I. INTRODUCTION

SCADA is a procedure control framework that empowers client to screen and control the process. SCADA systems are similar to controllers, computers, networks and controlling of automated home processes through data collection by sensors. SCADA is utilized to portary a system where both data acquisition and controlling performed. The basic components are designed in this paper include sensors, GSM network, predefined website, GPRS, ADC, relay driver, LCD driver, LED indicators. In this project PIC16F877A microcontroller is used as onboard controller and PIC C compiler is used for code compilation. Simulation part is done with proteus 7 software. PIC compiler is utilized for writing the code and compiling.

The machine source code is changed over into hex code and after the compilation with no errors program is dumped into PIC microcontroller. Mobile supervisory control and data acquisition is used as the underlying communication medium with the mobile phone network. We are exchanging the information all around on the world by SMS with utilizing cellular telephones. General Packet Radio Service (GPRS) is utilized here for particular versatile correspondence convention with no time based charges.

SMS that allow the exchanging of al type messages between mobile user and other services for example paging, mail, voicemail systems. It is forward way and store of transferring messages from and to mobiles. SMS have benefits includes the delivery reports and alerts, low cost and reliable communication mechanism and also it having screen messages and return calls and increased subscribe productivity.

II. SYSTEM OVERVIEW

The implementation Scheme is proposed in FIGURE 1,

Sensor is an object to sense the changes in its environment or detect events and then provide corresponding output. In this project sensors are used for sensing the voltage, frequency, current, temperature and IR for fencing security. Signal conditioning is used for filtering, amplification, isolation. ADC is a device that changes a nonstop physical quantity to digital number for representing the quantity's amplitude. PIC16F877A microcontroller is used in this project. A one unit of PIC microcontroller which is very brilliant and can be programmed and erased so many times.

The General Packet Radio Service (GPRS) is an administration that gives genuine packet radio access to Global System for Mobile Communications (GSM) users. It accommodates the transmission of IP packets over existing cell systems, conveying the Internet to the cellular telephone. GPRS enable SIM is used for sending and receiving the SMS alerts to or from the microcontroller to control the real time values of electrical parameters.

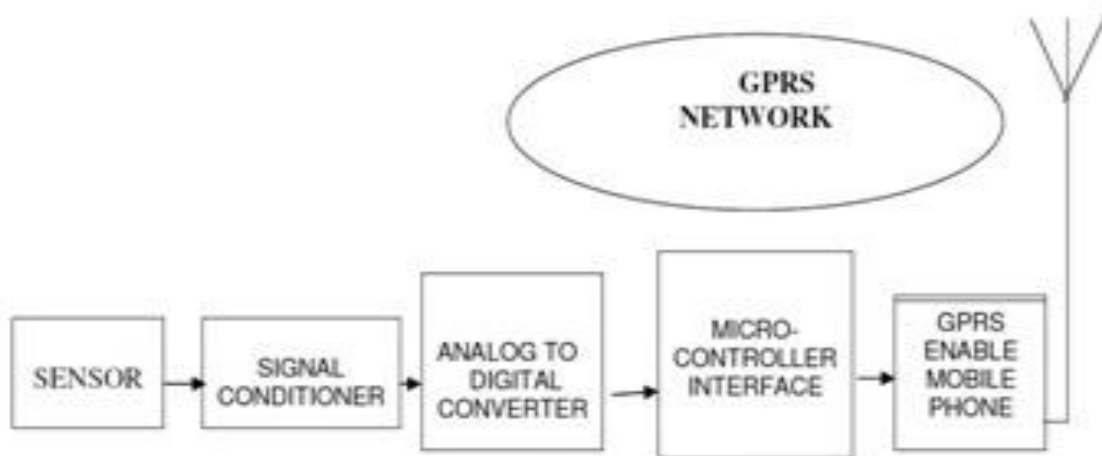


Fig.1. Block Diagram of wireless SCADA

In Fig.2. Regulated power supply is used for converting 230 AC mains voltage to DC 5V. Relay is used for automatic activate or deactivate the system on basis of commands by user to Microcontroller and sending the SMS alerts if any electrical parameter exceed the predefined value using GPRS network. 16*2 LCD is used for displaying the real electrical parameter value from sensors. Microcontroller is the heart of this project.

It is controlling, monitoring and saving the value of the sensors continuously. PIC microcontroller is given some inward memory to hold the code and saving the values of sensors. The controller is performing all tasks according to user by programming. The objectives of this project is sensing the different electrical parameters, forwarding the electrical parameters over GSM network, monitoring of parameters on predefined website and automatic circuit breaking operation. Crystal oscillator is used for to increasing the speed of execution part of instructions per cycle.

