

# 3D Drawing Program Which Processes Sensor Voltage Ratings Instantly From Parallel Port

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**Abstract** — In this study, it is aimed to form 3D graph of any analog data changing related to its position, in computer environment instantly. For that purpose, a new 3D drawing program which updates itself by getting data instantly from an open txt file is developed. The analog data saved in a txt file is provided by KMZ51 AMR sensor that shows voltage changing according to the size of magnetic flux. That is why, output ends of the sensor are put into the Analog Digital Converter (ADC) which has got 24 bit resolution and the output of ADC is connected to the parallel port of the computer. The command that sends voltage in the sensor to the computer is given by the user via a trigger button connected to the parallel port. Every time the user pushes the button, the voltage value which is measured in the sensor comes to the computer as digital data, later on, the analog equivalent of the digital data is found and it is recorded in a txt file. This newly developed 3D drawing program's database is constituted by this file. In this paper, developed 3D drawing program's usage and operation are discussed in detail.

**Keywords** — AMR Sensor, 3D Graph, Analog data.

## I. INTRODUCTION

It has got high importance for researchers to take record and make graph of sensor voltage values obtained during an experimental study, automatically to the computer. There are three ports on a computer in order to make two-sided data communication with external equipment. These are serial, usb and parallel ports. Among these ports, only the parallel port is used for parallel communication. Parallel port consists of three ports as their names are status, control and data and it totally consists of 25 pin. 12 of them, which are belonging to data and control port are used for data output (data transmission), 5 of them are used for data input (data intake) and 8 of them are used for grounding [1-4]. So the computer has given an address for each parallel port. Here, the important thing is to make the logic circuits which inputs or outputs from the known-addressed parallel port, meaningful via the program.

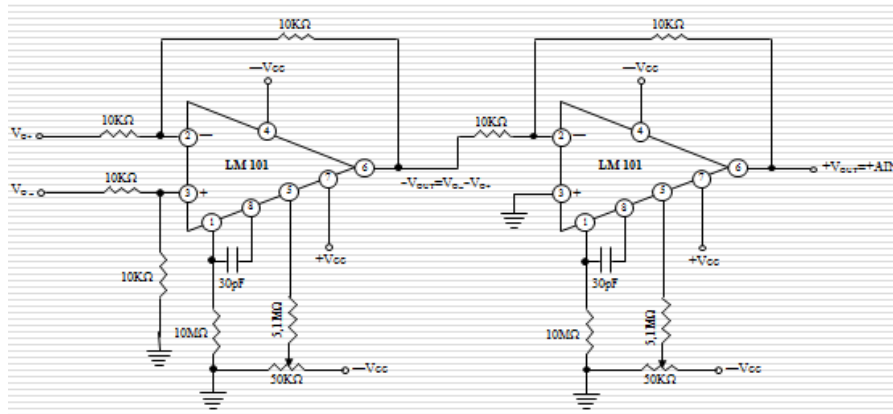
In order to indicate the change according to scan area of several physical quantities as

temperature, magnetic field, pressure, damp in an environment, it is firstly required to develop the mechanic and electronic of measuring system. At this step, the sensitivity of sensor which reads the physical quantity, data transmission resolution and processor speed of your computer are very important. After the electronic system is established, a data intake program which will define analog equivalents of digital data coming to parallel port is required. The final step is to indicate 3D graph of values recorded in a file according to scan area [16-19]. Within the scope of this study, the analog data transmission coming from KMZ51 AMR is obtained to be taken into 24 bit resolution - user controlled computer environment sensor by using parallel port of the computer, be recorded and it makes 3D graph of the sensor able to be formed instantly according to the sensor's location information at x-y axis. The operations made from this point of view are explained with details in lower sections.

