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Ardunio Based Security and Safety using GSM as Fault Alert System for BTS (Base Transceiver Station)

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Abstract: As we know in mobile communication the Base Transceiver Station (BTS) site, the tower maintenance has a very important role. Now days scenario some of the problems are being faced in the maintenance of the station site .The major problems which are faced include the fluctuation or variations of températures, unnoticed or unauthenticated entry of Person , fuel level amount being not noticed, the technical person has to manage time management in case of any of the above discussed problems. The instant message about the each activity happing in the site given by GSM .The temperature sensor LM35 will sense the room temperature level and if it is above the minimum level Global System modem will send an immediate message to the technician unique mobile. The values are displayed on LCD monitor, the aurdino controller gives command to turn on AC cooler or fan. The Base Station which is operated by Diesel fuel for generator. When the fuel level goes below the set value similar way message is sent to the technician unique number saying as fueil level is about to finish its 10% remaining. Door close/opener sensor is also used for indication of door opening and closings hall effect sensor for saving light energy as well finiding un noticed person entry. Theft of wire Status indicated by motion detection IR Sensor.The site door can be accessed only through the ID system ie using RFID reader. The situation in the site is updated to the technician through messages. PIR sensor used to detects the presence of humans inside the room. Camera is placed to record BTS room happings.

Keywords: Atmega2560, BTS Shelter, Mobile station, GSM, Arduino, RFID, Sensors.

I. INTRODUCTION

In this project, using GSM modem problems faced are rectified. Such as using GSM as alert system or fault informing system or fault alert system for BTS we are providing solutions to rectify these problems. The GSM modem whatever gives the instant message about the each activity happening in the site room. The LM35 sensors will sense the temperature of the site room and if it above the value, the GSM module will send the message to the master mobile which is already set in the system. similarly A fuel level sensor is provided in the generator fuel tank. Whenever the fuel level goes below the message is sent to the technician requesting real status of the tank. .The BTS cabinet with tower includes Diesel generator, Cooling Fan , Current Transformer, motion detection PIR Sensor , LM35 Temperature ,Door Open/Close Sensor hall effect sensor ,ID Reader Module , Theft Sensor & GSM Module etc .This project aims a single comprehensive solution that remotely controls and monitors the subsystems inside base station site .Module are placed in inside BTS room for monitor & control above the parameters with the help Ardunio Atmega 2560board with PC RFID Reader Module & GSM Module.

The said parameters value are displays on the 16X2 dot matrix LCD display, simultaneously transfers the parameter data to PC via RS232 link, & send massage to technician using GSM Module.

II. LITERATURE SURVEY

The monitoring and management of powering and conditioning systems within a remote mobile telecommunication site is to be proposed by Pizzutiet .al[1]. Paschke et.al proposed system is based on client-server architecture, providing data to main monitoring centers using controllers located at telecom sites or with technological controllers of supervised power and air conditioning systems [2].The detail about monitoring of all technical infrastructure equipment on site power system ,HVAC, security ,access control system, fire alarm system ,copper wire protection is possible by one controller gives by Piotr Paschke et.al [3]. Sadeque Reza Khan et.al suggested FCU is an electronic instrument that records the temperature data and takes decision according to that data usingPIC18F4520 which includes 10 bit ADC for data

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conditioning [4].Sadeque Reza Khan et.al uses Voltage Temperature Monitoring System or VTMS forsynchroniza tion of the operation of Generator and battery with Microcontroller PIC 16F877A [5] . AshishKashyap et.alsuggested TMS320F28031 DSP chip controller are to measure & calculate various metering parameters such asvoltage, current, power, temperature of BTS [6] . To sen seVarious parameters related to BTS like Diesel Level, Temperature, Human intrusion, Door Open /Close &contr olled, monitor it by ARM 7 Microcontroller. Alerting users immediately by SMS using GSM about the activity happening in BTS room proposed by Chetan Patil et.al [7].Arun Alla et.al proposed controller ARM 9 also maintain the room temperature under a predetermined value by controlling the Fan Unit. If the values exceed beyond the threshold limit this information is messaged to user using GSM module [8].Swati Chhajed et.al proposed the faults are fed into a remote user device with the help of GSM modem creating a message instantly.

