Telecommunications

ETD410

Pratical books

Réf : ETD410041

software operating on PC

FIBULA G : SIGNAL PROCESSING IN REAL TIME[1]

STRENGTHS

- Ø Very ergonomic, handling in a few minutes**.**
- Ø Writing graphical block diagrams in a few clicks
- Ø Hierarchical structure: functional blocks defined from within blocks to the atomic level.
- Ø Catalog of atomic blocks containing many functions for signal processing, for telecommunications and for process control.
- Ø Very effective: from concept to embedded application in DSP [2] board in a few minutes.
- Ø It products native DSP assembler code, about 10 times faster than ANSI C compiler.
- Ø Opportunity to enrich the catalog by using blocks created by the user.
- Ø Pedagogic : opportunity to comment on layouts, print, create automatically documentation for the library.

The platform FIBULA Graphic [3] offers a top level conceptual vision and enables to mostly ignore the hardware level.

TOPICS.

- Ø Study of DSP, algorithms such as convolution typical, FFT, etc. …
- Ø Digital Communications : Baseband, modulation, channel coding etc. …
- Ø Signal theory : sampling, filters, FFT, statistics …

AERA OF APPLICATIONS

- Polytechnics (Electronic and data processin engineering ; Electronic, Signal Transmission and Telecommunication engineering)
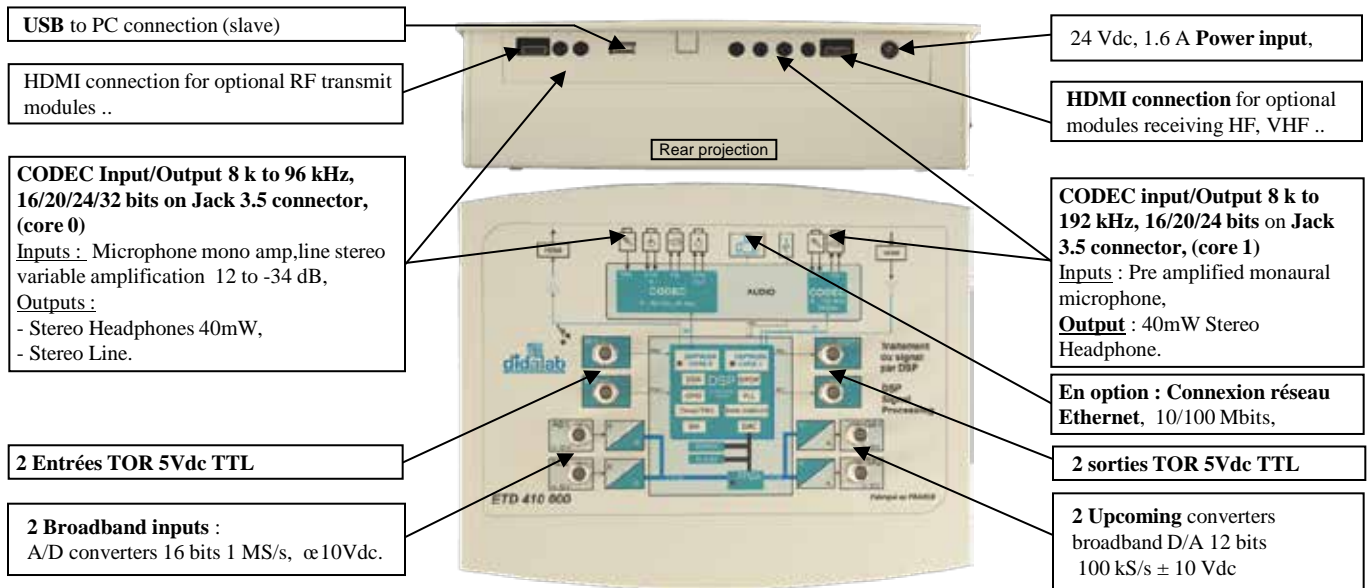- Universities
- Military schools

[1] Hard real time
[2] **DSP** = **D**igital **S**ignal **P**rocessor
[3] **FIBULA G** = **F**unctional **I**nterconnected **B**locks **U**ser **LA**nguage **G**raphic

