capacity of the condenser with a ferromagnetic fluid changes. This change is due to changes of the dielectric permeability of the ferromagnetic fluid under the effect of the magnetic field.

According to the results of the experimental study we can draw a conclusion that capacitive cells with ferromagnetic fluid are responsive to an external magnetic field due to orientation of magnetic particles and their interaction. We plan to use a different particle size and properties in order to increase the sensitivity of the capacity elements for a magnetic field sensor.

References

1.Bloom E. Y, Mayorov M. M., Cebers A. O, Magnitnie zhidkosti. - Riga: Zinatne, 1989. -386 pp (in Russ.)

2.Gubin S. P., Koksharov Y. A., Homutov G. B., Yurkov G. Y. Uspehi himii. 2005. - Vol. 74 (6). - pp. 541-574 (in Russ.)

3.Kantorovich S. S. Cepochnie agregati v polidispersnih magnitnih zhidkostyah.PhD thesis. -Yekaterinburg, 2004. -175 pp. (in Russ.)

ACOUSTIC DEPTH SOUNDER

Ju Yangyang, Komarov S.
Tomsk Polytechnic University, Tomsk
Scientific supervisor: A.I. Soldatov, D.Sc., Professor, Department of Industrial and Medical Electronics
Linguistic advisor: T.S. Mylnikova, senior teacher, Department of Foreign Languages

Ultrasonic energy is currently widely used for ultrasonic distance measurement. Range finders and all levels of measurement can be performed through ultrasonic technique. Ultrasonic testing is relatively rapid, convenient, simple, and easy to do real-time control. The measurement accuracy meets practical requirements, so a wide range of applications has been developed in the mobile robot.

The presented ultrasonic ranging system designer is mainly controlled by Micro Control Unit (MCU). MCU controls the timer, the ultrasonic transmitting circuit, the display circuit and the temperature probe. The ultrasonic depth finder was designed and tested for different depth, and the error analysis was conducted.

Consider the block scheme shown in Fig. 1.

