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DEVELOPMENT OF A DATABASE FOR THE SUBSYSTEM RESEARCH PYROELECTRIC SENSORS

In this article subject area using pyroelectric sensors and motion detectors on their basis are examined. The necessity of examining the characteristics of the pyroelectric sensors. Infware and software subsystems for research pyroelectric sensors are developed.

Key words: passive motion detectors, pyroelectric sensors, development of the infware, development of the software, subsystem for research pyroelectric sensors.

Розглянуто предметну область використання піроелектричних сенсорів та детекторів руху на їх основі. Показано необхідність дослідження характеристик піроелектричних сенсорів. Розроблено інформаційне та програмне забезпечення для підсистеми дослідження піроелектричних сенсорів.

Ключові слова: пасивні детектори руху, піроелектричні сенсори, розробка інформаційного забезпечення, розробка програмного забезпечення, підсистема для дослідження піроелектричних сенсорів.

Introduction

With the rapid development of information technology *has* a lot of software products that allow you to raise to a qualitatively new level of scientific research in various fields of science and technology [1-7]. Such software should primarily include: Axiom, Derive, Macsyma, Maple, MatLab, MathCAD, Mathematica, LabVIEW, and many others. Among all the variety of existing software none so fully that would ensure the needs of the scientist or researcher. In particular this applies to highly specialized research. These products contain a powerful mathematical apparatus that allows for extremely complex calculations but does not include databases, taking into account all the necessary features peculiar to specific research [8]. One of the research is research of pyroelectric sensors [9,10]. Therefore, the development of subsystems to conduct such research in view of all the subtleties of a scientific experiment is the actual problems.

Description of subject area

Today in any object where material values established security systems. Whether it's a bank, museum, warehouse, dwelling, or even educational laboratory. An integral part of modern security systems are passive infrared motion detectors [1], and also used during engineering development and implementation of the companies involved in the development project "Smart House". However, these detectors have several disadvantages. The main ones are: high frequency of false anxiety arising from radiation detectors sunlight shot convection air flow, vibration, or presence in the area of detecting other living facilities, and lack of signal anxiety in those cases when the temperature of an object is equal to background temperature zone detection. The reason for this behavior detector should be sought primarily in the principle of its sensing element - a pyroelectric sensor Fig.1.

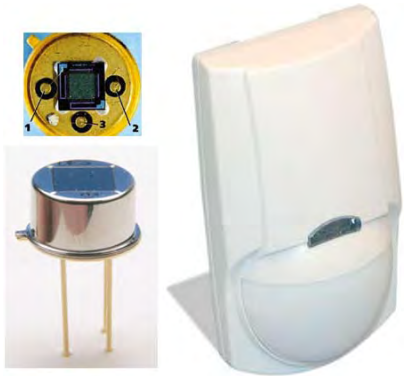

Fig. 1. Pyroelectric sensor and passive infrared motion detector designed based on it

The aim of research is to determine the pyroelectric sensor according to the parameters of electrical output analog signal from the thermal pattern changes in the area of detection. As the researcher is primarily interested in the parameters of the signal (Fig. 2.) which will result from the emergence in the area of detecting living facility it is necessary to take into account data such as the distance to the object, its temperature, weight, geometry and more. Useful the output signal will be formed on the background noise parameters which should also be considered as background parameters: the width of the zone detection, length, height, temperature, relative humidity, pressure, etc. An example of the output electrical signal parameters that will be investigated is its amplitude, shape, energy, and temporal characteristics of frequency spectrum, and so on. One of the samples of the signal from the pyroelectric sensor is shown in Fig. 2.

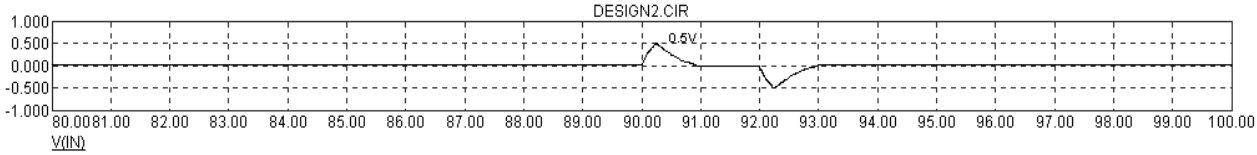

Fig. 2. Useful signal from the pyroelectric sensor

Designed subsystem is designed primarily to study the characteristics of pyroelectric sensors under real operating conditions, determine their characteristics and weaknesses with a view to further improving and developing new methods of detecting signals from objects detection.

Infware

To solve this problem was developed following conceptual database model Fig. 3.

