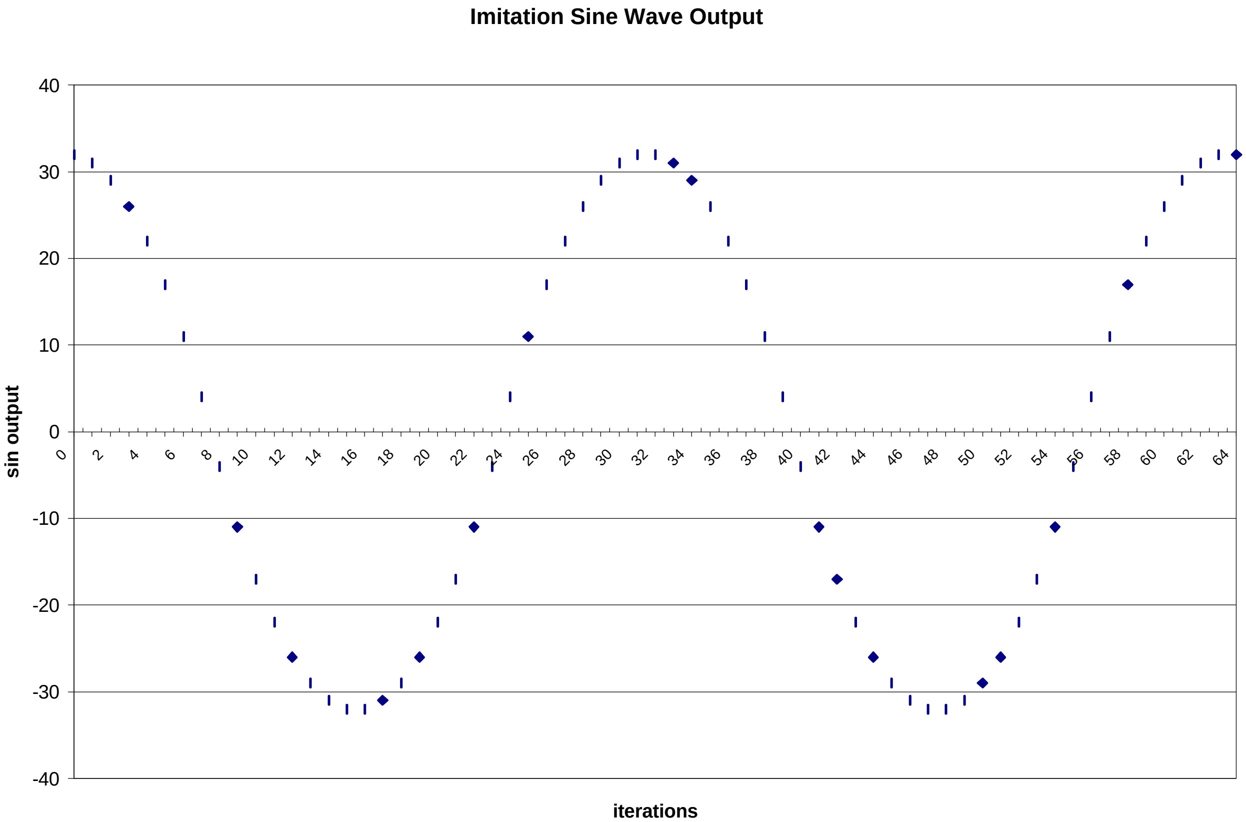
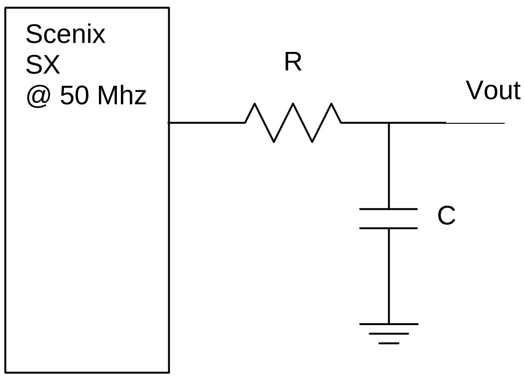
Sine waves are used extensively in the telecommunications industry, as well as other industries, so why are they so hard to create without using code-eating table lookups or complex math functions? One easy solution is to create an artificial sine wave, which utilizes the properties of gravity. It does not create a perfect sine wave, but it's pretty close. The theory is this:

When a ball is thrown into the air it has a constant downward acceleration until it's velocity is equal to zero; at this point it obtains a positive velocity towards the ground until it hits the ground. What were to happen if the ball were to continue through the ground, once again accelerating towards the ground? It would decelerate until its velocity reached zero and once again would gain velocity towards the ground. Passing the ground, it, once again, would begin decelerating and the cycle would continue…

In software form, this algorithm works to create an extremely efficient imitation sine wave generator, whose output would appear somewhat like the following table:



Although the resultant wave is not a perfect sine wave, it is extremely easy to obtain and is precise enough for most low-demand applications. Gluing a PWM Virtual Peripheral to the Sine Wave Generation Virtual Peripheral allows the SX to become a pretty good sine-wave generator. The software for this virtual peripheral is called imitation_sine.src. Calculations for computing the constants for each frequency are listed in the source code.



Circuit Design

The simplest version of the circuit requires only two components for the PWM output, a resistor and a capacitor. ← Here is a block diagram of the circuit.

Depending on the maximum frequency you wish to obtain, you should adjust the component values for R and C to choose the resolution of the PWM. Ideally, you should calculate the maximum SINE frequency output you will use and choose the cutoff to be at this frequency. For instance, if your maximum output frequency will be 2.1kHz, calculate R and C:

First, choose a value for R.

R=100 ohms

Now, calculate C:

C = 1/(2 * pi * Fc * R)

Therefore:

C = 1/(2 * pi * 2100Hz * 100 ohms)

And

C = 0.758uF