converter creates the signal which is processed on minicomputer Raspberry PI. Raspberry PI processes incoming data and creates termoprofiles, Raspberry PI has fine element analyses software - Comsol Multiphysics. In Comsol Multiphysics we create some models of heating with current parameters, so we can quickly change heating parameters to create more suitable termoprofiles. Comsol Multiphysics modeling allows us to choose the most optimal parameters, for example we can create induction heating models. Thermoprofiles for induction heating model are shown on fig. 2.

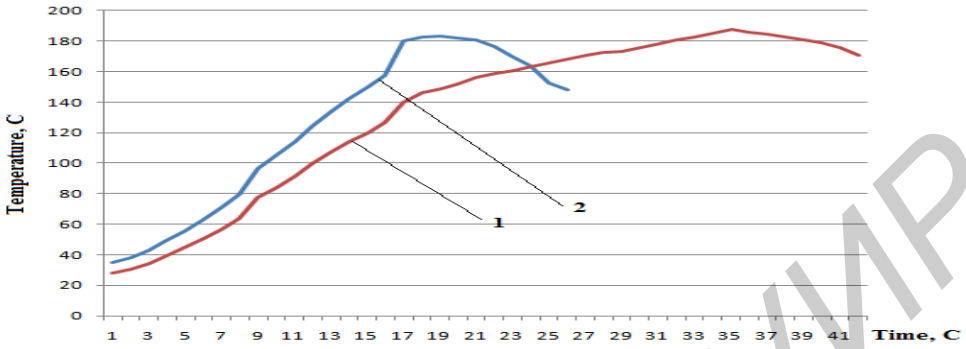

Fig. 2 - Induction heating termoprofiles: 1 – with magnet, 2 – without magnet

Thus, it is possible to control effectively the process of soldering and replace the device using large controllers. For example, Raspberry PI has credit card size and less power consumption than big computers but provides the same capabilities. Using FEA software provides more possibilities to control technological systems and can increase the quality of products.

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THE HARDWARE-SOFTWARE COMPLEX OF ELECTRONIC-OPTICAL SYSTEM CONTROL

Belarusian State University of Informatics and Radioelectronics
Minsk, Republic Belarus

Y.A. Arlou

S.I. Liahushevich – candidate of Philological Sciences

The last two decades are characterized by intensive development of research in control of robotic systems. Modern methods of electronic systems use microcontrollers. They represent a chip combining functions on a single chip microprocessor peripherals and permanent random access memory and can perform simple tasks. The advantages of the microcontroller compared with other methods of control may include a small size, high performance, low power (10mW at idle).

The objective is to create a hardware-software complex of control robotic pneumatic system and a laboratory methods complex.

The implementation of the hardware is performed on microprocessor unit Arduino (Fig. 1) with microcontroller ATMega2560.

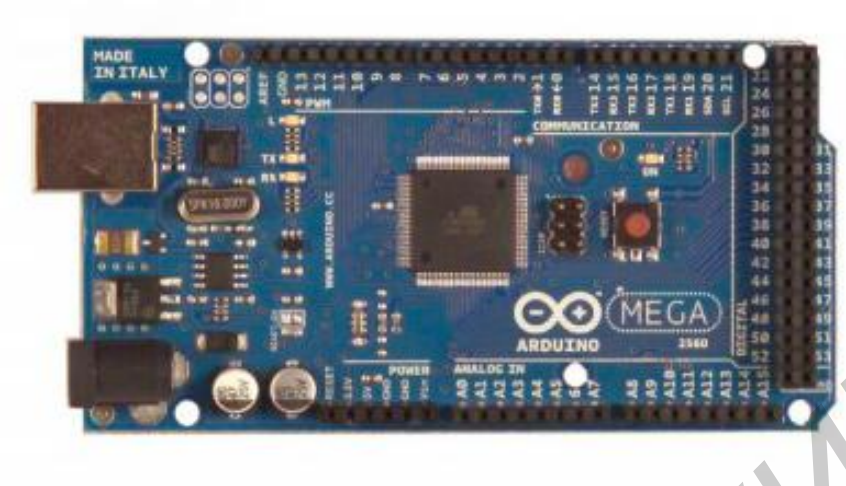

Fig. 1 - General view of the Arduino microcontroller unit

The advantages of a microcontroller unit include the following features:
- low power consumption;
- high frequency of up to 16 MHz;
- the presence of up to 54 digital, 16 analog and 14 PWM outputs;
- an integrated programmer with USB interface;
- automatic selection of power supply;
- the built-in protection of the microcontroller;
- a small size module;
- communication outputs;
- open cross-platform development environment;
- the simplicity of development and application;
- low supply voltage, thereby reducing the risk of use;

The specialized developing environment is used to programming. The programming language which is used is easy in application and learn thanks to the fact that it is similar to the programming language C++. The unit is connected to the PC using the standard USB and doesn't requires special equipment since the programmer function is implemented at the block.

Digital and analog outputs of microprocessor unit can be used as inputs. The complex feedback implemented using optoelectronic devices are optical pairs. This will add to the system flexibility and additional functionality.

The system is provided secure emergency power-off to prevent damage to personnel.

The operation of the system can be made both in standalone mode and by transmission operations from PC.

Laboratory-methodical complex will fully evaluate contemporary methods of management of electronic systems and obtain the necessary skills to work with microprocessor blocks.

ELECTROMAGNETIC RADIATION SHIELDING

Belarusian State University of Informatics and Radioelectronics
Minsk, Republic of Belarus

L.L. Hankou

S.I. Liahushevich – Candidate of Philological Sciences

Electromagnetic fields are present everywhere in our environment. Some objects emit electromagnetic radiation at high level that can affect human health.

Radiation is a broad term used to describe energy emanated in the form of waves or particles. Radiation in the form of waves is referred to as electromagnetic radiation. Electromagnetic radiation of sufficient energy can cause atoms to become electrically charged, or ionized, and is referred to as ionizing radiation. Lower energy electromagnetic radiation is referred to as non-ionizing radiation. All electromagnetic radiation combined can be represented in an array known as an electromagnetic spectrum. Electromagnetic radiation emanates from both natural and human-made sources.

Electromagnetic radiation is assumed to have effect on biological objects. Mostly electromagnetic fields effect on biological objects is dielectric heating. There are publications which support the existence of complex biological effects of weaker non-thermal electromagnetic fields. Fundamental mechanisms of the interaction between biological material and electromagnetic fields at non-thermal levels are not fully understood.

Biological effects are measurable responses to a stimulus or to a change in the environment. The body has sophisticated mechanisms to adjust to many and varied influences we encounter in our environment. But the body does not possess adequate compensation mechanisms for all biological effects. Changes that are irreversible and