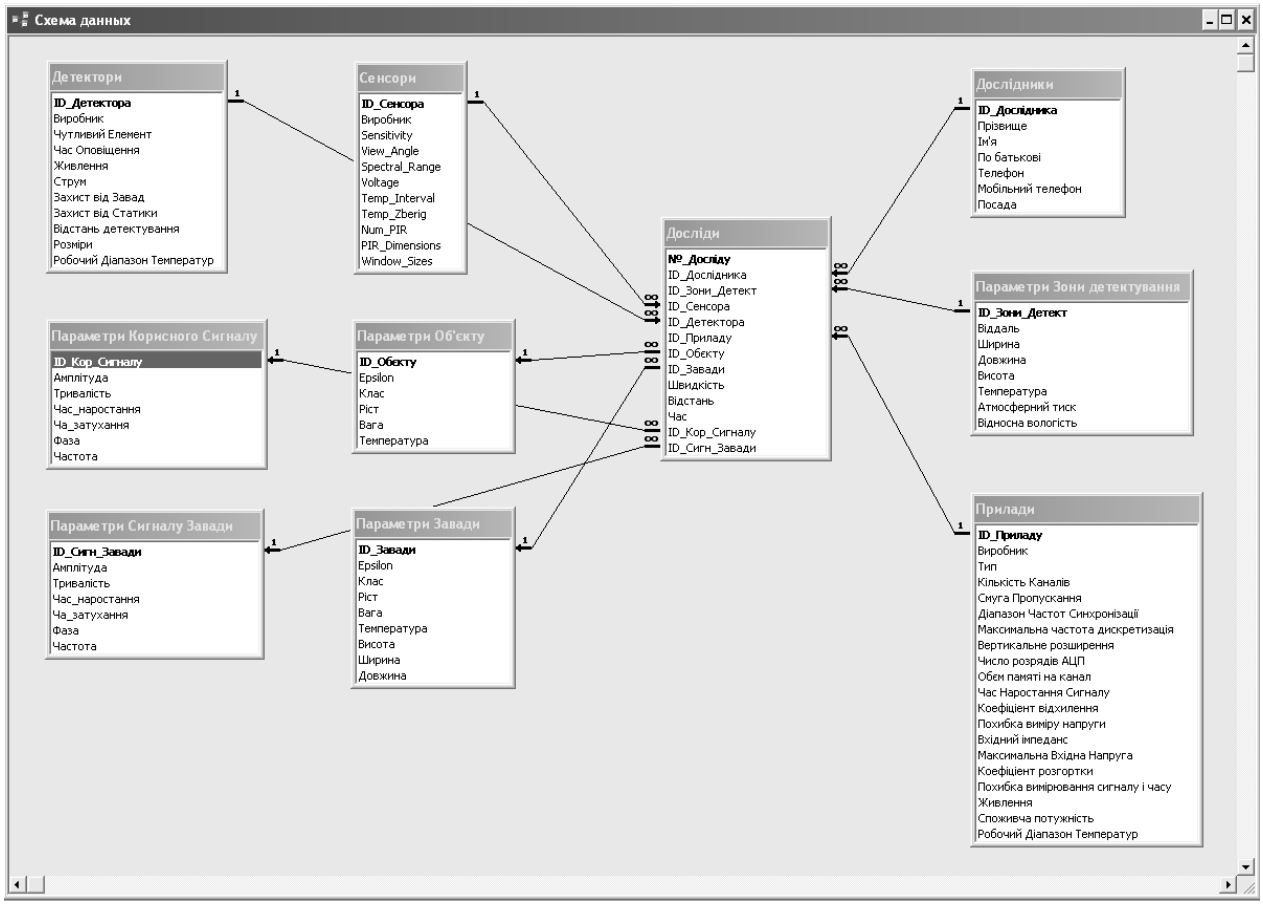

Fig. 3. Conceptual model database subsystem for research pyroelectric sensors

The analysis of the domain was developed infologic model of database subsystem for research pyroelectric sensors. It could reflect given subject area as a set of information objects and their structural relationships. When datalogic modeling was used obtained infologic model and describes the properties of the concepts of the subject area that researched, their relationship and the restrictions imposed on the data. Considered features a data storage component model on a physical level in the database that is used for its software implementation. Datalogic model database subsystem for research pyroelectric sensor is shown in Fig. 4.

