Documentation for research on the VS1053 codec line-level IO on Pi and Arduino

RaspberryPi

|  |  |
| --- | --- |
| Links | General code for any microcontroller to use the VS1053 to recording and playback, written in C, [here](http://www.vlsi.fi/en/support/software/microcontrollersoftware.ht) – stopped pursuing because Arduino was showing more progress, so change of plans: have everything work on Arduino, then port it to the pi. |
| Resources | My github has the recording capabilities for a USB input mic and documentation written up upon previous request, [here](https://github.com/tracypham1/SW_roverlink). |

Arduino

|  |  |
| --- | --- |
| Links | No code provided, but describes how to write the VLSI ADMixer plugin to the SD card to decode the audio input and eventually decode and playback, [here](http://www.vsdsp-forum.com/phpbb/viewtopic.php?t=1903). |
|  | To see a forum on using the codec as a music player and voice amplifier, [here](http://www.vsdsp-forum.com/phpbb/viewtopic.php?t=1388). |
|  | For other VLSI solutions plugins for different encoding formats and techniques for manipulating the audio data with individual documents on implementation, [here.](http://www.vlsi.fi/en/support/software/vs10xxplugins.html) |
|  | A project that uses the MAX4466 Electret Mic to record 9 hours activated with a button press, [here](https://www.instructables.com/id/Make-Your-Own-Spy-Bug-Arduino-Voice-Recorder/). |
|  | Specific VS1053 audio input/output, addresses, modes, and registers, [here](https://github.com/CalPlug/VLSI_VS1053B_AudioProcessor_Examples/blob/master/Samples%20and%20Documentation/vs1053audio.pdf). |
| Tibits | Have played with adafruit blinka and circuit python bundles, seems like a dead end so far. |

**Pin Connections**

(VS1053 -> ARDUINO) (equivalent SPI connections can be found on Pi’s pinout reference sheets)

XDCS -> D8

SDCS -> D4

CS -> D10

RST -> D9

SCLK -> D13

MOSI -> D12

MISO -> D11

GND -> GND

VCC -> 5V

DREQ -> D3

(MAX4466 -> VS1053)

VCC -> 5V

GND -> AGND

OUT -> LINE2

Other people with mic connection issues, [here](https://forums.adafruit.com/viewtopic.php?f=19&t=49143).

If audio is spotty, [here](http://www.vsdsp-forum.com/phpbb/viewtopic.php?t=399).

(VS1053 -> HEADPHONE SOCKET)

AGND -> MIDDLE PIN

LOUT/ROUT -> OUTER PINS

**WHAT IS IN ‘SW\_roverlink’**

Python scripts for USB audio input on the Raspberry Pi 3 and a folder for Arduino sketches

**WHAT IS IN ‘onArduino’**

*Adafruit\_VS1053\_Library* contains some edited data members and Arduino console print statements for testing

* Used by all other sketches included

*admixer-plugin-record (in progress)*verifies connection by playing an audio file, which can be stopped by sending ‘s’ through the serial monitor, attempts to load a plug in for decoding

* was going to use plug ins to have real-time mic input/speaker output in this tutorial [here.](http://www.vsdsp-forum.com/phpbb/viewtopic.php?t=1903#p9545)
* more plugins for different functions in different environments found [here.](http://www.vlsi.fi/en/support/software/vs10xxplugins.html)

*read-from-SD*plays a tone before reading an audio file from the SD to verify the SD files can be played properly

* need to further investigate how file is being decoded in playFullFile() may be helpful
* working audio files ‘secret.mp3’ and ‘roar.ogg’ provided
* function call details commented inside

*record\_Ogg*uses pin 7 to start and stop a recording saved to the SD card in ogg vorbis format using a plug-in

* physically removed SD and played back through VLC media player for insurance
* should use this sketch to investigate how plug ins are processed and implemented

*SD*is an edited version of the standard Arduino SD library, which was used to understand how files were being saved and written to the SD card.

*sineTest*checks pins are connected properly by sending a tone to LOUT/ROUT without the SD card

* it is the example provided in the vs1053 library used in other sketches for verification purposes.

**UPLOADING TO THE SD**

Use machine to read SD card and manually copy over audio file, plug ins, images, etc.

**WORKING ON**

Done

* Adafruit\_VS1053\_FilePlayer object, musicPlayer is flawless
* The sketch has a sinTest at the beginning to make sure communication with pins is working
* The SD card is readable and prints the directory to prove it

Doing

Mainly recording and playing back through SD card to verify mic is connected and functioning, no luck so far on input side.

* use recorgOgg to upload ADMIXER plug in to encode in mp3 wav format (?)
* make admixer-plugin-record.ino upload ADMIXER plug in to eventually decode input as its being encoded (not sure which format yet bc encoding is in ogg but decoding works for ogg, wav, and mp3)

Notes

* MAX 4466 [datasheet](https://cdn-shop.adafruit.com/datasheets/MAX4465-MAX4469.pdf) says to bypass the power supply with a 0.1µF capacitor to ground