ETD410000 : HARDWARE OF DSP FUNCTIONS IN SIGNAL PROCESSING

The module consists of an insulated box incorporating a DSP high power computer board.
- CPU DSP dual core, computing power de 2x200 MIPS, internal RAM memory of 2x92 k(24 bits)+ 64 k(24 bits),
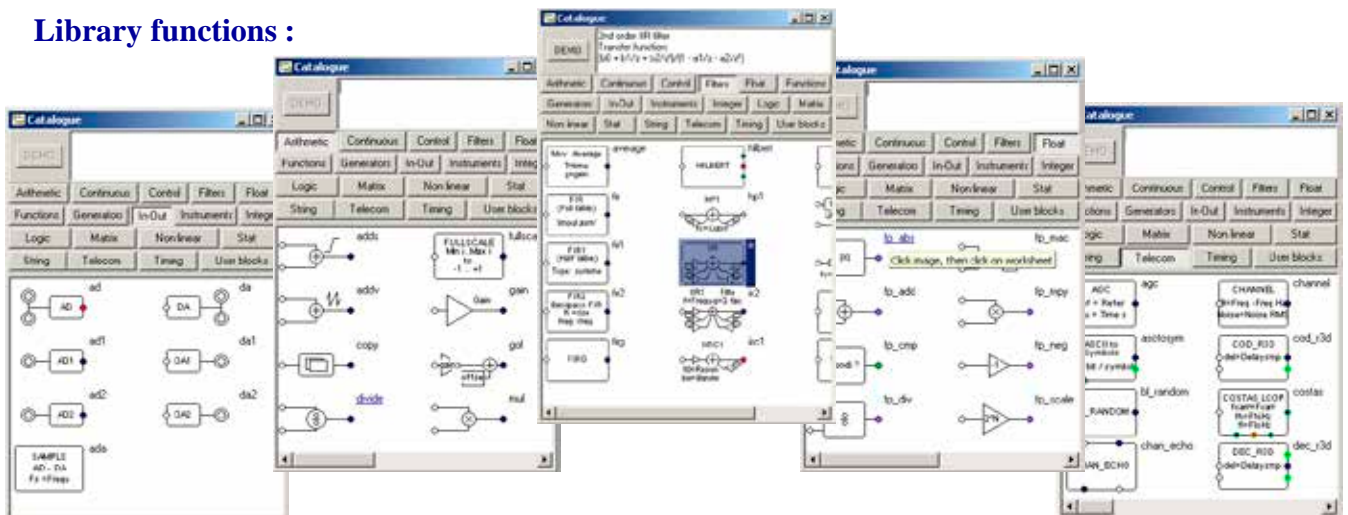- SDRAM 16M(24 bits) memory, analogue and digital inputs/outputs described here after.

USB to PC connection (slave)

HDMI connection for optional RF transmit modules ..

CODEC Input/Output 8 k to 96 kHz, 16/20/24/32 bits on Jack 3.5 connector, (core 0)
Inputs : Microphone mono amp,line stereo variable amplification 12 to -34 dB,
Outputs :
- Stereo Headphones 40mW,
- Stereo Line.

2 Entrées TOR 5Vdc TTL

2 Broadband inputs :
A/D converters 16 bits 1 MS/s, œ10Vdc.

Rear projection

24 Vdc, 1.6 A **Power input**,

HDMI connection for optional modules receiving HF, VHF ..

CODEC input/Output 8 k to 192 kHz, 16/20/24 bits on Jack 3.5 connector, **(core 1)**
Inputs : Pre amplified monaural microphone,
Output : 40mW Stereo Headphone.