III. RELATED STUDY

This project aim is to provide a single solution which remotely controls and monitors the subsystems inside each base station site and enables network operators to coordinate and manage the conditions at all base station sites across their network. Control multiple individual subsystems per base station site. The objectives of the BTS project are to facilitate the achievements of the AMPE (Accelerated Mobile Phone Expansion) Programmed which targets the achievements of full voice coverage [3]. Alerting users immediately when temperature rises to prevent or reduce damage to cell sites. As more and more people around the globe are extensively using mobile handsets, the demand for reliable and high-capacity networks has never been so high as nowadays. Not only the increasing number of callings including the calling time but also the various possibilities of using your phone for apps, which demand mobile data connectivity are the real challenges for network provider. The key to success is to care about the central network elements, the Base Transceiver Stations (BTS). To maintain and to protect those is crucial in order to provide connectivity to customers as well as a certain level of quality even in the most remote areas of the world.

A) Problems Occurred due to

-The site has to work in particular temperature if temperature increase above normal level then their occurs damages of the system, which is due to fluctuation of the temperature.
-The authorized site technician has to enter .Poor security occurs unauthorized entry.
-The Generator fuel being unnoticed by the site person which stops whole working procedure of the system.
-energy (light) saving is very important.
-In the absence of technician Due to some problem Smoke is generated. Which should be sent wirelessly sent information to authorized person.
-Due to improper time management by technician unauthorized entry in room

IV. PROPOSED METHOD

It consists of two parts1) Software unit 2) Hardware unit Software unit includes the compiler to build the assembly program used in Atmega2560 microcontroller. Hardware includes Atmega2560 microcontroller, Sensors, Power supply, Buzzer, Display unit.The ATmega2560 gets the input from the various devices which are present in the BTS (Mobile Tower) systems.GSM modem is serially interfaced with ATmega2560 [4]. Thus we can send an SMS to the pre-assigned mobile number giving exact information about the fault occurred with the help of this modem.

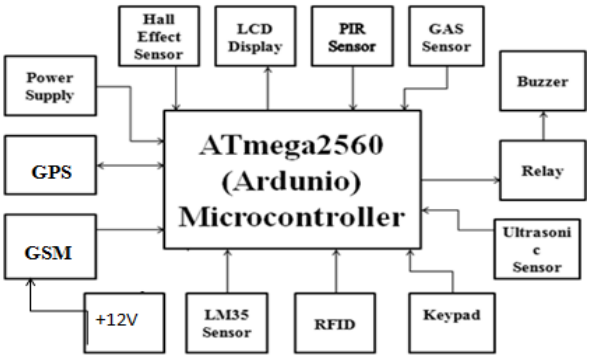

Fig 1..Block Diagram

Fig.1. Shows the block diagram of the proposed method. In this Atmega2560 along with other peripherals Relay, LCD,PIR Sensor, GSM module, RFID module ,IR Sensor, Level Sensor ,Phase detector ,Temperature Sensor & Humidity Sensor etc. Camera: The whole site room is under the cover of camera. It give inside images of BTS room & save it in PC. The site room includes door open/close sensor. IR Sensor for indicating the door open/close status.

The door is open for authentication person only The value of Temperature &Humidity of BTS room, Diesel levels of Generator, Site Door Open/Close status, Load Current, Wire Theft Status, & Authentication person entry To read the status from e sensor. The data from ADC is sent to microcontroller for process. The said parameters value are displays on the 16X2 dot matrix LCD display, simultaneously transfers the parameter data to PC via RS232link, & send massage to technician using GSM Module . Problems occur with the fluctuation of site temperature. The site machineries work at specific temperature, if temperature goes above some value then they may get permanent damage. The temperature sensors will sense the temperature of the room and if it rises above the threshold value the GSM module will send the message to the mobile. The values are displayed on LCD, the controller gives command to Cooling Fan to ON& graphical real time Images recording on PC terminal by

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using MATLAB software with GUI. To display BTS inside room Humidity &Temperature, Diesel level of generator, Door open/close status, Human intrusion, Wire Theft Status, Load Current, Generator ON/OFF, MSEB present & authentication person entry. GSM (Global System for Mobile Communications) is the most popular standard for mobile telephony systems in the world. In this project we used GSM modem which has SIM900 Module.

This is a plug and play GSM Modem with a simple to interface. We send SMS of BTS inside room Humidity & Temperature, diesel level of generator, door open/ close status, Human intrusion, wire theft status, & authentication person entry to technician. The system includes a RFID Reader at the door entry. This setup opens the door only if valid card is moved across the reader Door is open. PIR sensor senses motion, almost always used to detect whether a human has moved in or out of the sensors range. PIRs are basically made of a Piezoelectric sensor, which can detect levels of infrared radiation. IR Sensor indicate wire is theft by human or not.

B) Flow Chart

1. Start 2. Initialize the LCD 3. Print the project name on LCD 4. Initialize the GSM 5. Wait for fault 6. Check the fault 7. Check Di1=0 if yes then 8. Print on LCD name of fault 9. Hooter on, relay on and LED of respective fault glows 10. Send SMS to the registered mobile no. 11. If Di1=1 then check Di2=1 if yes go to 8, 12. Check for MUTE button if it is pressed then hooter is off 13. Check for RESET button if it is pressed then LED is off ss14. Go to 6 15. End

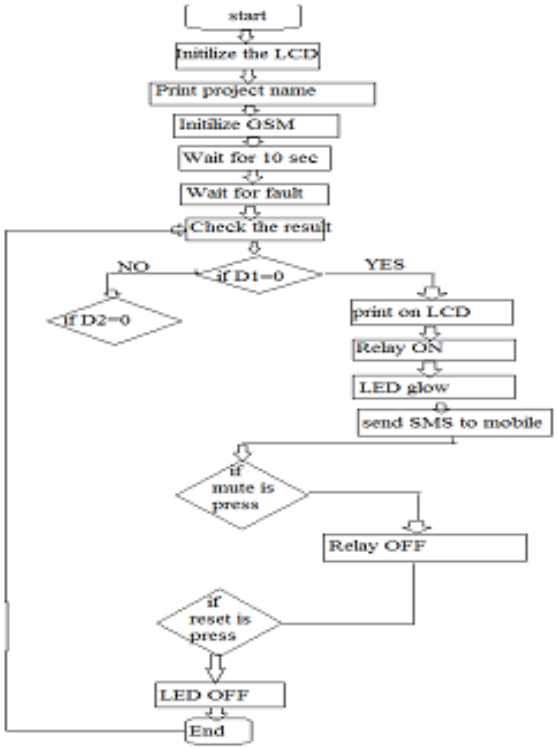

Fig 2.Flow Chart

V. RESULT AND DISCUSSION

In this work Data Storage &Real Time Image of Parameter on LCD Display Result such as Authentication Person Entry , Door Open/Close Status , Wire Theft ,Intruder Alert, Temperature Value of BTS room, Diesel Level of Generator , Load Current Value, ,Generator ON, SMS 2 Sending , SMS3 Sending, SMS 1 Sending, Overload Temperature. Alerting Technician by SMS1, SMS2 & SMS3 on mobile.

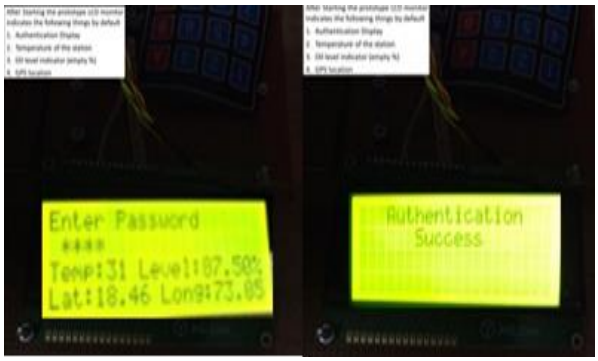

Fig 3.Authontication Success Message on LCD

The Real Time Images Recording on mobile of Diesel Level value, Temperature of BTS inside room value shown in below Fig.4 Alerting technician immediately when temperature rises above threshold value, Low Diesel Level of Generator, ON by SMS1, then Sending this SMS1 to Technician on Mobile. If door open, wire theft Intruder Alert& Generator off at same time, first sending the SMS2 after sending SMS3