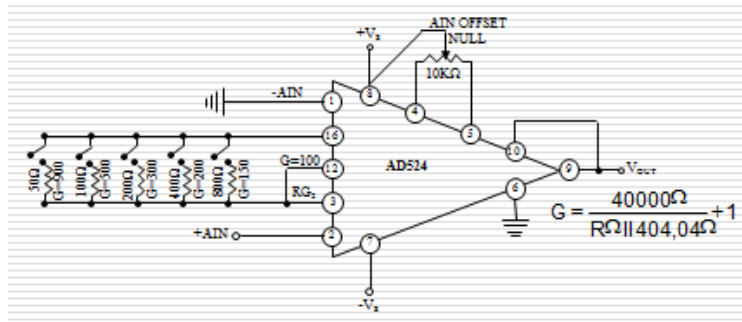
## II. MATERIAL AND METHOD

This study consists of three stages named as; making of the electronic unit that makes KMZ51 AMR voltage values be sent from the parallel port, the software of data intake program and the software of 3D drawing program. Into the electronic unit, the parallel port connection is provided by an summing amplifier circuit that makes KMZ51 AMR sensor's positive and negative voltage values available to add up, an amplifier circuit for increasing the changes which are at the nV level on this circuit's exit and 24 bit resolution ADC circuit design which makes analog signal to be converted into digital signal that is enhanced to mV interval (Fig.2.1).

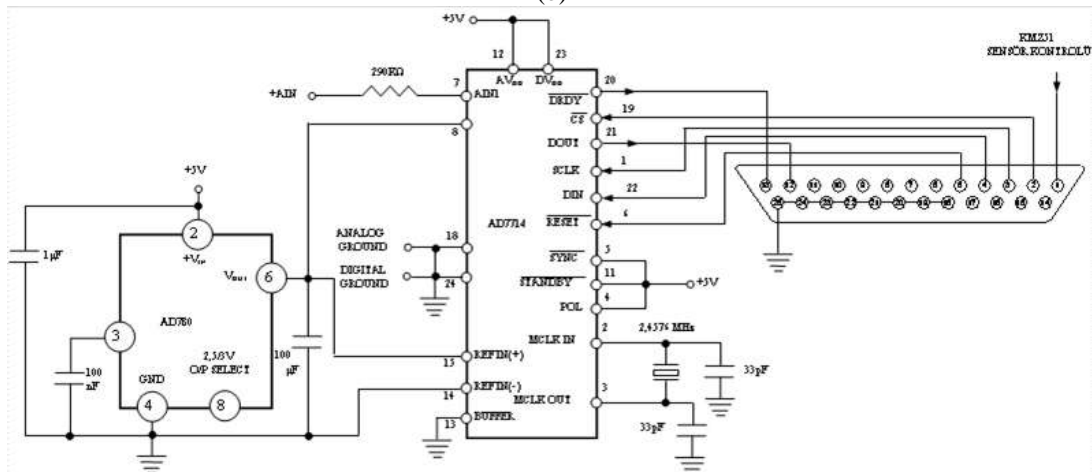
After the electronic unit design is completed, the data intake program is started to write. The program is designed by keeping the following information in interface; recorded file information, where the sensor is on x-y axis, maximum x-y location information and the analog equivalent of 24 bit digital data that comes to the parallel port. The program sends appropriate trigger signal to analog-digital converter, it puts the 24 bit digital data in order and it calculates its analog equivalent and then write it on the text box in interface. Also, when the user pushes 3D graph button, the changes can be seen instantly according to the location (Fig.2.2).



(a)



(b)



(c)

Fig.2.1 (a) Summing amplifier circuit, (b) Amplifier circuit, (c) Analog-Digital converter circuit

When the user opens the interface in order to activate the program, firstly “Start” button should be pushed and then respectively, file name for record and maximum X and Y values should be typed. Starting to measurement is indicated by the user button that is associated with parallel port. When the user pushes the button, the codes under the “start” button become activated and also “start” button becomes passive till the subprogram cycle is completed. After the cycle is completed, the analog equivalent of digital data received from the port is seen in sensor voltage box. At every time the user pushes the button, X location value increases “1 value”. When X value reaches up to Max X, Y value increases “1 value”. When Y value reaches

up to Max Y, the measuring area will be finished. At the beginning, recording to the named file is checked in as the formats; X location, Y location and voltage value received at that location. Thus, before the data intake program is started to work, the user should make a decision about how many locations and at how many distance intervals on x and y axis, he /she will make measurement. And then the user should type location information on the program interface. Lastly, the program is designed with a stop short button that enables the user to restart the program where it is left off in the case of a power cut. If required, the user pushes 3D graph button and can see instantly the sensor voltage values taken at every location and its three-

dimensional changing according to x-y location. The interface that is opened when 3D graph button is pushed is shown at Figure 3. As it is seen from Figure 3, in the left, there is a section of a hollow plot area scaled at -1, 0, +1 range, at the top- right, there is a section of minimum and maximum values of x, y, z values rated directly from the other interface and at the lower right, there are sections of a colouring scale and axis scaling values that should be typed according to maximum and minimum z values. When 3D graph interface is

opened, the only area that should be typed is scaling information. When the mouse is over one of the cells, which cell of X and Y at the interface and z value and location value in that cell can be seen easily. When the left button of mouse is held down and moved on graph area, 3D graph rotates with the movement of the mouse. In addition, the plot area can be minimized or maximized with the size control rod.

