SSI 263 text to speech in Python via Nanpy on the Arduino

The almighty SSI-263 speech synthesizer chip

As you can read on the Wikipedia page, the SSI-263 is the other name for the Votrax SC-02.
It is becoming quite difficult to find, much harder then it's little brother the Votrax SC-01 but I finally got one by buying a Mockingboard B on Ebay.
The SSI-263 is TTL compatible and need only very few component to be added. It is very easy to connect it to an Arduino but is much more complex than the Votrax-SC01 to program.

Nanpy

As I planned to make many software iteration and process the text to speech routine from Python, I decided to use Nanpy on the Arduino to « relay » the instructions to the chip. I guess I could also use Firmata to do the job as I am using really basics stuff like writing bytes on various pins.

Schematics

The SSI-263 datasheet is quite easy to find and so the programming guide via some Google search but the best one I found is the Votrax SC-02 version that has an extra page at the end with a nice and very simple schematics to get started with .

As I plan to build a shield for the Arduino, I started to draw this in Eagle too :

You can download the Eagle version here
The chip needs a 1-2 MHz clock signal. I am using a Attiny 45 to do the job because all the timer pins are already in use on the Arduino. I have described how to use the Attiny45 to do this in a previous post

Books

The best reference to get started is the article from Steve Ciarca : "Build a Third-Generation Phonetic Speech Synthesizer ».
A complete version is available on Google books. *Ciarcia, Steve, "Build a Third-Generation Phonetic Speech Synthesizer," Byte, March, 1984, p 28. (SSI-263)*
There is also a reference to the SSI-263 and to many other speaking chip in "*Chip Talk: Projects in Speech Synthesis*" but the chapter mainly refers to Steve's article.
The book is still available in some second hand book shop (I got mine via Amazon). The information provided is minimal but it's fun to ready about all these veterans speaking chips.
Prochnow, Dave, Chip Talk: Projects in Speech Synthesis, Tab Books, Blue Ridge Summit, PA: 1987. ISBN is 0-8306-1912-7 (hard cover) and 0-8306-2812-6 (paperback).
Have also a look here : http://www.redcedar.com/sc01.htm. The page is regularly updated and makes an excellent starting point.

Code

Here is the Main code

The text-to speech is performed via a lookup in the CMU Dictionary (The dictionary can be install with these instructions
: http://stackoverflow.com/questions/11911028/python-arpabet-phonetic-transcription)

It return an arpabet version of the text which is then translated into the Votrax allophone table.
(thank to this modified Arpabet to unicode script)
The allophone chain is then sent to the chip
The code is very basic and doesn’t use the SSI263 registers to their full potential : the voice generated is very robotic … but I like it a lot

Souncloud

Listen to the chip saying the Issac Assimov’s 3 laws of robotics with 2 different voice settings :

Todo

Next thing I will try is to add prosody or even make it sing
On the hardware side I plan to add a RC filter with an amplifier and add a midi in to the circuit .. so stay tuned.