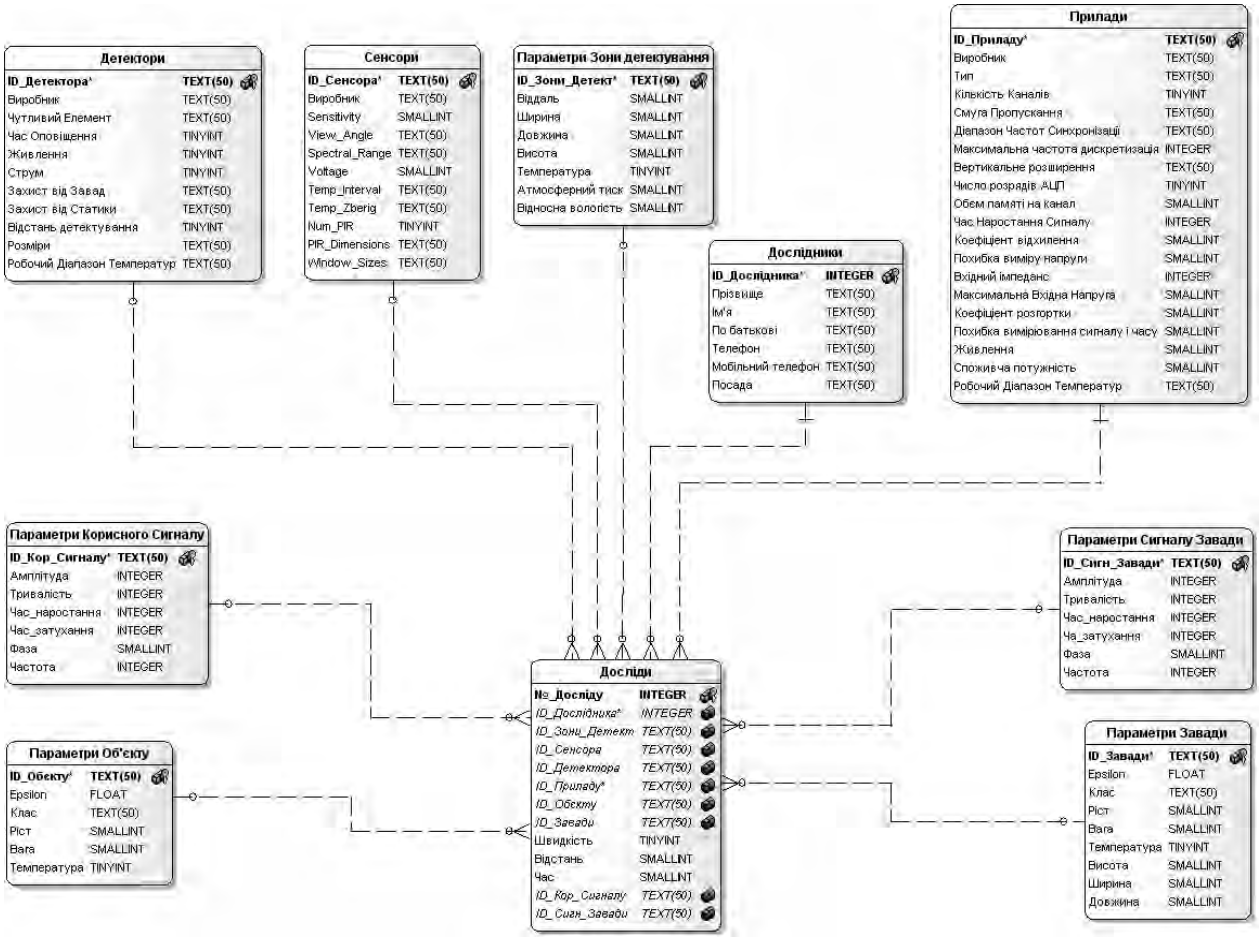

Fig. 4. Datalogic model database subsystem for research pyroelectric sensors

Accumulated during the experiments data is stored in tables. Examples of such tables can serve as a table: "Sensors" (Fig. 5).

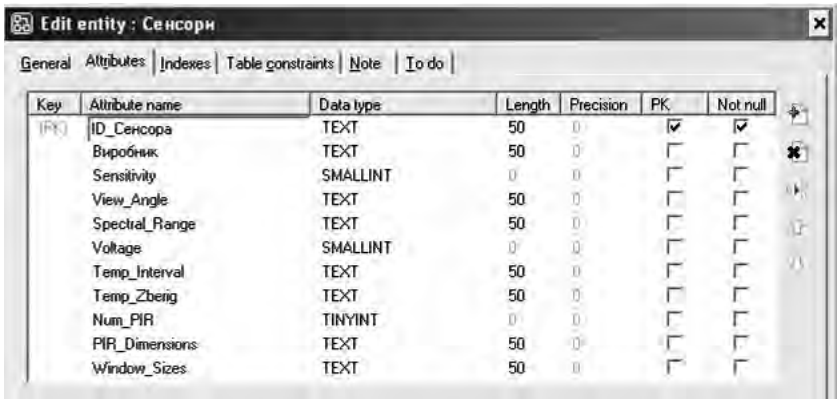

Fig. 5. The table structure "Sensors"

Software

To organize the interface and interaction researcher developed a database have developed special forms. An example of one of these forms can be seen in Fig. 6. An important feature of the developed forms is to control the accuracy of data entry, which significantly reduced the number of errors that occur at the stage of data entry.