En option : Connexion réseau Ethernet, 10/100 Mbits,

2 sorties TOR 5Vdc TTL

2 Upcoming converters broadband D/A 12 bits 100 kS/s ± 10 Vdc

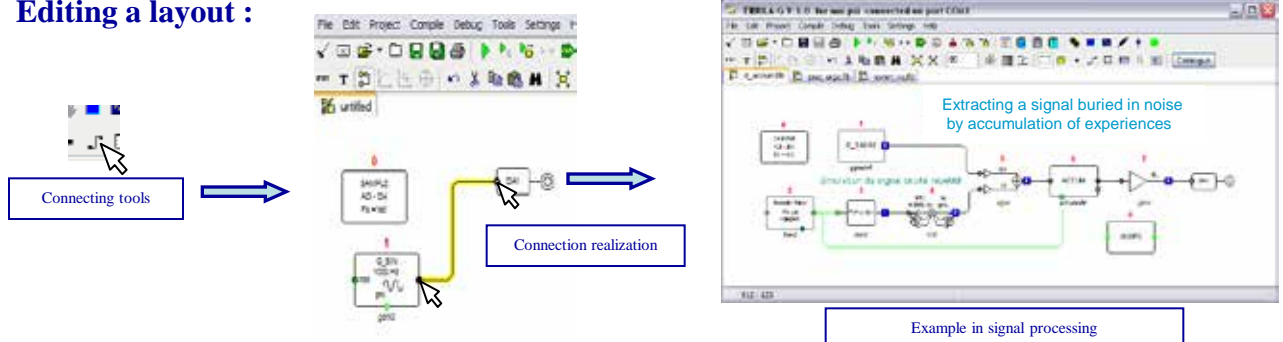# ETD410100 : SOFTWARE FUNCTIONS « FIBULA G»

Graphical editor and textual :

Ø Complete library of 270 configurable graphics functions (arithmetic: 17, floating point: 14, analog and digital telecommunications: 40, Statistics : 6, etc…),

Ø Opportunity to complete the library by creating their own graphics functions ,

Ø Switching between text mode and graphic mode, multi-page ,

Ø Instant detection of errors (short-circuit connections between 2 inputs, connections between incompatible types, incompatible sizes in matrices)
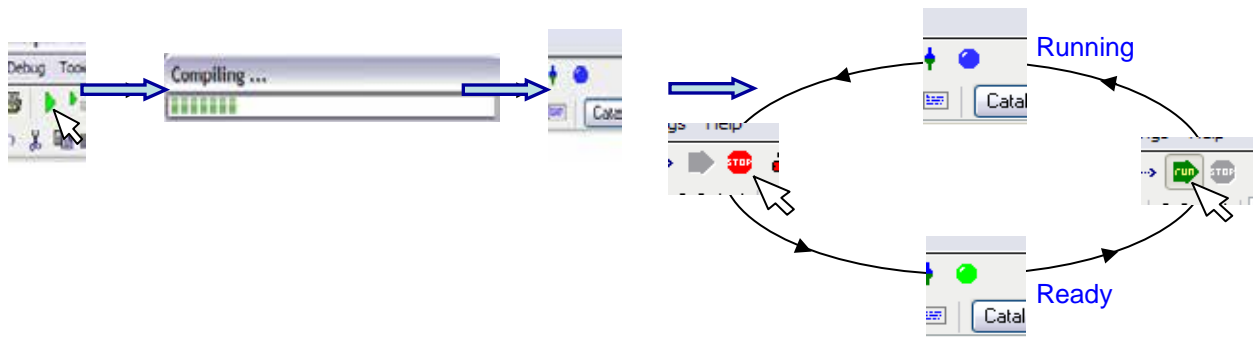
Library functions :

Editing a layout :

