Data aquisition experiments for Science Lessons

Elena-Mihaela Garabet, Ion Neacşu,
Liceul Teoretic "Grigore Moisil"-Bucureşti, Romania
mihaela_garabet@yahoo.com, iv_neacsu@yahoo.com,

Abstract. *We are trying to develop our studies on exploring and analizing the real world from the Science teacher's point of view, under the frame of the Socrates-Comenius "Hand's on Science" (110157-CP-1-2003-1-PT). We are still using our data acquisition board NIDAQ 6013 which explores the real word (experimental devices, electric circuits, aqueous solutions, plants, human beings) by transforming the computer in a chronometer, a voltmeter, an ammeter, a dynamometer, a teslameter, a Ph-meter, a microphone, a thermometer, a pletysmograf, etc,. Our contribution consists of the choosing and the coupling of the sensors with the data acquisition board and of the analyze of the signals we get. By using the classical set of a magnet (placed on the car) and a coil (with a fixed position), we can register the position of a race car in the circuit, by using a sonic explorer (a toy), we have registered the sonic interference, for the simulation of an acid rain we have used a pH electrode, for measuring the temperature we have used a thermistor, for the muscle fatigue we have used a Force Sensor (bought by the HSCI Network), for the study of the transpiration of a plant we have used a humidity sensor, for the study of the magnetic field we have used a Magnetic Field (bought by the HSCI Network).*

This paper shows a short presentation of these experiments, of the way of gathering and analyze the real signals and the fantastic impact they have on our lessons.

Keywords. LabVIEW, DAQ-data acquisition, DAQ-software, VI-virtual instrument.

1. Phase Transitions

For monitoring a phase transition such as the boiling of the water (fig 1.1), we have used a thermistor as a temperature sensor, by measuring his voltage and the established current. If we can calculate his resistance we can calibrate it as a thermometer. The dependence of the temperature during the heating and the boiling of water, versus time is shown in the fig.1.1.

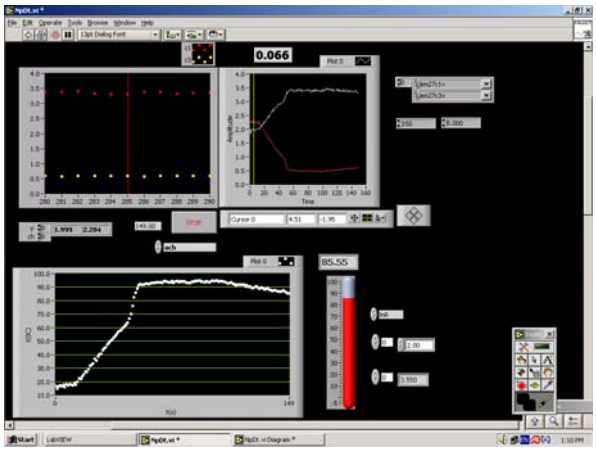

Figure 1.1

2. The Transpiration of the plants

For monitoring the transpiration of a plant we have used a thermistor as a temperature sensor and a sensor for humidity (fig.2.1). The result is shown in the fig. 2.2

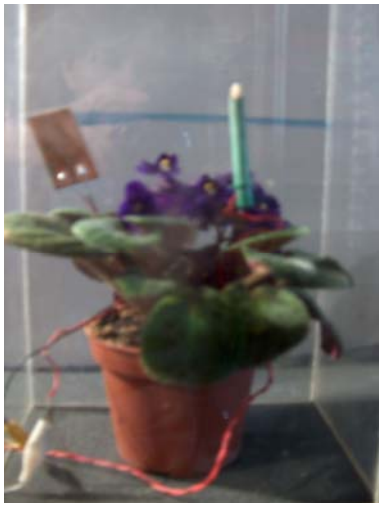

Figure 2.1

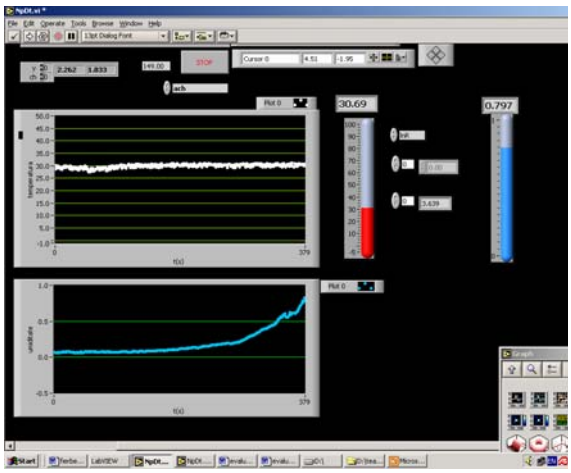

Figure 2.2

3. The monitoring of the cardiac rithm

A simple pletysmograph contain a IR emitter and a phototransistor .(fig. 3.1). It is able to work both on the ear lobe and on the little finger. You can see the results in the fig. 3.2. The acquisition software can show the value of the cardiac rhythm.

