

Research support by LabView-based data-acquisition systems

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The aim of all scientific experiment and measurement is to collect information about the measured object or incident. On the field of research it's especially important to acquire all of measurable information during the experiments, because often we don't know exactly, which of the parameters will give us new and useful information. But in a lot of cases the data acquisition could be quite difficult, because:

- If during the measurement more instruments are used, the simultaneous and continuous observation all of them is not possible.
- A lot of instruments don't provide built-in data acquisition and storing
- Although some instruments have this function, it could be difficult to synchronize the data acquired by various instruments.

The solution of this problems is such a data collection system, that in real-time collects and synchronizes all of the information, that the used instruments provide during the measurement and than stores them into a common database, allowing the common processing of them. By this way the efficiency of the scientific research could be greatly increased. For us at Oncotherm is a priority to make more efficient our R&D activity, so we started to develop integrated data-acquisition systems to support our research projects.

The main element of this system is the LabView program suite, which is developed especially for data-acquisition and instrument control and is provided by National Instruments. The main task of LabView is to control the NI's own DA units, but the products of the most important instrument manufactures are controllable by the suite too. During our projects we use both NI instruments and the instruments of other manufacturers (Tektronix, Rhode & Schwartz) too.

One of our main ambitions is the monitoring of the LabEHY oncothermia device, which is especially designed for medical experiments. The device sends some information about its state by RS232 serial port and the inner signal lines of the device are monitored by NI data-acquisition devices.

A typical data acquisition system consists of the following instruments and provides us the following information:

- LabEHY:
 - By serial port: time after the start of the treatment, output power, tuner positions and the S11 scattering parameter, which represents the efficiency of the tuner built into the LabEHY
 - By direct monitoring of signal lines: voltages proportional with the forwarded and reflected power
- Luxtron thermometer: this four-channel device gives us information about the temperature changes of different parts of the tumor during the treatment.
- Oscilloscope: by a two-channel oscilloscope we measure the voltage on the experimental animal and the current flowing through it. From this two data we can calculate the power emitted by the tumor.

By using the data provided by the reviewed instrumentation we can get a clear picture about the energetical efficiency and heat effects of the treatment, which are important questions on the field of oncothermia.

Of course, the data-collecting systems always follow the demands of the current research projects, capitalizing the flexibility of the LabView-based DA systems. On the grounds of our experiences until now we have more ways of improvement on this field. The most important of them are:

- LabView-LabEHY: the direct control of the LabEHY by a LabView-based surface, by an NI device built into the instrument. This solution will give us the opportunity to monitor all of the inner activities of the instrument.
- Production support: automated testing of our products by LabView-based instrumentations.

By realizing these conceptions we can improve both the effectivity and the speed of our R&D projects and improve the quality of our products, so we are committed towards these ways.