CSE-Lab

Mudrunka, Kamil (School: Gymnazium Pardubice, Dasicka 1083)

CSE-Lab is a software written in C# aimed for students, teachers and others interested in math/physics. CSE-Lab offers user friendly graphical user interface, interface for connection to measuring hardware and enables user physics measurements. I have managed to merge a tool for measurement and powerful mathematical software which can process the measurement and make a comparison of the measurement with a theoretical model. The measurement system presents significantly cheaper alternative to commercial educational measurement systems of the same functionality. I have created a simple measuring hardware based on the AT-MEGA328P-PU microcontroller. The system can sample data from any analogue sensor whose output ranges from 0 to 5 Volts, offers 10 bit resolution, sampling frequency up to 2 kHz and can process 5 sensors simultaneously. The mathematical software is based on datasheets where users can put variety of interactive graphical components and perform calculations. CSE-Lab displays mathematical expressions in the symbolic form (as if you write them on paper), users don’t have to learn any language for building expressions. Mathematical functions cover all topics of secondary education maths and some of university level math. The software works with matrices, complex numbers, vectors and any order tensors, plots 2D/3D graphs, numerically solve differential equations (both ODE and PDE) and compute derivatives and integrals (in symbolic form). CSE-Lab can be used to generate interactive presentations automatically reacting to user inputs or as a tool containing integrated measuring system for use in a laboratory or for a standalone work.

Awards Won: