



DESIGN OF REMOTE DATA ACQUISITION SYSTEM BASED ON 3G

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ABSTRACT

In this research paper, logging of data such as temperature, pressure, vibration, camera image etc. which may be applicable to any industry where all these parameters has to logged on a certain interval. This project is based on a demonstration model which shows how data logging operation can be performed from a distance using GSM 3G Technologies. This data logger is implemented using ATMEGA128 Microcontroller. These data loggers can be interfaced with various sensors based on the requirement and can be connected to the various plants in the industries which require data logging. Since these data loggers use GSM 3G interface they are the best solution for logging data from furnaces, Chemical plants, petroleum wells etc. where it is highly hazardous to log the data manually. This is very helpful in various industries where various parameters have to be measured simultaneously.

Keywords: ATMEGA 128 Microcontroller, GSM 3G Module, BMP 180 I2C Sensor, Vibration Sensor, VC0706 Serial Camera, GSM 3G USB Dongle.

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I.INTRODUCTION

Data acquisition technology, which mainly researches the acquisition, memory, processing and control of data, is an important part of modern science and plays an important role in modern industry control. The problems of measurement and control parameters always exist in the field of the intelligent instruments, signal processing, industrial production and automatic control. Normally, the process that the analogs such as existing temperature, pressure, flow, displacement and angle of external world are transformed into digital signal first, and then transferred to the computer to display, is called "data acquisition", and the corresponding system is called data acquisition system.

In Most places data acquisition and analysis are still conducted by manual. Since the monitoring

places of resources are widely distributed geographically, some of the existing data transferring methods such as the use of telephone lines and power line carrier have many problems for such as small coverage area, heavy line maintenance and the unreliable communication caused by the amount of noise pollution of power line carrier etc.

Data Acquisition systems with remote accessibility are in great demand in industry and consumer applications. In some applications, human beings have been replaced by unmanned devices that will acquire data and relay the data back to the base. There are data-acquisition and control devices that will be a substitute for a supervisor in a multisite job operation. A single person can monitor and even interact with the ongoing work from a single base

station. An acquisition unit designed to collect data in their simplest form.

Traditional data acquisition system by means of wires could not satisfy the requirements. With the rapid development of embedded system, wireless communication technology and 3G technology, the remote data acquisition system which is based on embedded systems platforms and depend on 3G as Wireless data transmit terminals will be used widely on industry.

II. SYSTEM DESIGN

This System consists of transmitter and receiver section as shown in fig.1 & fig.2. The transmitter section consists of I2C sensors, webcam, and Microcontroller development board, LCD for displaying sensor output and GSM 3G module. The receiver section consists of wireless 3G dongle, webpage and PC. 3G network is a new mobile data communication service, which builds a connection between the users and data networks, and provide the user with an end-to-end and wide-area wireless IP connection. Microcontroller modules and sensors interfaces are connected with RS-232, a remote data acquisition and analysis system built on the 3G service platform can send the data to the manufacturers' data analysis center in real time, realizing the combination of the spot monitoring teatime information and fault diagnosis algorithm together with the experience knowledge.

In this system, remote data transmits through the existing 3G network, and 3G networks provides the system with a simple and efficient means of communication transmission and the collected data are sent to the 3G wireless network through the protocol package. At last, the network sends it to the manufacturer's data analysis center. After receiving the remote data, the computer will analyze the data and then it will establish a remote data acquisition and analysis system, which combines the live monitoring information together with the remote fault diagnosis algorithm and the experience knowledge.

A. BLOCK DIAGRAM

The system architecture is presented in fig.1& fig.2. The complete system requires 9V Power Supply. The heart of the system is AVR microcontroller - ATMEGA128. GSM SIM300/900

module is used for data transmitting over 3G cellular networks to webserver/internet application. GSM module is serially connected to one serial port of ATMEGA128 microcontroller. For temperature and pressure sensing BMP180 is used. It is i2c based sensor with greater accuracy. Because of two wire interface, it reduces circuit complications. Its low power feature also reduces the current consumption of the system. BMP180 is connected to I2C port of ATMEGA128 microcontroller. The LCD 16x2 character display is connected to microcontroller for showing Temperature, Pressure and Vibration readings. Piezo based vibration sensor is connected to input pin of ATMEGA128 microcontroller. VC0706 which is serial camera used as a webcam for capturing image. It is connected to other serial port of ATMEGA128 microcontroller. The data temperature, pressure, vibration and captured image are sent through GSM 3G networks to internet based application/webpage.