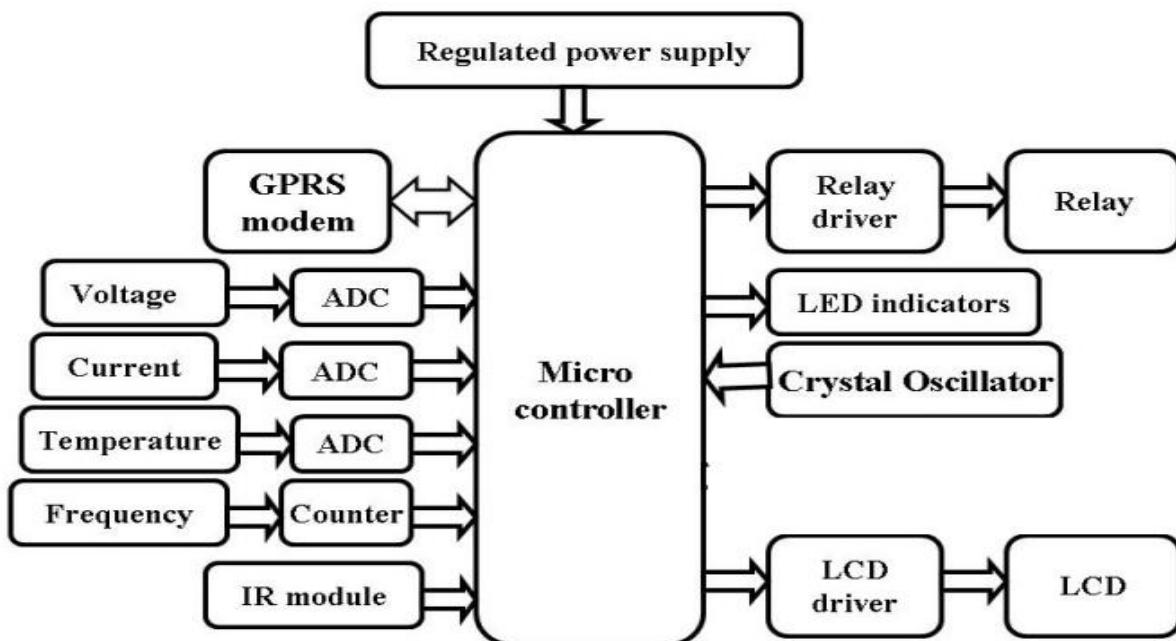


Fig.2. GPRS based SCADA implementation for multisensory security with SMS alerts.

III. SOFTWARE SIMULATION USING PROTEUS SOFTWARE

Pin 7, 8, and 9 are connected to sensor from PIC16F877A as voltage, current, temperature and pin 33 is used for IR sensor. The 13th and 14th pins of micro controller is connected to oscillators. The 1st pin MCLR of the microcontroller is Master clear pin is connected power-on-reset. Pin 25, 26 is GSM GPRS modem for virtual terminal. Pin 21 is connected to LED for observing the circuit is on working or not. In this paper Switches are used for all sensors.

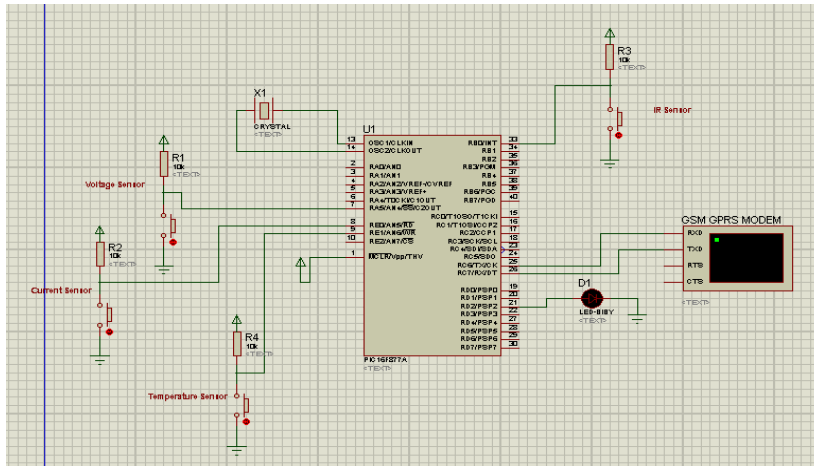


Fig.3. Software simulation in proteus software

IV. RESULT OF SOFTWARE SIMULATION

Alert message is getting in virtual terminal of GSM GPRS MODEM by closing the particular switch of the sensor when the value of electrical parameter is exceed the predefined value as Fig.4.