Connecting tools

Connection realization

Extracting a signal buried in noise by accumulation of experiences
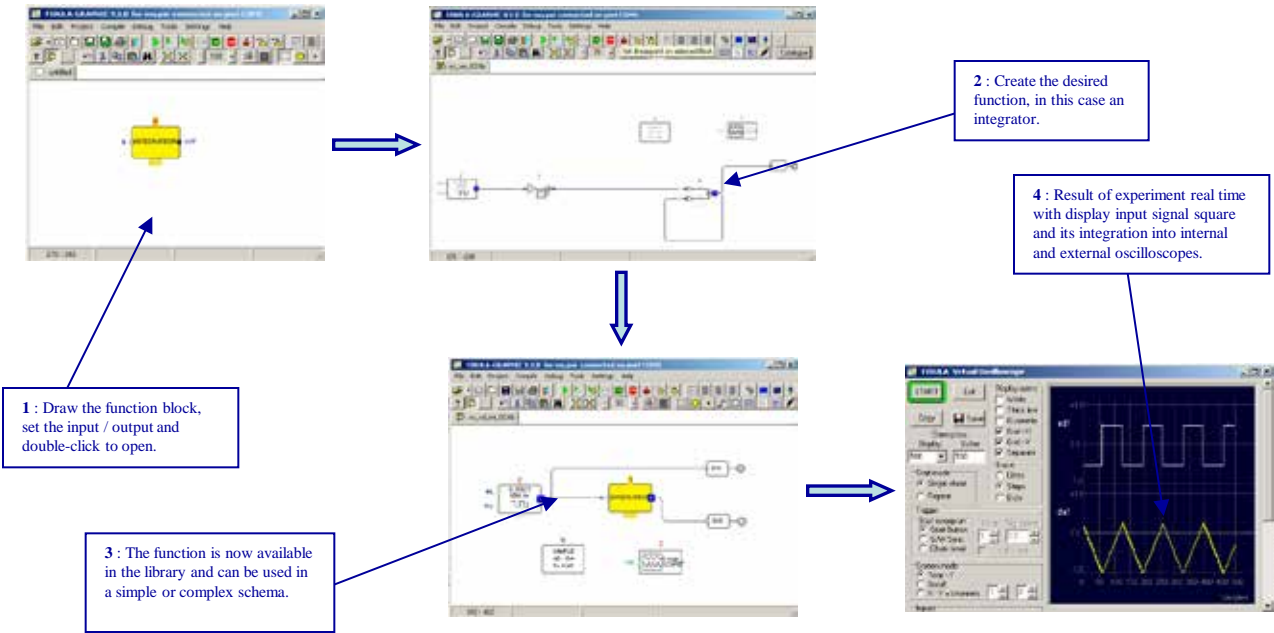
Example in signal processing

Compiler :

After editing, the graphics program is compiled and downloaded to the target board DSP real The user can then test the program using the internal or external generator, and view the output on measurement tools (internal or external) (Oscilloscope, FFT, statistical analysis etc…).
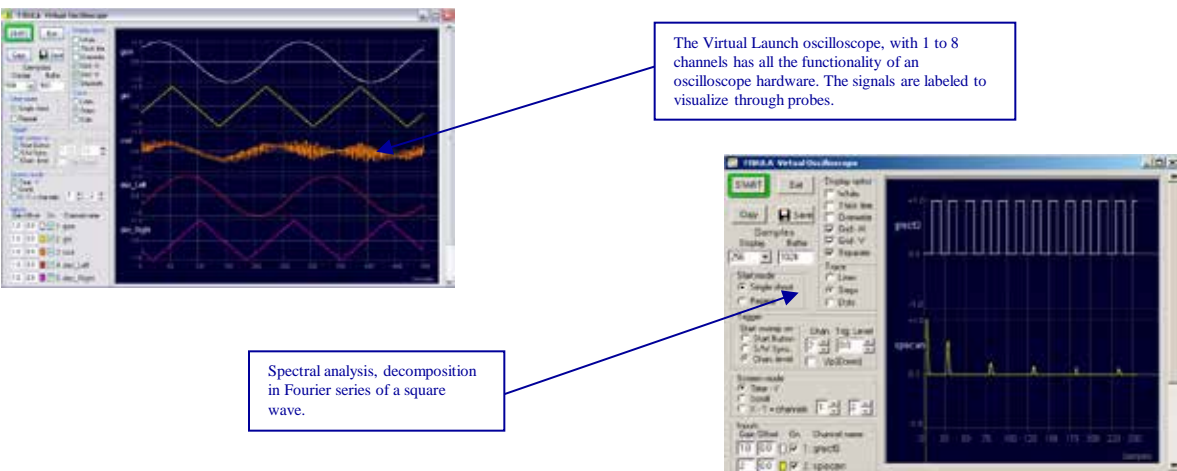

Creation of a graphical user :

It is also possible to easily add new features to an already very rich library. The example below shows how to create an integrative function and put it in the library :

2 : Create the desired function, in this case an integrator.

4 : Result of experiment real time with display input signal square and its integration into internal and external oscilloscopes.

1 : Draw the function block, set the input / output and double-click to open.

3 : The function is now available in the library and can be used in a simple or complex schema.

