Building Your Own Science Lab

by Tharowat Mohamed Ali, ***March 2011***

Abstract

When trying to develop your own products to sell commercially you sometimes need a helping hand, Matrix software and hardware is designed to make communicating and programming with microcontrollers easier. In this article we are shown how a full commercial software and hardware package has been created with a little help from Flowcode and ECIO.

Requirements

Software:

- Any licence type of Flowcode v3 or v4 for any variant.

Hardware:

- ECIO device

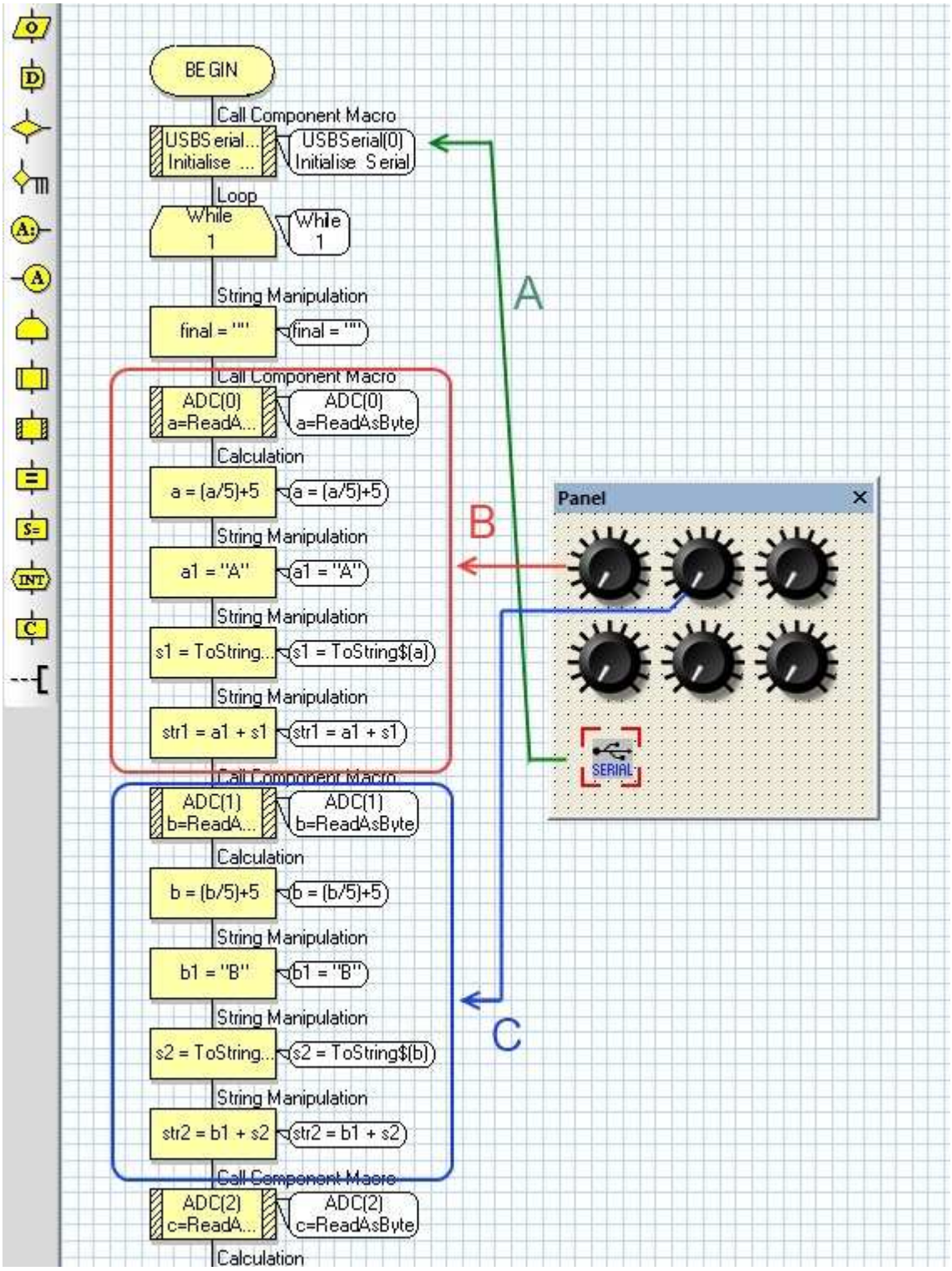
Introduction

While Matrix Multimedia are known for their software and hardware being excellent tools for learning and teaching; many people do not realise these same products are also invaluable devices for creating prototypes and experimenting with ideas as a precursor to creating products for industrial or commercial use. This article will begin to