At PC side, GSM 3G dongle (USB Modem) is required to access 3G Internet. After connected to 3G Internet network, the received data can be monitored on webserver/ webpage as shown in fig.2

Tx Section

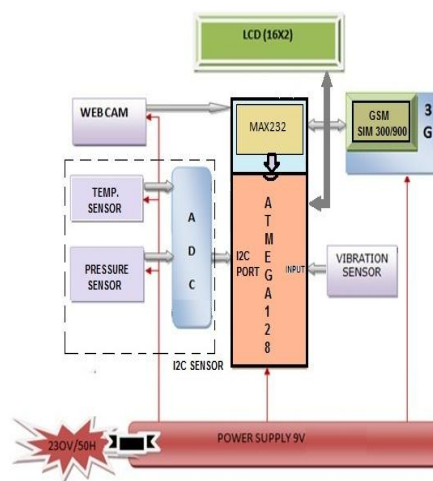


Fig.1: Microcontroller Board with sensors and GSM module

Rx Section



Fig.2: Web Server/Web Page on Computer

III.CIRCUIT DESIGN

Circuit Diagrams of the interfacing of ATMEGA 128 with sensors, LCD interfacing & power supply are shown in fig.3.

A power supply of +5V is required to operate the system safely. The regulator ICLM 317 is used to generate regulated power supply. I2C sensor & vibration sensor are connected to pin no.25, 26 and pin no.48 respectively with the microcontroller ATMEGA 128. Interfacing of LCD is used for display sensor's output which operates on +5V supply.

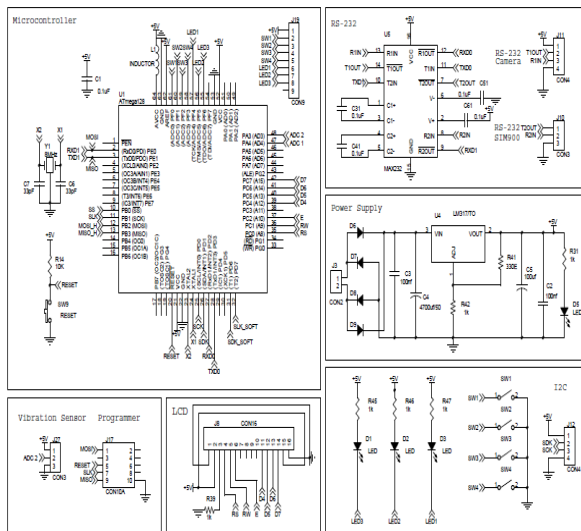


Fig.3: Circuit diagram of the system

B. Complete system Hardware

Fig.4 shows the complete system hardware of the project. It shows the ATMEGA 128 Microcontroller Board, GSM 3G Module, Vibration Sensor, Web Camera, LCD.



Fig.4: Complete Hardware of the system

IV.SOFTWARE DESIGN

For the software implementation, Code Vision AVR Professional V2.05.0. is used. This has in build C compiler, Debugger and programmer.



Fig.5: Code vision AVR Professional V2.05.0

C. Flow Chart for the system

Flow Chart of the program is presented in Fig.6. It shows that the system includes the features such as GSM SIM Module, I2C Sensor detection, Vibration sensor detection, Capture image from webcam, upload sensor data to webserver etc.

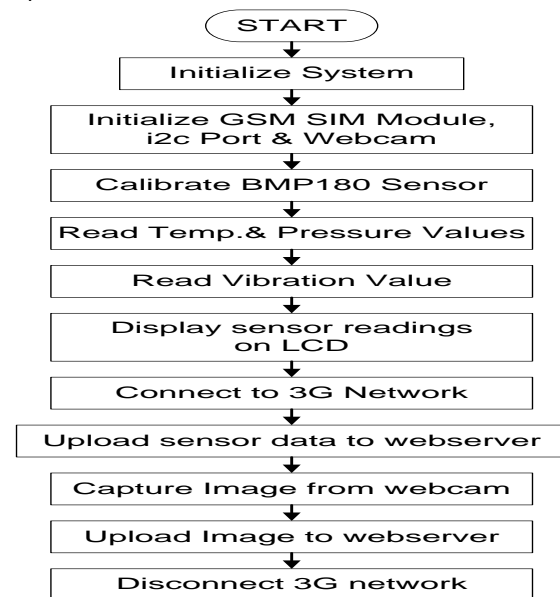


Fig.6: Flow chart of the system

V. WEBPAGE DESIGN

Webpage is design to display sensor output globally such as Temperature, Pressure, and Vibration and upload image capture by webcam.

D.FTP

FTP stands for File Transfer Protocol. It is a protocol used to transfer files between an FTP host/server and an FTP client computer on the Internet. FTP is most commonly used to download files from the World Wide Web. It is an alternative choice to HTTP

protocol for downloading and uploading files to FTP servers. Fig.-7 shows the FTP account details.

FTP Login and Upload Details

FTP Accounts allow you to access your web site's files through a protocol called FTP. You will need a third party FTP program to access your files. If you do not know anything about FTP you may use our web based File Manager to upload your files.