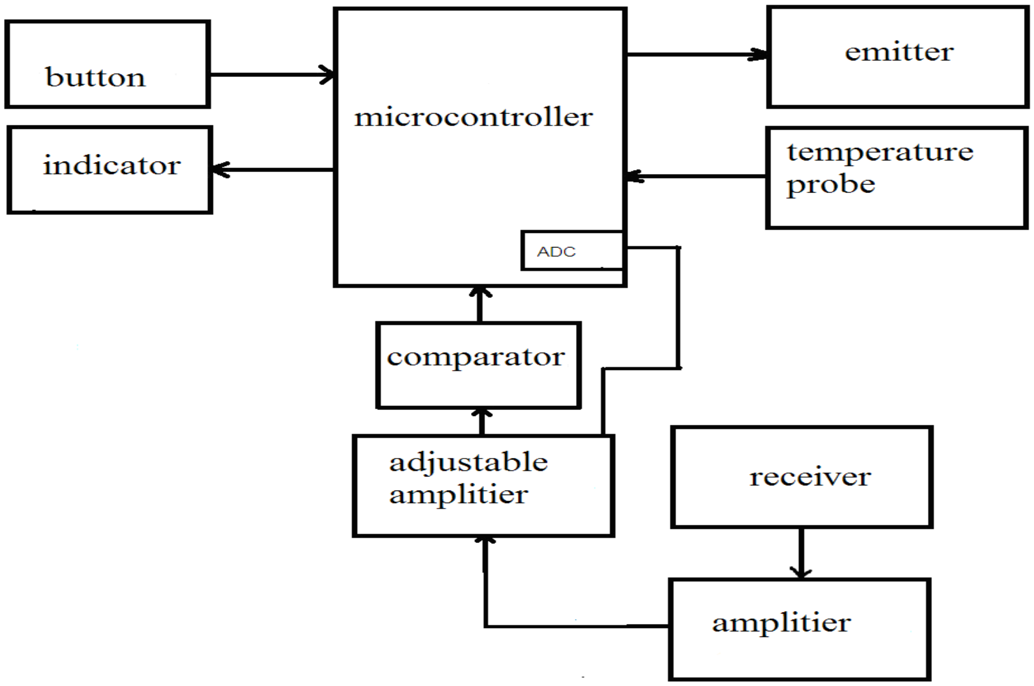

Fig. 1. Block scheme

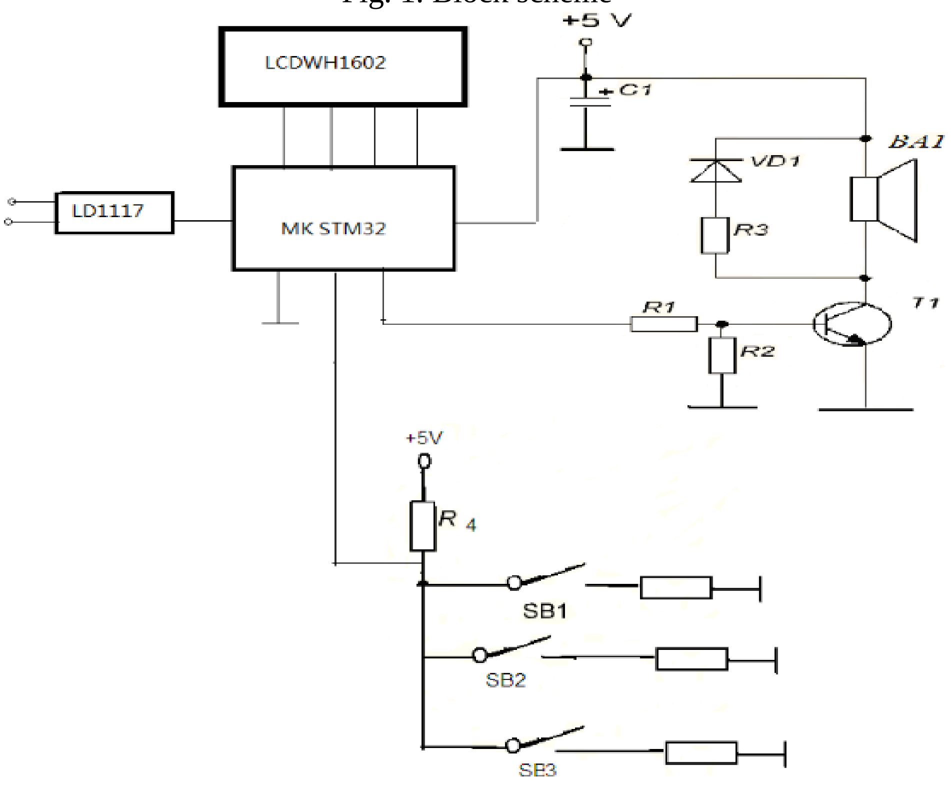

Fig.2. Theoretical scheme

The speed of sound is an important physical characteristic of gas which depends on temperature only. The sound velocity C (m / s) in air can be calculated from the absolute temperature T (K)

$$C=\sqrt{\frac{1}{\beta_{из}*p}}=\sqrt{\frac{x}{\beta_{ад}*p}},$$

where $\beta_{из}$ and $\beta_{ад}$ are isothermal and adiabatic compressibility, respectively

$\chi = C_p / C_V$ is the ratio of specific heats

$\beta_{ад} = -\frac{1}{V} * \left(\frac{\partial V}{\partial p}\right)_T$, where v is molar volume, м is molecular weight

$$C=\sqrt{-\chi * \left(\frac{\partial V}{\partial p}\right)_T * \frac{V^2}{M}}$$

According to the equations for ideal gases we obtain:

$$C=\sqrt{\frac{RTx}{M}} \quad C=\sqrt{\frac{px}{p}} \quad c_T=\sqrt{\frac{p_0 x(1+at)}{p_0}}$$

For dry atmosphere at 0 ° C and p = 1atm, $p_0 = 0.001293\, г/cm^3$,

Then C = $C=331.3\sqrt{1+at}$

$$c = 20.076\sqrt{T}$$ [2].

However, this formula is valid under ideal conditions. In practice, the measurement result is influenced by the sound speed and the presence of dust and fine water droplets (mist) in air that affect the attenuation level. Accordingly, it is necessary to adjust the gain of the receiver signal, to offset this effect.

Modern precise transmitter can not do without concomitant measurements of temperature and humidity. Figure 1 shows the block diagram of an approximate

In the measurement of bulk materials, in addition to the parameters of the medium significant errors are caused by the geometry of the object surface. In this regard, an acoustic transmitter provided with the ability to change the angle of inclination transmitter-receiver relative to a vertical axis has been proposed.

The principle of its operation is based on the echolocation method: distance from the sensor to the object is proportional to the time delay of the reflected signal. Installation of a positioning sensor allows correct readings on the basis of data on the geometry of the object surface, as well as on the state of the environment, to estimate the speed of the sound and attenuation in a medium that allows removal of additional temperature and humidity sensors. The proposed scheme has its drawbacks which are the complexity of the design reducing the system reliability; no additional sensors used require continuous automatic calibration of the meter to monitor the state of the environment. However, the scheme has a significant potential for improvement. Thus, the use of a high-frequency of the test signal, and varying the frequency will greatly increase the accuracy which is determined by the wavelength. [3]

As a result, the layout of the ultrasonic sonar has been assembled and tested. The experimental scheme is presented in Figure 3.The results are shown in Figures 4 and 5.