demonstrate how Matrix hardware and software was used to help create a commercial product. Easy Lab allows users to connect up to six sensors and using USB communications, plots the received data into a graph format which you can manipulate with its versatile software.

Flowcode was used to develop the USB communications between the NASOCT hardware and the Easy Lab software, the article shows how this was done in the flowchart, by analysing each sensor individually and processing the results. The Matrix ECIO was used as part of the clever NASOCT sensor hardware. The ECIO was a perfect choice for the development of this product, it offers an easy way to communicate to the microcontroller via USB with clean I/O.

Easy Lab System Requirements

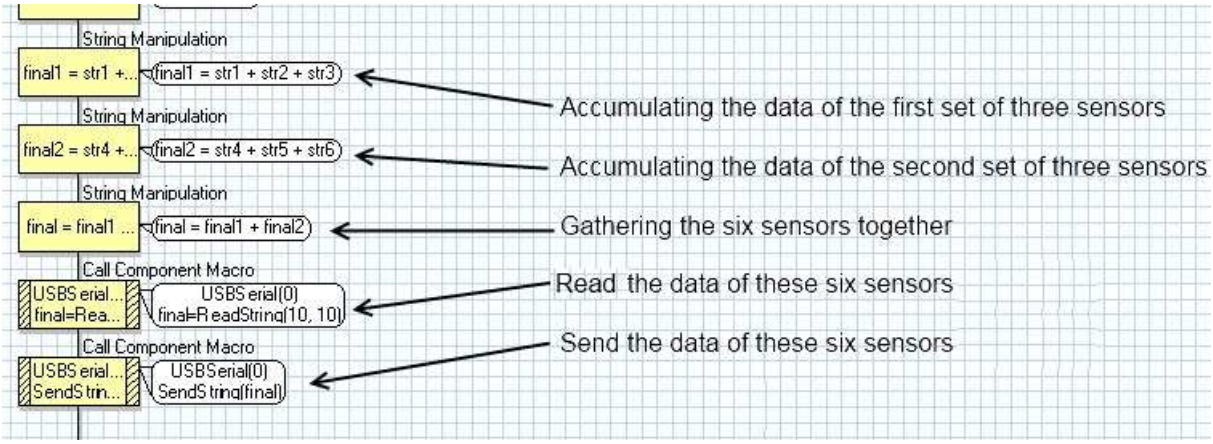
OS Requirements:	Software	Hardware
o Windows XP o Windows Vista o Windows 7	o Net framework 3.5 o Windows installer 3.1	o NASOCT Sensors Hardware