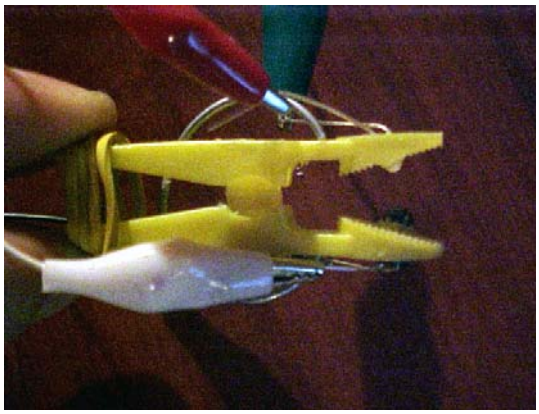

Figure 3.1

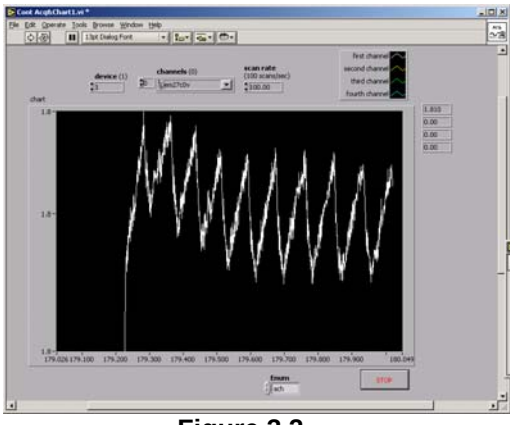

Figure 3.2

4. Acoustic registration

We have used a sonic explorer from the toy shop for acoustic registrations (fig 4.1) In the fig. 4.2 you can "see" a musical LA, emitted by a diapason.

Figure 4.1

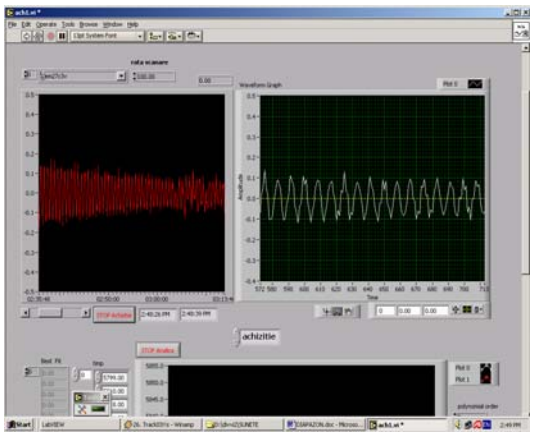

Figure 4.2

The same LA emitted by the organ from the fig. 4.3 looks like fig. 4.4.

Figure 4.3

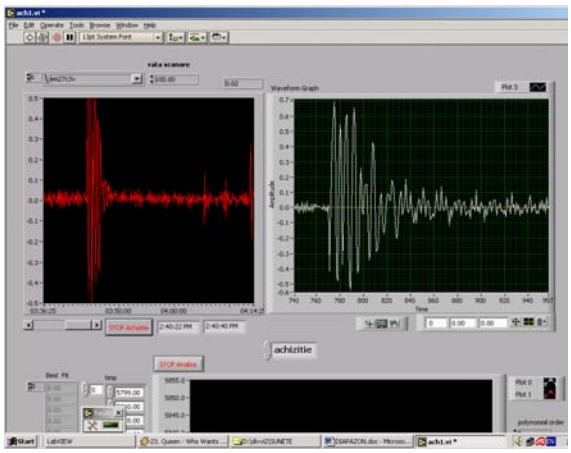

Figure 4.4

The experimental set-up from fig. 4.5, helps us to observe the apparition of the oscillation beats. (fig.4.6)

Figure 4.5

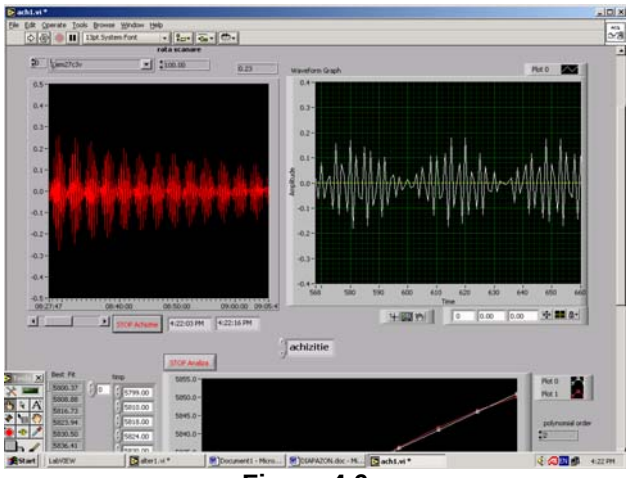

Figure 4.6

And a real sound: Mia, the turtle from our laboratory, during she was arguing us (fig. 4.7.)

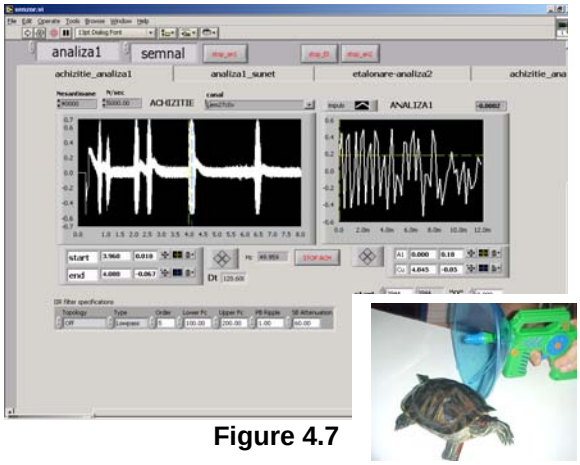

Figure 4.7

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