Oncothermia research support by LabView-based data-aquision systems

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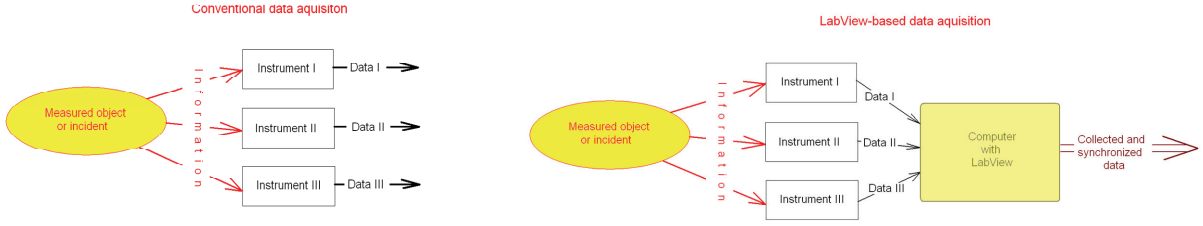
The necessity of integrated data-aquisition systems

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 the experiments, because often we don't know exactly, which of the parameters will give us new and useful informations But in a lot of cases the data aquisition could be quite difficult, because:

- If during the measurement more instrument is used, the simultaneuos and continuous observation all of them is not possible
- A lot of instruments don't provide built in data aquisition and storing
- Although some instruments have this functions, 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 synchronises 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 efficinency 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 aquisition systems to support our research projects

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



The instrumentation of an experiment

The key factor of destroying the tumor cells is the quantity of the current flowing through them By maximizing the current int he tumor the efficiency of the therapy can be maximized too During the propagation of the electromagnetic wave in cable, the formation of current maximum points is unavoidable There was a concept, that by changing the tuning of the EHY 2000 device (to tune not to the perfect 1 00 SWR) that points can be moved along the cable into the tumor The aim of the introduced experiment was to decide if that concept is right or not For the experiment a body and tumor phantom was used, which was built up by a beef kidney inserted into a pork thigh

The data aquisition system assembled to this experiment consisted of the following instruments and provided the following informations:

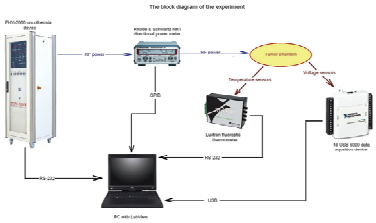
EHY 2000 oncothermia device: the forwarded, reflected and useful powers transmitted by serial port

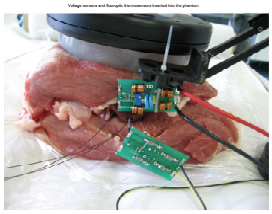
Rhode & Schwartz power meter: the forwarded power)to check the power meter of the EHY 2000) and the SWR by GPIB protokol

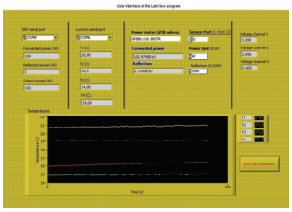
Luxtron fluoroptical thermometer: this four channel device gives us information about the temperature changes of different parts of the tumor during the threatment It transmits the collected data by serial port

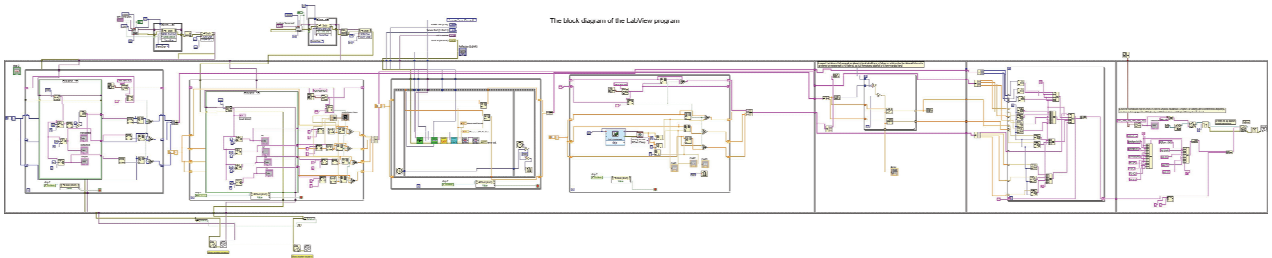
National Instruments USB 6009: this DA device was used to collect and transmit the data of the voltage sensors

By using the data provided by the reviewed instrumentation we got a clear picture about the electrical and heat effects of the various tuner settings, which gave important informations about the correctness of the concept

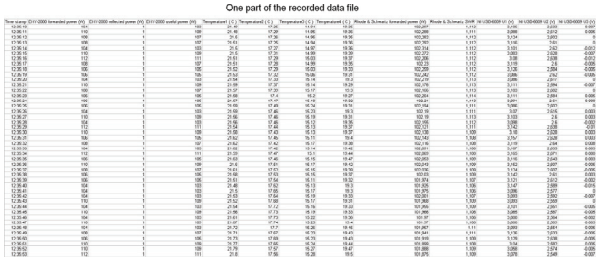








One part of the recorded data file



Other possible usages

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 possible applications of LabView based data aquisition systems The most importants of them are:

- LabView LabEHY: LabEHY is a hyperthermia device specially developed for in vitro and in vivo experiments Our ambition is to controll the device by a LabView based surface using an NI device built into the instrument This solution will give us the oppurtunity to monitor all of the inner activities of the instrument and control the device by various ways for example by using the output data of other devices for the automatic contol of the LabEHY
- Production support: automated testing of our products by LabView based instrumentations

By realising 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 comitted towards these ways