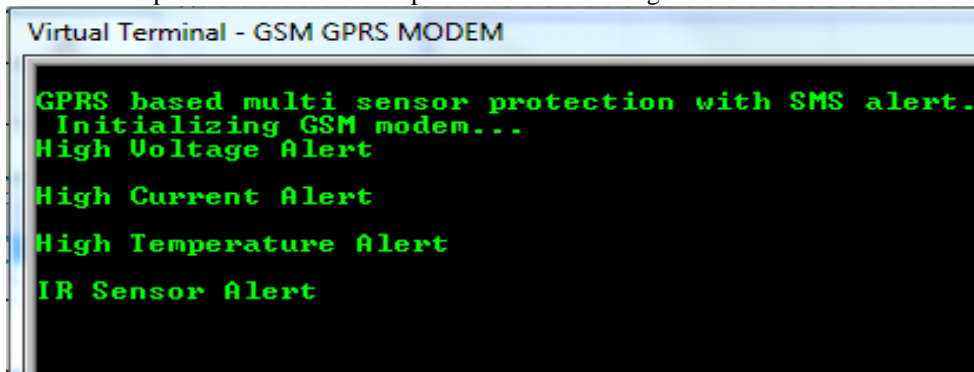


Fig.4. result in virtual terminal GSM GPRS MODEM

IV. HARDWARE SIMULATION

The below fig.5. Schematic diagram of GSM and WEB based SCADA describes how the interfacing is carried out of all components with micro controller and GPRS module. The 20MHZ frequency crystal oscillator is used.. 5V Regulated power supply is connected to micro controller for power supply to system. LED's also connected to micro controller through resistors and motor driver connected to micro controller. 16*2 characters display LCD is used. LM35 sensor is used for detecting the heat produced during fire occurrence. SIM300 is used for transmitting and receiving the SMS. SIM interface having nominal voltage 2.8V.

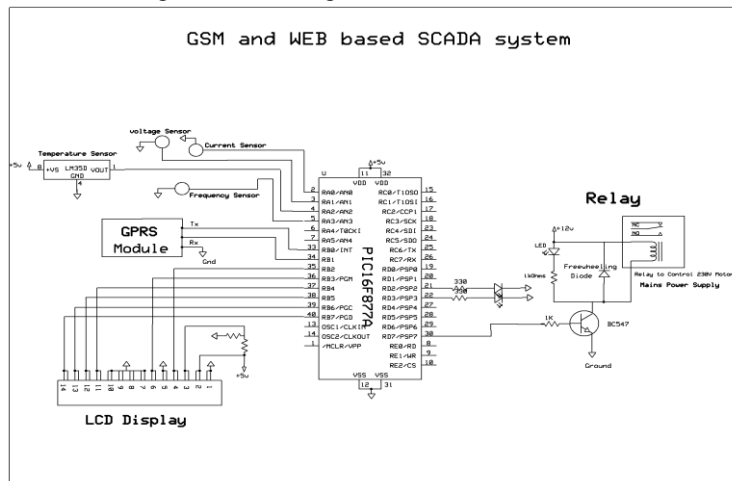


FIG.5. Schematic diagram of GSM and WEB based SCADA

PIC C is used for compilation of the program and PIC KIT 2 is used for dumping the program into PIC16F877A microcontroller. First we are initializing the ADC value to converting the physical quantity to digital samples as in hex code. That value is dumped into PIC16F877A microcontroller. All that parameter values are displaying and monitoring in particular website. Programmer have to be set the one threshold value and mentioned the condition as if the input of the any electrical parameter exceed that threshold value then electric magnetic relay is automatically on and sending the message alert to mobile network through SMS.