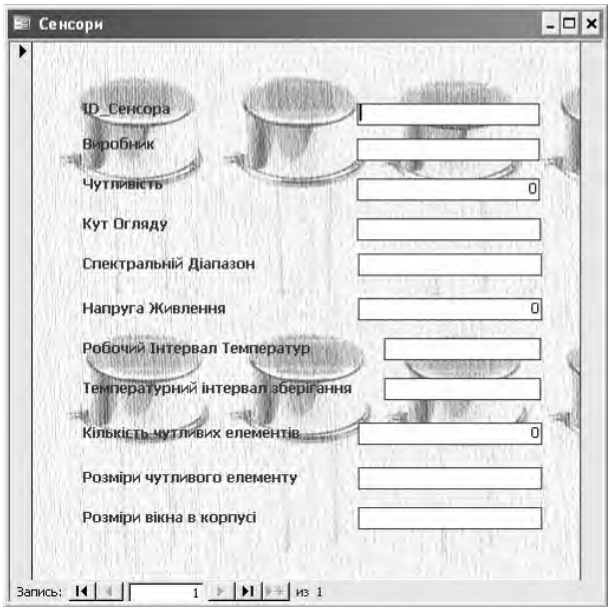

Fig. 6. The form of "sensors"

Calling required forms or select the desired command by using the menu on the main window. Example of a call form "Devices" is shown in Fig. 7.

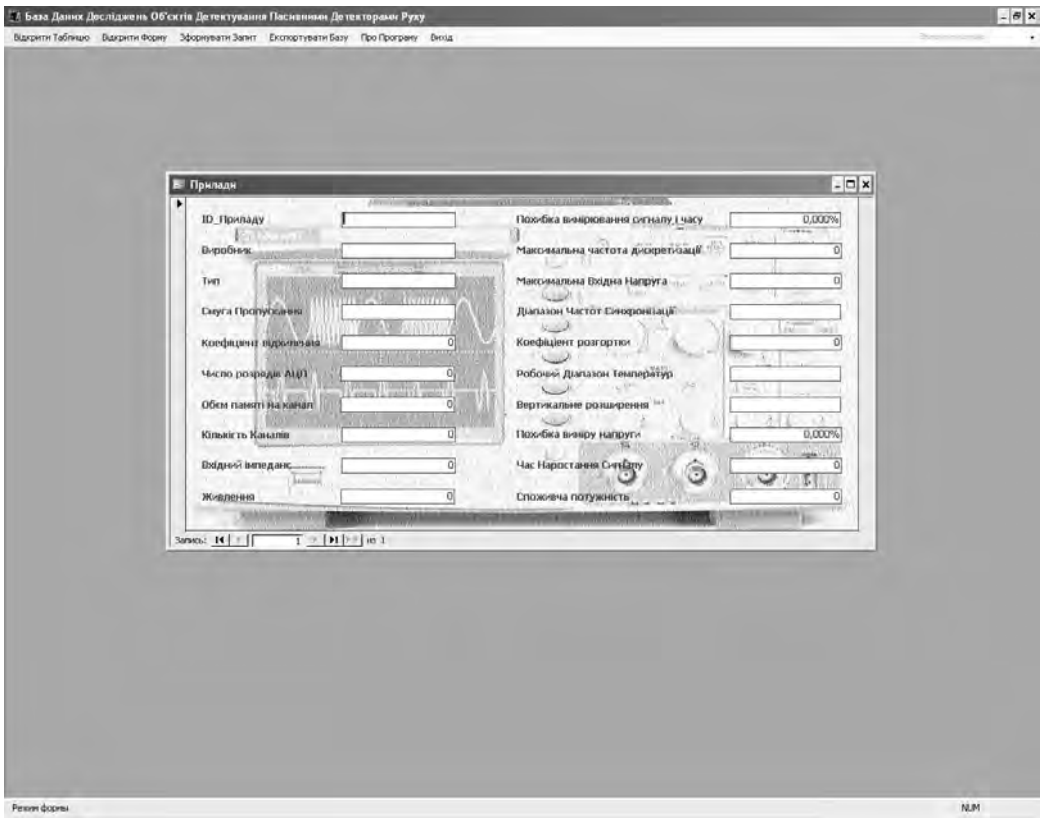

Fig. 7. Calling from menu form "Devices"

As a result of scientific experiments gradually formed and filled with useful reference database signals and signal noise. This framework can be used to develop intelligent detectors in solving tasks of object detection of passive motion detectors. Therefore, this program provides the ability to export data to external files for their further use, eg for firmware Flash memory in intelligent motion detection.

Example SQL - Query to create a database reference useful signals are shown in Fig. 8.

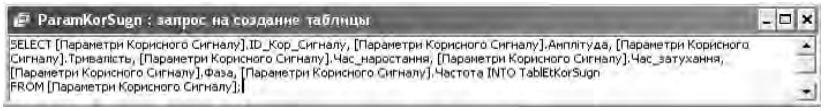

Fig. 8. SQL - query to create a database reference signal

After that generated a database reference signals can be stored in external files Fig. 9.

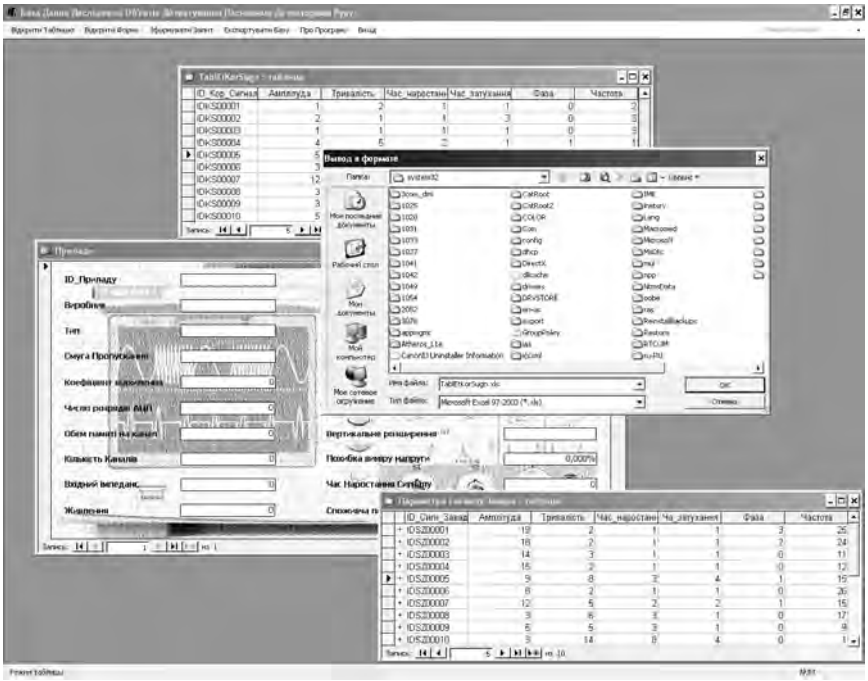

Fig. 9. Keeping a database reference signals in external files

Conclusions

The question of rational saving received data in scientific experiments at research pyroelectric sensors to further their optimal treatment. Defined data structures and formats of their physical representation in the database. Proposed block diagram of the database for the research of pyroelectric sensors. The results of the research subject developed her infological and datalogical model. In developing datalogical database model took into account the features of the experimental data storage on a physical level in the database. Developed and implemented data entry forms, structure tables for data storage database research. There are exports formed database reference signals in external files for data exchange with other software. Developed and implemented infware and software for research pyroelectric sensors.

1. http://www .chartwellyorke.com/derive/derivefeatures.html. 2. http ://www.macsyma.com/. 3. http:// www.maplesoft.com/. 4. ht tp://www.mathworks.com/. 5. ht tp://www.ptc.com/products/mathcad/. 6. ht tp:// www.ni.com/labview/. 7. http://www.statsoft.com/textbook/experimental-design/. 8 Лобур М.В., Головацький Р.І. КМОН інтегрований інфрачервоний детектор руху // Вісник Нац. ун-ту"Львівська політехніка" №548, "Комп'ютерні системи проектування. Теорія і практика". 9. Лобур М.В., Головацький Р.І. Методи адаптації чутливості пасивних інфрачервоних детекторів руху до об'єктів спостереження // Вісник Вісник Нац. ун-ту"Львівська політехніка" №512, " Комп'ютерні системи проектування. Теорія і практика". 10. Lobur M.V., Golovatsky R.I. Methods of sensitivity management of passive infrared detectors of movement. CADSM 2005, Lviv – Polyana, UKRAINE. P. 276.