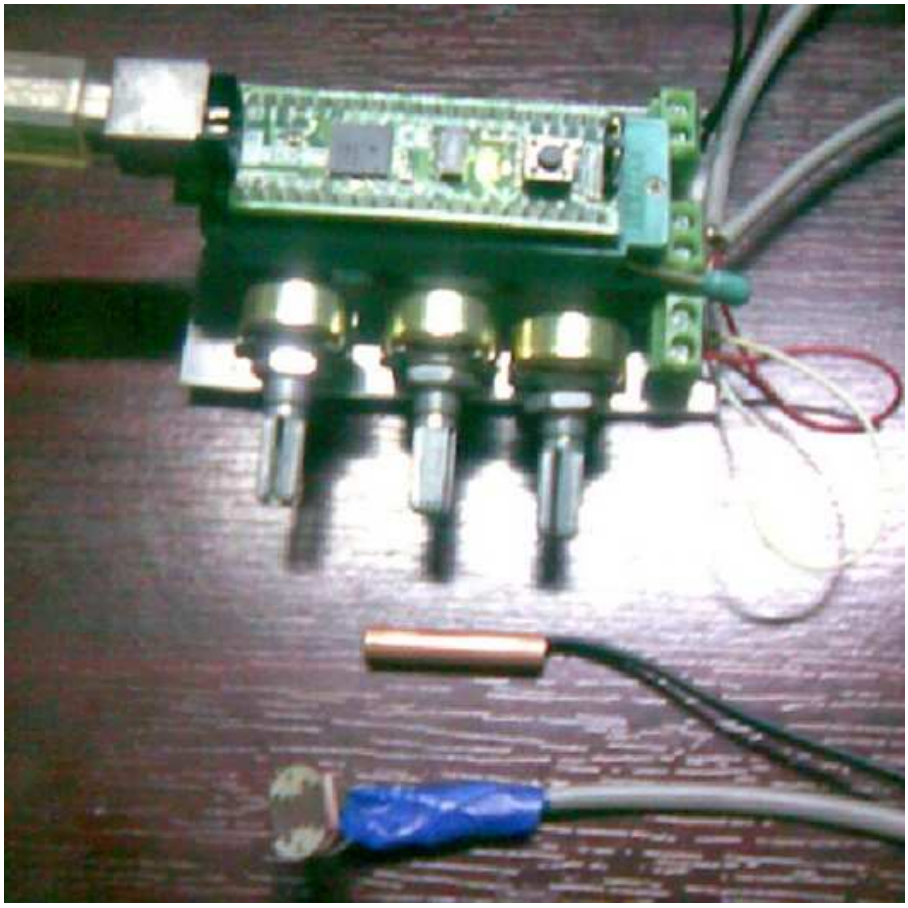
Explanation of Flowcode File

A - Initialise USB Serial Component
B - Read the data from the first sensor
C - Read the data from the second sensor

There are 6 stages reading from 6 ADC's each of which related to 6 different sensor (temperature ,light ,volt, current,….)



Finally I divided the six sensors into two groups and accumulating the reading from the groups and gathered them into one string by reading and sending the data serially through the USB.



The picture above shows the ECIO as used in the NASOCT sensors hardware.

Main features:

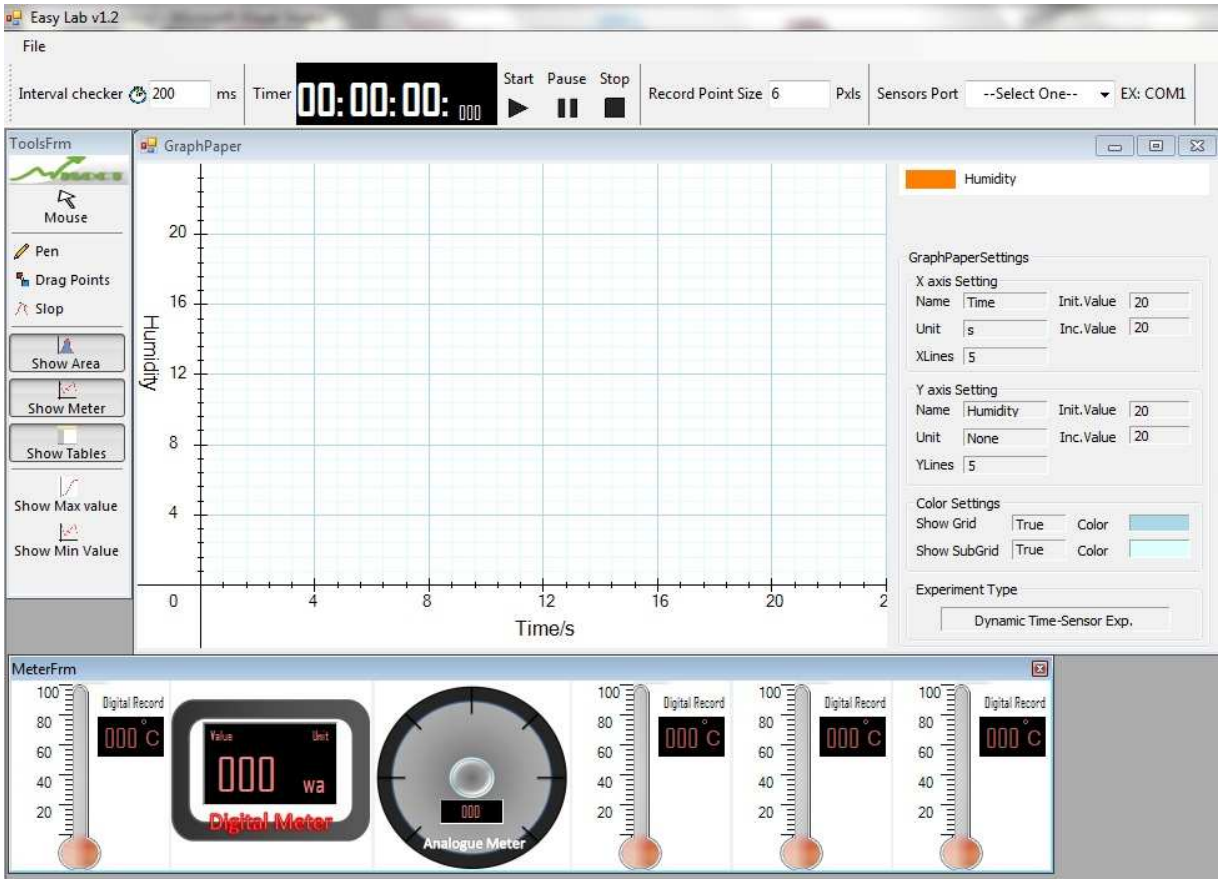
- Easy Lab has been developed to make potentially difficult calculations faster, easier and more accurate.
- Easy Lab creates advanced graphs with advanced editable accessible features.
- Easy Lab allows you to save, load and print files with .NELF Format extension. Saving in this format include all graph points, data tables, area calculations performed, among others.

Multi Plotter:

