SignalMaster

Open Hardware and Software Digital Signal Processing Systems
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SignalMaster is a powerful portable Digital Signal Processor (DSP) based system with dual microphones and earphones that can be used to develop customized speech processing algorithms for hearing aid research and other signal processing and detection experiments. The system uses a powerful Texan Instruments (TI) TMS320C6746 DSP processor with 32 bit Analog-to-Digital (AD) and Digital-to-Analog (DA) convertors. It can be used either freestanding, powered from two rechargeable lithium-ion batteries for up to 10 hours, or while connected to Personal Computer (PC) and recharging.

Users can develop both customized DSP algorithms and PC-based testing interfaces for a wide range of research applications and experiments. SignalMaster reduces the learning curve associated with software development by providing source code examples and the ability to share solutions across a worldwide multi-user group being developed.

Hardware Specifications:

Processing Family: Texas Instrument TMS320C6746 32/64 bit floating point processor**.**

For complete datasheet, visit:
http://www.ihsys.com/ohsspds/signalmaster/tms320c6746.pdf

Processing Speeds: The TMS320C6746 is capable of performing 2100 million floating point operations per second (MFLOPS) with a 2.8 ns cycle time

Codec: TLV320AIC3254 Ultra Low Power Stereo Audio Codec with imbedded miniDSP. For additional information, visit:
http://www.ihsys.com/ohsspds/Documents/slaa408a.pdf

Memory: 256KB (Kilo Bytes) of internal memory and addressing lines providing access to 4MB (Mega Bytes) of external asynchronous memory.

Data Sampling Rate: Programmable with rates from 8 to 96kHz.

PC Communication: USB & Ethernet

Analog Input: Microphone inputs with stereo drivers & A/Ds (programmable 16/20/24/32 bits)

Analog Output: Stereo headphones outputs with drivers & D/As (Programmable 16/20/24/32 24 bits)

Universal Asynchronous Receiver/Transmitter (UART) communication modules: The system provides a USB/Serial communication and EtherNet UARTs for data exchange with a PC for programming, parameter selection and data exchange.

LEDs: Battery power indicators and programmable logic indicators.

Power Supply: Options to run off battery or A/C power adaptor.

Battery: ICR18650 Li-Ion 2 X 3.7 V 2600 mAh (10 hours) (1.67 oz each)

Size: 190 mm X 90 mm X 30 mm

Weight: <8 oz

Software Features and Specifications:

- **Complete DSP Control:** Ability to program any DSP signal processing application using C language compiled with Texas Instruments (TI) Code Composer.
- **DSP Coding Examples:** Example source code ready to be modified by users with all timers, codecs and hardware elements preprogrammed.
- **Built-in Customized Boot Loader:** A customized IHS boot loader allowing easy communication with the PC through the USB/Serial or other UART interface is embedded in the DSP firmware. The boot loader acts as the primary interface between the DSP and the outside world. The boot loaded will respond to instructions arriving from the interface UARTs and either initiate the upload of specific DSP code or processing incoming request for control instruction or data from the PC.
- **Software-Hardware DSP Startup Kit:** Complete IHS hardware customized software startup kit files with UART and Codec programming code for use with TI Code Composer.
- **DSP Code Loader:** A customized DSP program loading utility that allows fast upload of programs from any PC based application through the DSP system boot loaded. This utility allows for different DSP programs to be uploaded into the DSP which will reconfigure the processing algorithm being executed for any application or experiment.
- **PC Code Development Examples:** Example PC based programs showing how develop applications using the DSP for stimulus generation and data acquisition.
- **Simplified Communication Interface:** A simplified communication interface protocol is ready to be used for any user developed application with simple PC and DSP functions calls. The interface was developed to standardize the transfer of instructions and data between the PC and DSP. The standardization of the communication interface facilitates user development by not having the recreate the complexities of PC to DSP command and data exchanges. PC-based and DSP source code examples show how to call function on the DSP and transfer data and commands using the standardized protocol. The protocol can be further expanded by the user since all source code is provided.
- **Processing and Latency:** The DSP can perform operations on a point-by-point basis, resulting in a minimal time delay (latency) between input and output, or using an input and output data array option with automated Direct-Memory-Access (DMA). The DSP has sufficient processing capabilities to execute up to 14 stacked IIR filters in real-time using a 60 data point sample window (with a 9 msec latency) at a sampling rate of 24 kHz or up to 10 IIR filters on a point-by-point basis at a sampling rate of 16 kHz with a single sample point latency (0.0625 msec). Adaptive Noise Cancellation (ANC) algorithms can also be implemented on a point-by-point basis. In general, it is possible to implement signal processing algorithms with a 239 data point delay line within the 10 msec delay specification at a sampling rate of 24kHz.

Webpage: http://ohsspds.ihsys.info/

This webpage is available to provide additional information and current documentation. The webpage provides the latest DSP algorithm examples and a user's forum to share and discuss any development issues among users.

Additional Information:

For additional information contact:

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