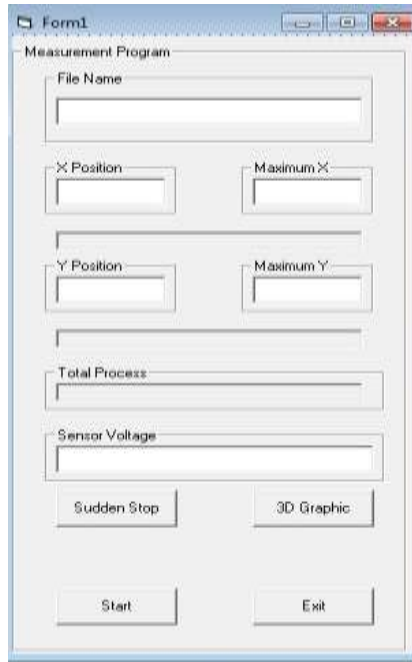


Fig.2.2 The interface of data intake program

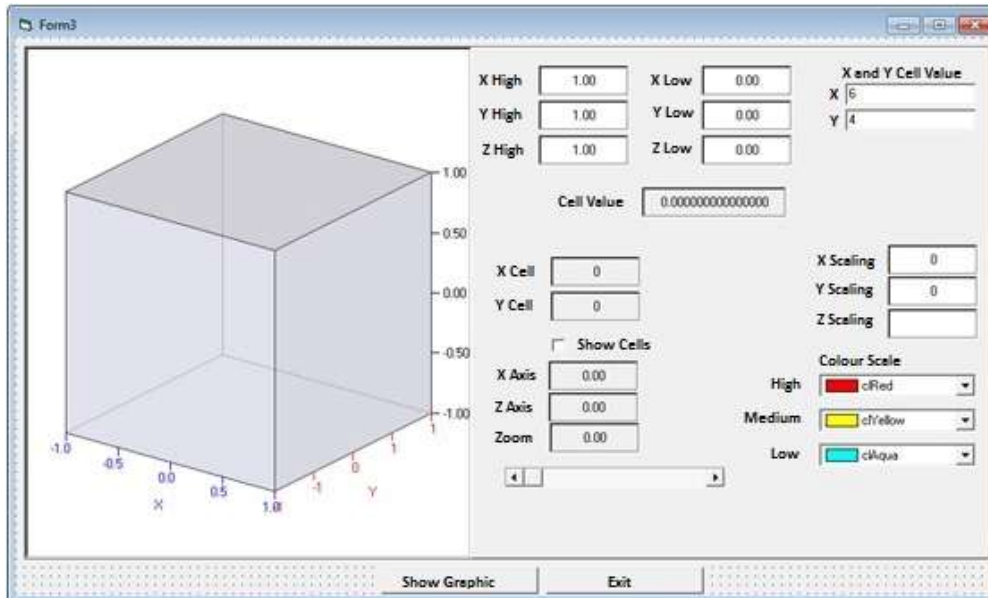


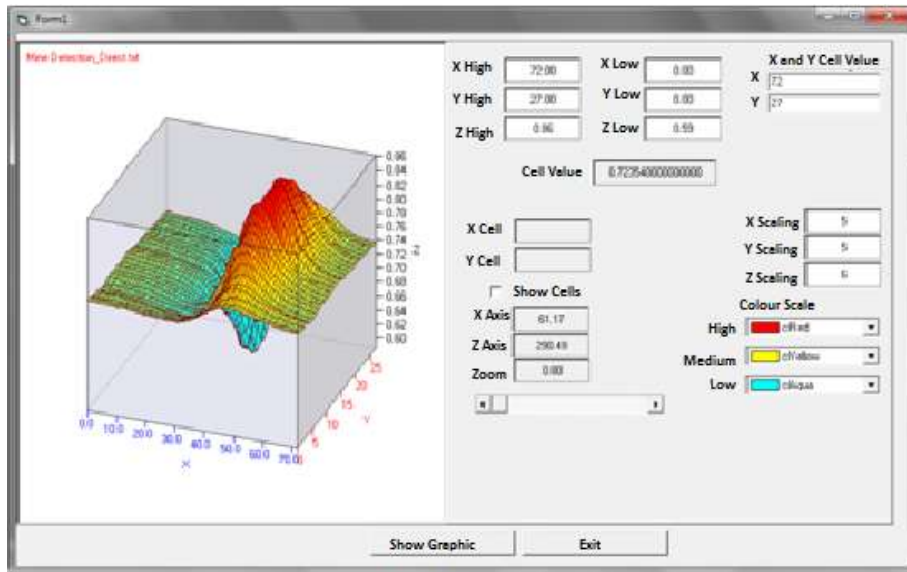
Fig.2.3 The interface of 3D graph program

The interface of 3D graph program is prepared by Delphi software language. Because of the fact that this program uses some values from data intake

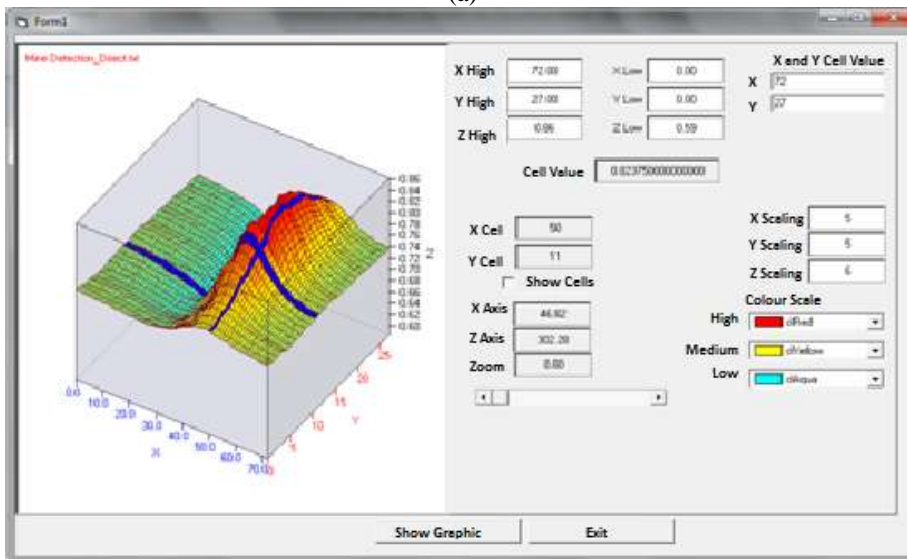
program which is written by Visual Basic software language, it is become a part that can be used as ocx. extension at VB. By this way, two programs

which uses different languages could be worked at only one common VB Project. The applications of

the program in experiments that we made on the mine detection are shown at Fig.2.4.



(a)



(b)

Fig.2.4 The application images of 3D graph program

### III.DISCUSSION AND CONCLUSION

Within the scope of this study, a new electronic unit construction that makes KMZ51 AMR sensor voltage values be sent from parallel port, the software of a new data intake program and the software of a new 3D drawing program are developed. In this study, it is tried to be explained to the researchers how a connection will be done with any external electronic element over parallel port. In addition, the program's requirements which provide induction signals to be sent to the ADC and intake of digital data synchronized with clock signal are given after the connection is made. Because of the fact that the language of the program's software is close to the machine

language and the operating speed of the computer is high, code processing speed will be increased. However, there should be not big differences between code processing speed and transmission speed of digital data of ADC. In the opposite case, sensor voltage value which is read on data intake program should be 0 or +5V due to the fact that there is no direct digital signal output from ADC. That's why; a program developed at a computer will not work at a second computer which has got a different operating speed. In this case, it will be required to put "holding" between induction signals provided by the program. As for 3D drawing program, the processing speed of sensor voltage values instantly to the graph is related to software language and operating speed of the computer. Therefore, .exe formatted data intake and 3D

drawing programs are not generally working at our computers. On the other hand, it is a significant contribution that both data intake program and 3D drawing program are open to all kinds of add-in. The researchers making experimental researches pay a lot of money for data intake programs, drawing programs and electronics. This case is really a serious national loss.

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