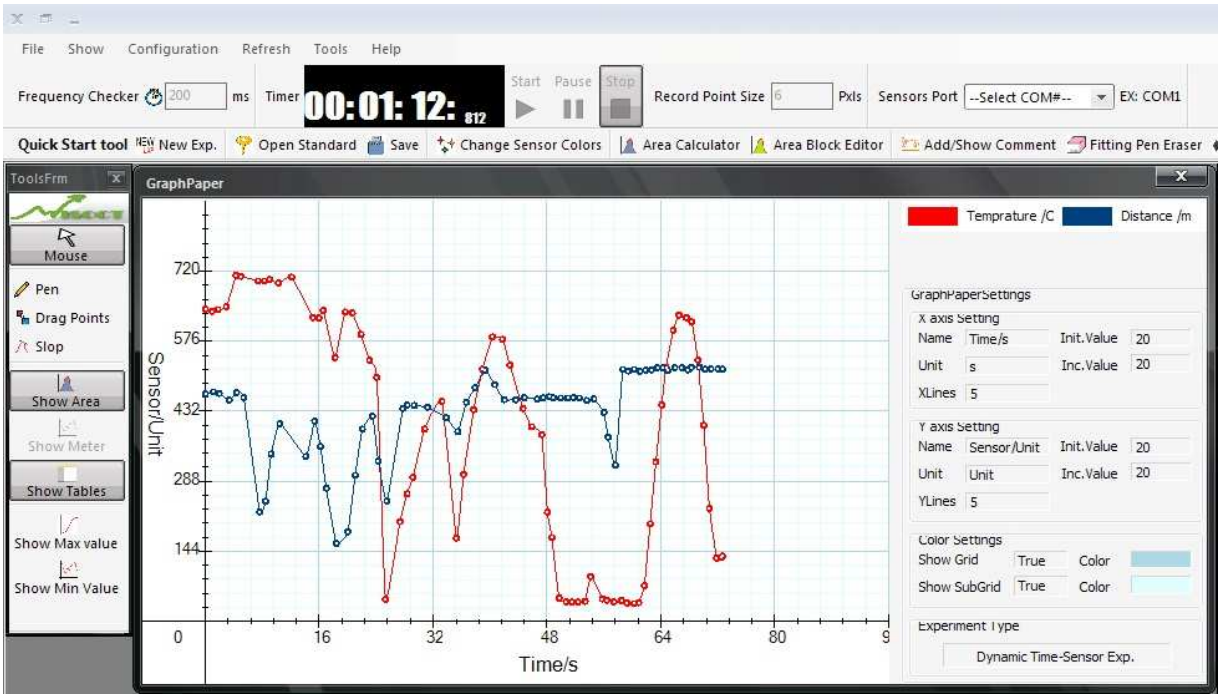
Easy Lab's multi plotter feature allows a user to retrieve accurate points from the NASOCT sensors hardware and plot them on a graphing area it also allows a user to plot a graph from either a single sensor or up to six simultaneously.

Communication:

Easy Lab v1.2 & NASOCT sensors hardware communicates through virtual serial communication. Data is simulated automatically and distributed for each sensor path. Communication settings can be edited through the communication port settings and these auto saved in the software running location.



Picture shows how Easy Lab looks on the PC



This picture shows Easy Lab giving **real time** sensor readings.

Easy Lab Icons

Easy Lab has many features, below is a brief summary of the different icons you will encounter when using the software

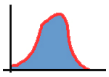
Fitting pen tool: allows a user to draw on the graphing area.

Dragging tool: allows a user to pick up a point and drag it from one location to another.

Slope tool: allows users to insert slope lines at any point on the graph.

Show MAX & MIN Points: are two functions that draw a dashed lines at the Y max value point, and the Y min value point.

Selecting tool: allows user to select and edit points.



Area tools: calculates the area between two defined points.

Conclusion

Overall using Flowcode and ECIO has enabled Easy Lab to take its current form quicker and easier as the use of rapid prototyping tools have facilitated Easy Lab to getting into the market. Flowcode has allowed the USB programming aspects of the package to be created quickly and simply rather than having to write in C and navigate the nightmares of programming USB communications. Please try out Easy Lab by downloading it at the link provided in the article.

Acknowledgements

I would like to thank my little daughter Mayar, who was the main reason for my knowledge about Flowcode, two years ago I was explaining some of the principles of electronics and programming language C for Mayar and by chance she had got to know Flowcode, which struck me by its great performance and excellence ,My daughter is 14 years old. Also I thank Matrix Multimedia for giving me the chance to issue my article.

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Further reading

Below are some links to other resources and articles on related subjects, and technical documentation relating to the hardware used for this project...

Flowcode:	http://www.matrixmultimedia.com/flowcode.php
ECIO:	http://www.matrixmultimedia.com/ecio.php
EasyLab video	http://www.youtube.com/watch?v=hQICuK4mHlw
EasyLab Demo	http://www.matrixmultimedia.com/software/EasyLab Setup10min.zip
NASOCT homepage	http://www.nasoct.com
Learning Centre:	http://www.matrixmultimedia.com/lc_index.php
User Forums:	http://www.matrixmultimedia.com/mmforums
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