# EBLOCKS®

## DSP Audio Training Solution

# General information

This solution provides a motivating solution for learning about digital signal processing (DSP) technology, audio effects and frequency synthesis.

1. Benefits
- Provides understanding of audio based DSP technology, practice, and implementation

2. Features
- Fully working 16-bit ADC & DAC peripherals constructed from E-blocks
- Active configurable anti aliasing filters
- Includes Flowcode Professional software
- Full curriculum support
- A great introduction to audio DSP device implementations

# Solution description

This solution allows students to carry out a number of practical exercises in audio DSP technology. Students learn about DSP by developing 7 different system developments: Audio pass-through, Echo effect, Reverb effect, Sine wave generator, Waveform generator, Low pass filter, and High pass filter. Working through the exercises students build a good understanding of the various types of DSP operation including Inputs, Outputs, Sum, Level, Filter and Delay. The solution can also be used as a motivating platform for learning general microcontroller programming and project work.

All E-blocks boards are fitted with clear acrylic covers which prevent links and chips from being removed.
The solution is assembled and tested in the Factory, and is shipped in rugged plastic trays for storage and transport.

A Professional Academic PIC16 single user licence of Flowcode V6 graphical programming software is provided. Flowcode allows students to understand communications programs and strategies without getting bogged down in the complexity of C or Assembly code. The system can also be used with C and Assembly code (software not provided).

A printed and bound manual with student exercises is included. This is also available in electronic form (Word and PDF) along with fully worked exampled on CD ROM.

This solution is made available at a discount to the sum of the individual parts.

# Learning objectives

This Audio DSP solution can be used for teaching microcontroller programming in a highly motivating context. It is also useful for teaching the specifics of Audio DSP development and has many outcomes which include:

Programming outcomes:

General programming of systems including graphical LCD, I/O etc
SPI protocol and programming
Timer Interrupts used to control sampling rates
The use of state machines in controlling electronic systems

Communications outcomes:
SPI communications and protocols
Splitting and combining data bytes
DSP functionality and methods of operation

Project management and development outcomes
The use of flowcharts and state diagrams in planning systems
How electronic systems are developed from scratch
The modular approach to building electronic systems

# Further information

1.   Learning time

Dependant on course structure and options chosen from the teacher's manual. Approximate figures:

Electronics: up to 20 hours

2.   Prerequisites

Some understanding of electronics
Windows skills
Some microcontroller programming in C, Assembly or Flowcharts

3.   System requirements

PC with CD ROM drive and Windows XP or greater.

4.   Further information

A separate datasheet is available for each of the E-blocks boards included in the pack. Please see our web site for details.
Order code
The order code for this product is EB650.

5.   Also consider

CAN bus training solution
Zigbee training solution
Mobile Phone training solution
Embedded internet training solution
RFID training solution
Bluetooth training solution
FPGA Solution
USB Solution

# Solution Contents

The table gives a list of the major items of the pack contents.

Datasheets on any individual item are available from the resource section of the Matrix TSL website www.matrixtsl.com

| Qty | Description |
| --- | --- |
| 1 | Metal backplane |
| 1 | USB cable |
| 1 | dsPIC/PIC24 Multiprogrammer |
| 1 | E-blocks slide switch board |
| 1 | E-blocks gLCD board |
| 1 | DSP Input Board |
| 1 | DSP Output Board |
| 1 | E Blocks User Guide |
| 1 | Dual E-blocks IDC cable |
| 1 | ELSAM2 - Driver information sheet |
| 1 | Plastic shallow tray |
| 1 | Power supply |
| 1 | dsPIC30F3014 chip |
| 1 | Headphones with microphone |
| 1 | Tray Lid |

# MATRIX