FTP details for deepakpatil.hostei.com

FTP host name	deepakpatil.hostei.com
FTP user name	a2501772
FTP password	*****
Folder to upload files	public_html
Forgot FTP password?	Change account password
Recommended FTP clients	SmartFTP or FileZilla

Account Information

Domain: deepakpatil.hostei.com

Username: a2501772

Password: *****

Disk Usage: 0 / 1500.0 MB

Bandwidth: 100000 MB (100GB)

Home Root: /home/a2501772

IP Address: 31.170.160.97

Apache ver.: 2.2.19 (Unix)

PHP version: 5.2.9

MySQL ver.: 5.1

Status: Active

Fig.7: FTP Account Details

E. Webpage address

Webpage address for remote data acquisition system based on 3G as shown in below.

<http://deepakpatil.hostei.com/meproject.html>

Below fig.8 shows the screenshot of webpage which indicates the sensors output such as Temperature, Pressure and Vibration.

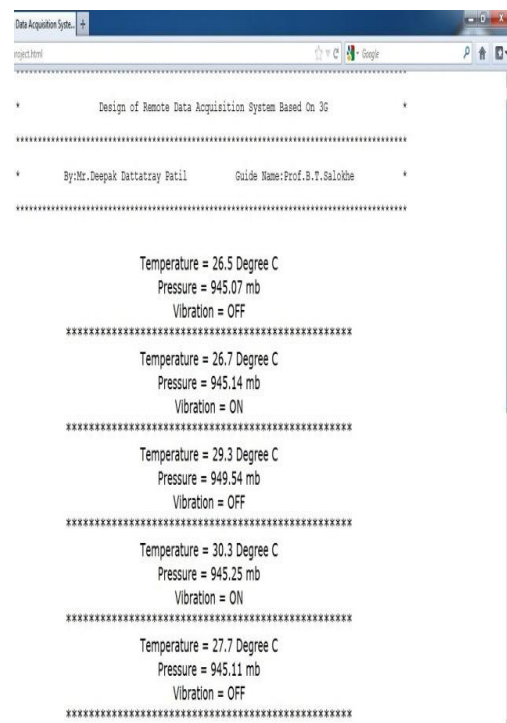


Fig.8: Webpage Screenshot

VI. RESULTS & DISCUSSIONS

As we have already discussed in this paper that monitoring is done according to webpage result.

F. System Initialization



(a)



(b)



(c)



(d)

Fig.9: images of System Initialization (a) At beginning (b) Student Name (c) Course Name (d) Guide Name

G.GSM 3G Module Initialization

GSM 3G Module is required a few minute to initialize.



Fig.10: GSM 3G Module Initialization

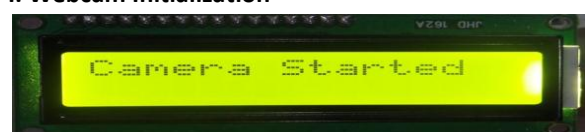
H. Sensor Parameters Results

LCD displays the reading of the Pressure sensor, Temperature sensor and Vibration sensor ON or OFF as shown in Fig.11



Fig.11: Sensor Parameter Result

I. Webcam Initialization



(e)



(f)

Fig.12: Images of Webcam Initialization (e) Camera start (f) Images uploaded on web

J. Webpage Results

Webpage includes the sensor output and webcam image as shown in fig.13

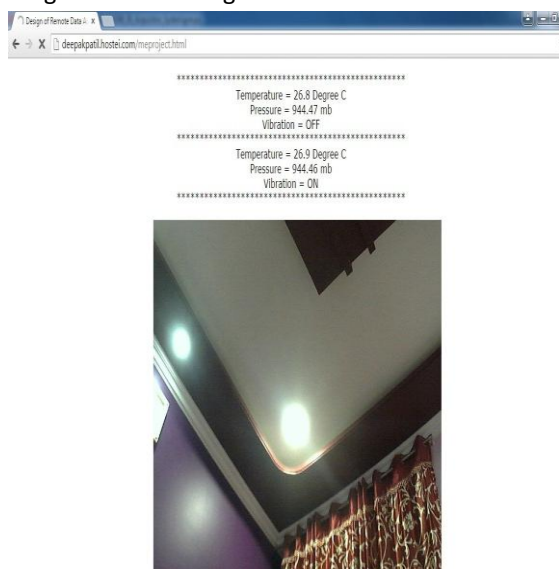


Fig.13: Webpage Results

VII. CONCLUSION

We use 3G communication module with GSM 300 standards to design a remote monitoring system. It not only solves the problem of low-rate, short-distance transmission and scene cumbersome wiring, but also reduces high installation cost and power consumption. In addition, it has the advantages of high Speed high sensitivity, high accuracy, strong compatibility and efficient operation. Users who have a PC connected to the Internet can get monitoring variety real-time information easily. This system can also be widely used in the fields of industrial and agricultural production, environmental monitoring, traffic monitoring, measurement and control.

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