V. RESULT FOR HARDWARE SIMULATION

When the value of temperature parameter is exceeds the value then the microcontroller sending the SMS as high temperature alert as shown in fig.6

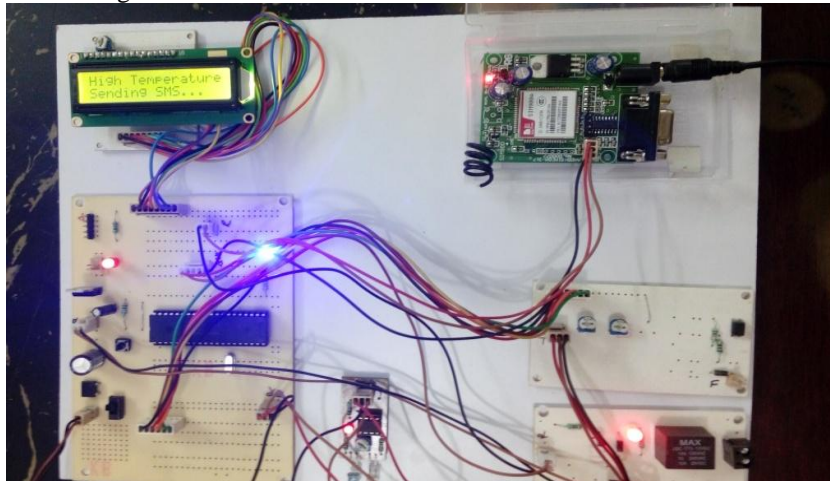


Fig.6.Controller sending High temperature SMS alerts.

Fig 7 shows the message alerts from controller when the electrical paramter value exceed the threshold value. If controller recieves input signal 'get' it will delivers the SMS of all electrical parameter to the corresponding recipient.

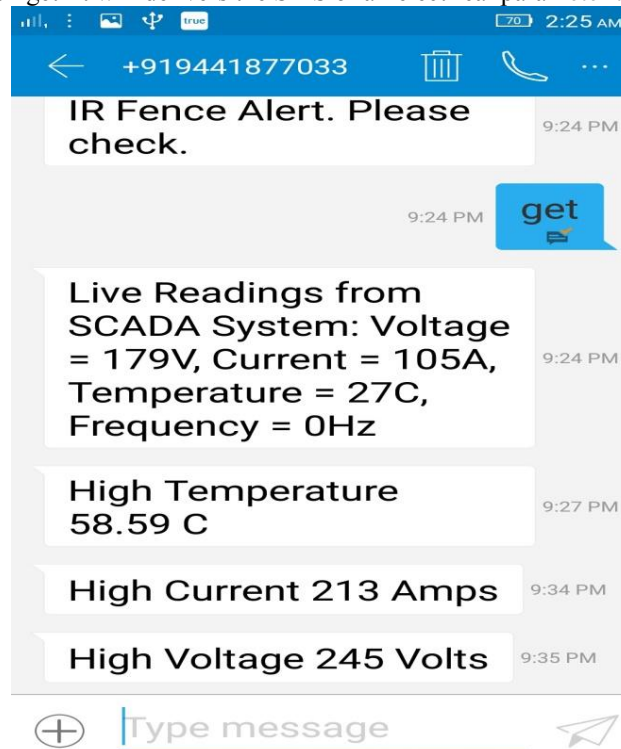


Fig . 7. Messages received from microcontroller.

Fig. 8. Shows the all electrical parameters displayed on predefined website. Using this website we can monitor the system globally through GPRS.

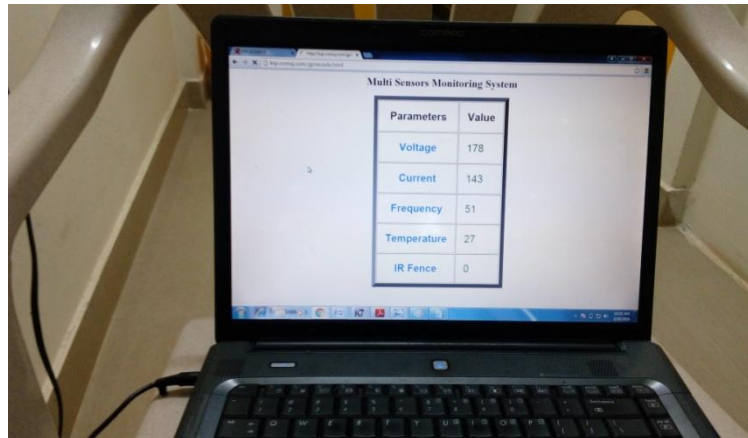


Fig.8. Predefined website displaying values of electrical parameters

V. CONCLUSION

Our goal is to work on the remote site safety and in the application where needed security by using microcontroller. Collecting and managing the data and sending message alert to monitor website. Wireless based solutions have all around acknowledged, recognizable and user friendly system. Continuously monitor values permits the warnings to supervisors and permit to take action before the quality and estimation of the catch is debased. All values of frequency, temperature, current, voltage are successively monitored in one specific website using hardware setup. We can record and store values in microcontroller memory. This project helps of application area as industrial or home security system by remotely placed location.