Fig 4 Low Diesel Level Indication SMS Sending to Technician Mobile respectively.

In this work Data Storage Parameter & Real Time Image of Parameter on PC. GPS (Global Positing System) is used for the finding the area of the base station, which is very easier to find out the location .It will sends the latitude and longitude message to the mobile so that location can be found . It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.

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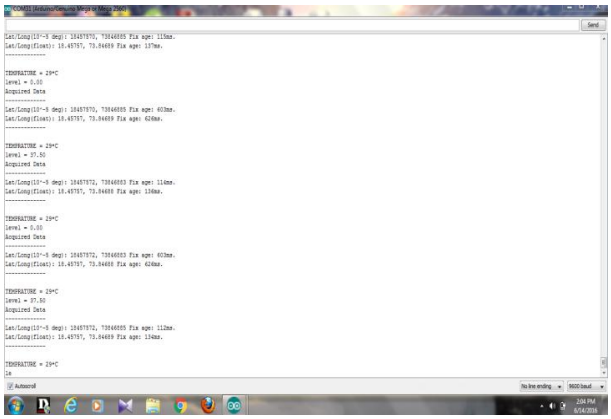

Fig 4.Temperature level, GPS location, using GSM on PC

Diesel Level of Generator value, Door Open/Close status, Wire Theft Status, Authentication Person Entry. The Low Diesel Level, Generator get Off display on LCD & which is shown in PC This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send and receive SMS or make/receive voice calls.This GSM modem is a highly flexible plug and play quad band **SIM900A** GSM modem for direct and easy integration to RS232 applications.

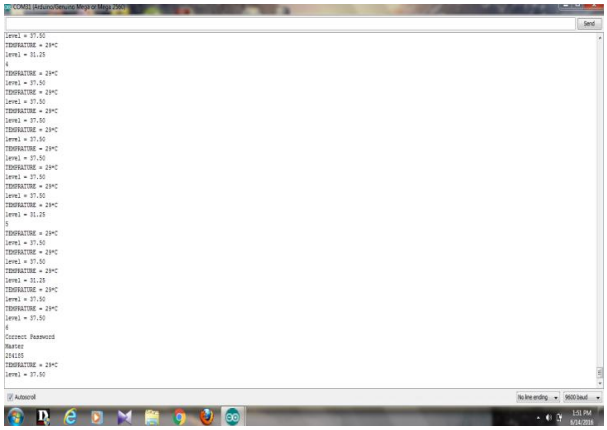

Fig 6.Low diesel level indication in PC

VI. CONCLUSION & FUTURESCOPE

This paper represents the implementation of a low cost BTS security system. Many of the previous works required to the user to type and send and Shorter message to send the command to the system. But this paper present an unique and simple way to control all the applications and as well get notifications about the present condition of the Base station .Reduced size makes it more applicable for commercial manufacturing and distribution. This project introduced an good techniques to protect the mobile base station site. Mobile Base station Security Monitoring enables to monitor remotely the conditions of base transceiver stations. With the help of this system the technician is alerted with any unexpected situation and can attend to it immediately and hence the loss is minimized. It is Great time management and requires very less number of technical person. By making use of Aurdino Microcontroller the maintenance of Mobile communication BTS can be very well attended in proper way in shortest possible time, So that the system complexity and time required or consumed in finding the faults is reduced. This project can further be used to remotely located machines systems .This project can also be suitable to extend services which need maintenance like pressure ,smoke detector etc.

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BIOGRAPHIES

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