Several examples of measuring instruments :

The Virtual Launch oscilloscope, with 1 to 8 channels has all the functionality of an oscilloscope hardware. The signals are labeled to visualize through probes.

Spectral analysis, decomposition in Fourier series of a square wave.

Signal theory:

Sampling : observation of aliasing in time and frequency domains

Quantification : Observation of quantization noise, distribution, spectrum, measurement of signal to noise ratio

Spectral analysis : decibel mode utility and ponderation windows. Detection of nonlinearities of a system with harmonic appearance.

Filtering : Implementation of a FIR filter by TF and ponderation window, implementation of recursive filters calculated in Matlab™ or Scilab™.

Identification of a linear system with auto-adaptive FIR filter.

Random Processes : Ergodicity checking of a process.

Distribution of a sum of several even sources. Distribution of variable random function. Intercorrelation, speed measurement without contact.

Telecommunications :

Transmission Baseband :

Transmetter, ideal channel, receiver . Flow on a band-limited channel. Inter symbol interference (ISI), using spectre pulse with high cosine (RC pulse shaping), RRC filtering. Error rates due to Gaussian noise added. Line coding (NRZ, Manchester, AMI, etc..) spectre comparaison.

Modulations :

General linear modulator Fresnel plane, display of the constellation. .

Numerical modulation OOK .

ASK amplitude modulation, differential coding to remove the sign ambiguity, DPSK, Differential Phase Modulation.

Modulation in phase and amplitude QAM with differential encoding and Scrambler.

Frequency Modulation FSK, MSK, GMSK, OFDM, modulations broadband orthogonal with CDMA codes,

Information Theory and Coding :

Measuring the entropy of a source. Measuring the mutual information between input and output of a noisy channel without memory. Linear block codes and correction with the syndrome. Code 3 interlaced redundancy.

Complete application :

Realization of an acoustic modem with various concepts here above, the channel being formed with the space between a speaker microphone.

Transmission of a text such as "The goat of Monsieur Seguin" corrected or erroneous characters appear in red on the terminal receiver.

Manuals of pratical :

ETD410020/030 : Manuals of Practical, signal processing, ISCED 3 and 4 level :			
TP 1	Flip flop RS	TP 7	D/A Analogic to Digital Conversion
TP 2	Flip flop RSH	TP 8	A/D single ramp meter converter D/A
TP 3	RS flip-flops and JK master / slave	TP 9	A/D tracking
TP 4	D flip-flops	TP10	Realization of a semi-Flash A/D converter
TP 5	Up and down counters synchronous BCD	TP11	Analogic Filters
TP 6	Reminder course on A/D & D/C converter		

ETD410040/050 : Manuals of Practical, signal processing, ISCED 5 level :			
TP 1	Reminders course on filters digital systems	TP 6	Reminder courses on digital transmission
TP 2	Non-recursive digital filters (1 & 2nd order)	TP 7	ASK digital transmissions
TP 3	Recursive digital filters (1 & 2nd order)	TP 8	FSK digital transmissions
TP 4	Reminder courses on analog transmissions	TP 9	PSK digital transmissions
TP 5	Analogic transmission AM, FM	TP10	QAM digital transmissions

Standard configuration :

ETD410B : The basic package "SIGNAL PROCESSING with FIBULA Graphic" composed of :		
Reference	Description	Qty
ETD410000	Signal processing module based on DSP dual core with 2 audio inputs/outputs and 2 inputs/outputs broadband	1
ETD410100	**FIBULA G**, software programming blocks graphics	1
ETD410010	Technical Guide with examples	1
ETD410020	Manual of Practical, signal processing, and reporting issues, ISCED level 3 & 4	1
ETD410030	Manual of Practical, signal processing, subjects, ISCED level 3 & 4	1
ETD410040	Manual of Practical, signal processing, and reporting issues, ISCED level 5	1
ETD410050	Manual of Pratical, signal processing, subjects, ISCED level 5	1
EGD000006	USB lead AA	1
ETD410200	Accessories (monophonic microphone, amplified stereo speakers)	1
PEM010021	Isolated BNC lead length 1 m 50 OHM	2
EGD000018	Packing case	1

Packaging :

1 box dimensions 30 x 40 x 30 cm
Gross weight 5 kg

Non contractual document