

# A Non-Invasive Expert System for Diagnosis of Intraocular Tumors / NICDIT

## the objective of the project

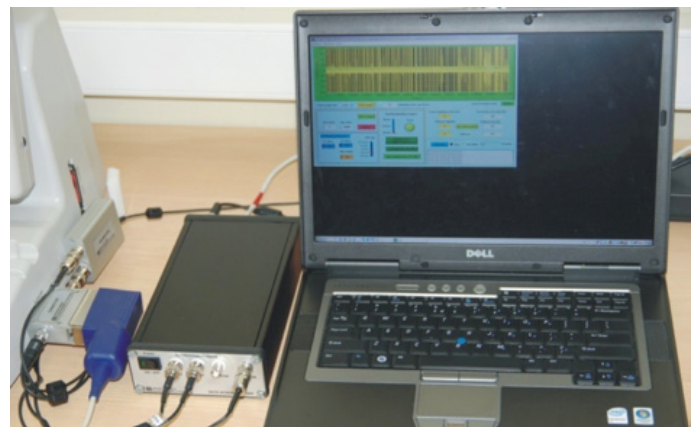
Development of non-invasive system for intraocular tumor diagnosis, its tissue characterization and parameterization which will consist of the innovative device-attachment, conventional non-invasive ultrasonic diagnostic equipment, innovative digital ophthalmoscope and sophisticated software.

## solution

To develop the device-attachment to the conventional ultrasonic diagnostic equipment in order to pick-up the raw ultrasonic signal, which is reflected from the tissue of the human eye. Further, processing in time-frequency domain will be performed in order to extract more information about tissue anomalies, like cancers.

## problem

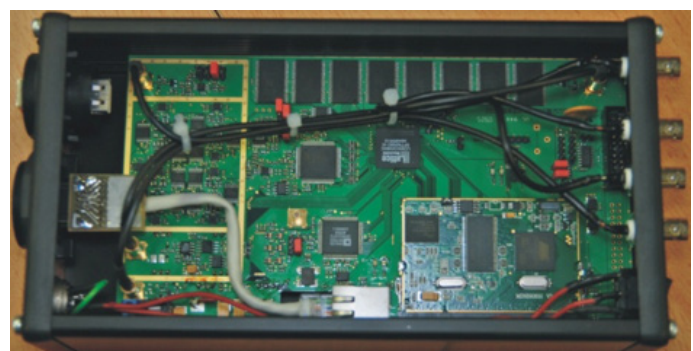
The conventional ultrasonic diagnostic equipment performs visualization only of the envelope of the received ultrasonic signal. There is no possibility for user to apply more sophisticated signal processing techniques, for example filtering in time frequency domain.



Connector, preamplifier and data acquisition system

## ultrasound institute

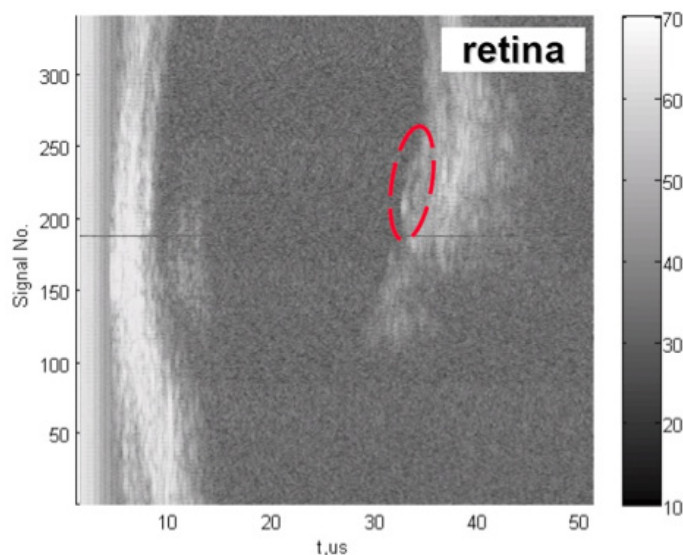
Has designed and developed the special hardware for ultrasonic signals capture. Design and development of the special hardware is oriented for acquisition, processing and storage of radiofrequency (RF) ultrasonic signals.



View of printed circuit board of data acquisition system

## the parameters of developed portable system

Embedded system controller (ARM9 32bits);  
Acquisition of whole frame (116 measurement positions, 348 signals);  
ADC 12 bits and 200MHz sampling frequency;  
Programmable amplifiers up to 80dB;  
Programmable filters in frequency band 5..40MHz;  
Performance controlled by FPGA logic;  
USB2.0, LAN, COM, VGA interfaces.



The B-scan image of the eye affected by melanoma



The main window of ultrasonic data acquisition system control

## project homepage

<http://www.stratelus.com/projects>

## related publications:

1. A. Paunksnis, V. Barzdžiukas, R. Kažys, R. Raišutis, A. Lukoševičius, M. Paunksnis, A. Janušauskas, V. Marozas, D. Jegelevičius, S. Daukantas, S. Kopsala, S. Kurapkienė, L. Kriaučiūnienė, R. Jurkonis. A non-invasive expert system for diagnosis of intraocular tumours: the system concept. *Ultragarsas*. 2008. Vol.63. No.4. P.66-71.
2. R. Raišutis, O. Tumšys, V. Deksnys. The prototype of ultrasonic imaging system–attachment for diagnosis of human eye tumours. *Ultragarsas*. 2010. Vol.65. No.2. P.42-46.
3. R. Raišutis, R. Kažys, O. Tumšys, V. Deksnys, V. Barzdžiukas. The early stage diagnosis of intraocular tumours: recent developments and prototyping, Proceedings of international of XIVth Conference "Biomedical Engineering-2010", ISSN 2029-3380, pp.10-13