CML Microcircuits
COMMUNICATION SEMICONDUCTORS

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(CMX7011 – Demonstrator 4)
Voice store and retrieve using one PE0101-7011 evaluation kit

Introduction

This document is intended to assist with the evaluation and demonstration of the CMX7011 Digital Voice Processor and the Digital Voice Encryption Function Image™ 7011FI-1.x.x.x. It describes the use of the PE0002 Interface Card for easy connection to a computer via a USB cable and a single PE0101-7011 (CMX7011 evaluation kit) connected to the PE0002 C-BUS1 port.

General description

These scripts demonstrate the use of the voice storage and retrieve facility provided by the device. Voice messages can be stored in the device's memory and then played back.

Two scripts have been provided for this demonstration:-

transmit.pes – This script performs three discrete *push-to-talk* transmissions. These can be recorded using digital audio editing software such as Audacity® for play back into the device when the second script is being run.

If the audio editing software being used allows simultaneous recording and playback (this is a feature provided by Audacity®) then the voice samples for transmission can be played by the computer, otherwise some other source of voice samples must be used such as a microphone.

rxstoreret.pes – This script will receive the three discrete transmissions created by the first script, store each received block of speech in memory, and then allow any of them to be retrieved and replayed. The «step-back» facility may also be exercised to step back to earlier parts of a message.

A third script has been included, setlevel.pes, which may be used to help set the analogue signal levels.

Key Items Required

- 1 off PE0002 Interface card
- 1 off PE0101-7011 Evaluation Board
- USB audio card with mic/line and speaker connections
- Pair of headphones or powered speakers
- 5V power supply
- Digital audio editor software such as Audacity® (http://audacity.sourceforge.net)
- PE0002 GUI Software - ES000243.exe
- Scripts – setlevel.pes, transmit.pes, rxstoreret.pes
- Function Image™ 7011FI-1.x.x.x – (fi7011_1030.ped or later)
- Voice sound file example around 20 seconds in length or a microphone.

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Connection Diagram

Demonstration Procedure

The following procedure assumes that audio editing software with simultaneous recording and playback will be used for the demonstration.

1. Make connections as shown in the diagram, with the speaker output of the PE0101-7011 being connected to the mic/line input of the sound card
2. Turn on power supply
3. Start the audio editing software and enable simultaneous recording and playback
4. Start the PE0002 GUI software (ES000243.exe) and select the «Script Handler» tab
5. Set up sound card input signal level
    a. In the PE0002 GUI window, click the «Select Script» button, locate the setlevel.pes script file then click the «Open» button.
    b. Click «Run». This should instruct the device to produce an FFSK signal.
    c. In the audio editing software, check the level and record the FFSK signal. Adjust the signal input level for maximum amplitude without clipping.
    d. If a higher signal level is required from the device, each script has an AOGAIN constant that may be changed to increase the level (in 2dB steps). If the signal level from the device is too high with the AOGAIN constant set to 0 (which is the default for the transmit script), then an external attenuator must be employed.
    e. In the PE0002 GUI window, click on «OK» to stop the FFSK signal.
6. Set up the sound card output level
    a. Play back the final test recording made in step 5 and adjust the output level so the signal level is ~2Vp-p. If this level cannot be achieved, each script has an AIGAIN constant that may be changed to increase the effective level of the signal.
    b. The AIGAIN value represents 1.5dB gain steps. If the sound card will, for example, only deliver 1Vp-p, set the AIGAIN value to 4 (6dB)
7. Transmit operation
    a. In the PE0002 GUI window, click the «Select Script» button, locate the transmit.pes script file, then click the «Open» button.

b. Load an appropriate voice sound file and ensure that any previous recordings are deleted or muted.
c. Delay the voice samples by approximately 5 seconds, either with a time shifting tool or inserting silence before the start of the voice samples
d. In the PE0002 GUI window, click the «Run» button. The script will download the Function Imagetm to the device and configure the device for transmitting.
e. The script will display «Start recording» in a dialogue box. Set the audio software to record and just before the time shifted voice starts to play, click «OK». The script will instruct the device to start transmitting digital voice data.
f. The script will display «Stop transmission 1?» in a dialogue box. After a short while, click «OK». The device will stop transmitting digital voice data.
g. The script will display «Start transmission 2?» in a dialogue box. After a short while, click «OK». The device will start transmitting digital voice data again.
h. The script will display «Stop transmission 2?» in a dialogue box. After a short while, click «OK». The device will stop transmitting digital voice data.
i. The script will display «Start transmission 3?» in a dialogue box. After a short while, click «OK». The device will start transmitting digital voice data again.
j. The script will display «Stop transmission 3?» in a dialogue box. After a short while, click «OK». The device will stop transmitting digital voice data.
k. The script will display «Stop recording» in a dialogue box. Stop the audio software from recording and then click «OK». The script will then finish.

8. Make connections as shown in the diagram, with the speaker output of the PE0101-7011 being connected to the either headphones or powered speakers.
   a. The script that will be used to receive and play back the previously recorded digital voice data has an analogue output gain value of 0dB set. If the level is not appropriate it may be changed by changing the constant AOGAIN near the top of the script. The script writes this value into the AOG register ($06). Please refer to the data sheet for more information.
9. Receive and play operation
   a. In the PE0002 GUI window, click the «Select Script» button, locate the rxstoreret.pes script file, then click the «Open» button.
   b. In the PE0002 GUI window, click the «Run» button. The script will download the function imagetm to the device and configure the device for receiving.
   c. The script will display in the console «Start playback of recorded transmission blocks» followed by «Searching for a frame head»
   d. In the audio editing software, mute the original voice track and start playing the recorded blocks of digital voice data.
   e. Whilst the data is being played, the device will decode the data and reproduce the voice that was previously sent as well as storing it in its internal RAM. Each of the three blocks will be stored in a separate buffer.
   f. Once the device has received all three transmissions, a test dialogue will be displayed allowing one of the buffers to be played. Choose 0, 1 or 2 to play the associated buffer. Choose 9 to end the script.
   g. The next dialogue box allows the message to be played (clicking «Yes») or deleted(clicking «No»)
      i. If «Yes» has been clicked, the message will play and another dialogue box with «Step back?» will be displayed
      ii. Clicking on «Yes» will cause the message being played to step back by 3 * 0.8s blocks. Repeated clicks will step back by the same amount each time until the start of the message is reached.
      iii. Once the message has played to the end, it is still possible to step back and replay some or all of the message.

iv. To move on in the script, click on «No». The script will wait until the message has finished playing (if it was still playing) and then go back to step ‘f’

Example Audacity screen shot showing sound file and transmitted FFSK voice data