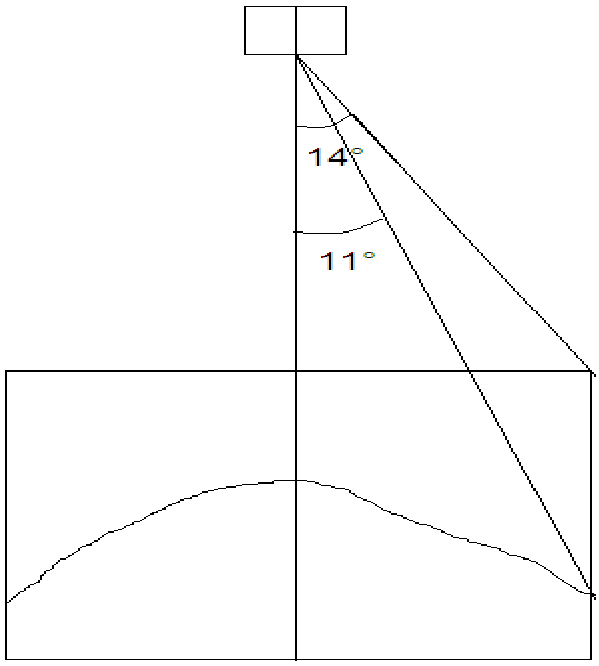

Fig.3. Experimental scheme

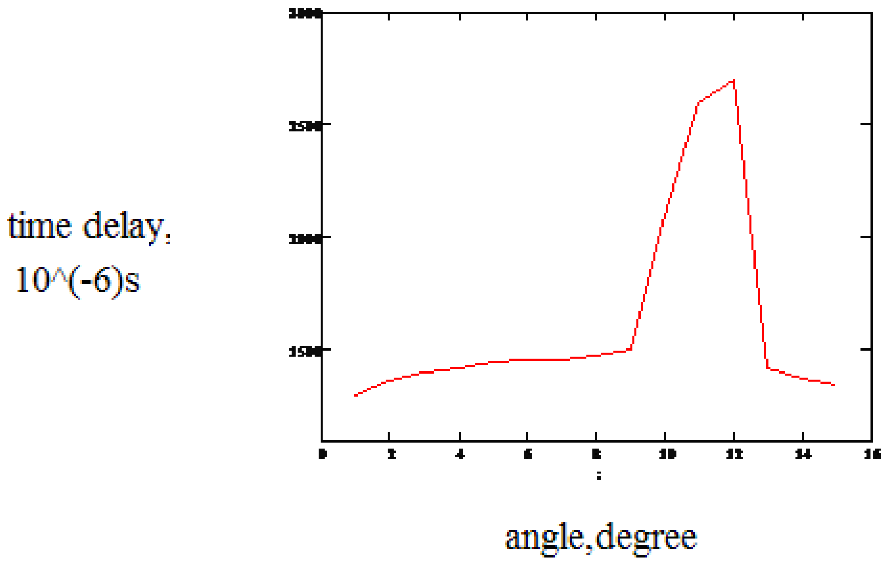

Fig.4. Experimental results

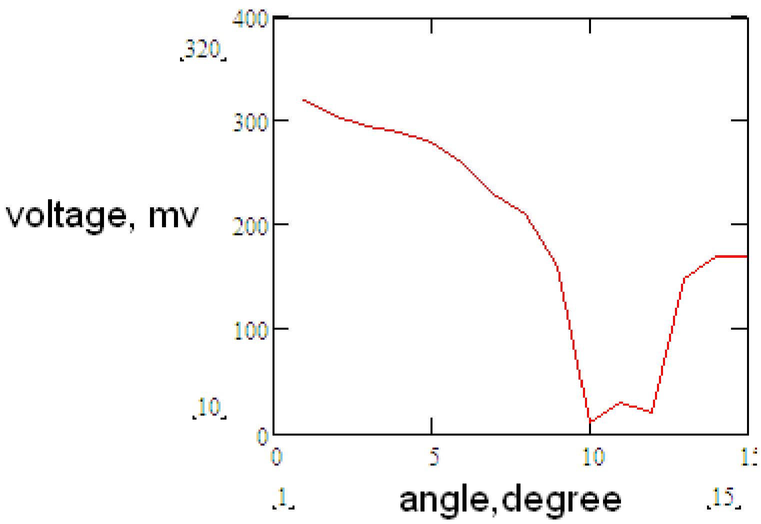

Fig. 5. Experimental results

The basic methods of measurement with ultrasound were studied and practiced. An ultrasonic well depth finder was designed. The principles of the design and installation of an experimental module were studied. Information on modern methods, improving the quality of work performance with microcontroller was obtained. The study allowed mastering the methods and sequence of work in scientific research to develop new electronic circuits and modules.

Reference

1. Ango A .matematika for electric t radioinzhenerov. th: Science, 1965.-780s

2.http://files.school-collection.edu.ru/dlrstore/029fe75a-09f7-76b3-60fa-0b5ef24f9840/1001156A.htm

3. Mysteries of plain water. Vsevolod Arabadji

THE INFLUENCE OF CLIMATIC TESTS ON THE PARAMETERS OF THE ELECTRIC SIGNAL GLASS FIBER REINFORCED CONCRETE

Korzenok I.N.
Tomsk Polytechnic University, Russia, Tomsk
Scientific Supervisor: Fursa T.V.. Dr.

In the operation process in natural conditions vivo structures of reinforced concrete under the influence of temperature and humidity is the