Implementation of Ring counter using Colpitts Oscillator and Multiplexer signal

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Abstract:

An integrator is an op amp circuit, whose output is proportional to the integral of input signal. An integrator is basically an inverting amplifier where we replace feedback resistor with a capacitor of suitable value. A multiplexer (MUX) is a device allowing one or more low-speed analog or digital input signals to be selected, combined and transmitted at a higher speed on a single shared medium or within a single shared device.A Colpitts oscillator looks just like the Hartley oscillator but the inductors and capacitors are replaced with each other in the tank circuit.Schmitt trigger devices are typically used in signal conditioning applications to remove noise from signals used in digital circuits, particularly mechanical contact bounce in switches.A ring counter is a type of counter composed of flip-flops connected into a shift register, with the output of the last flip-flop fed to the input of the first, making a "circular" or "ring" structure.

1. Reference Circuit Details

The circuit contains the integration of op amp based integrator, 2×1 multiplexer, Colpitts oscillator, schmitt trigger and ring counter. The connections are shown in the Figure1. The expected waveforms are shown in Figure 2. The implementation focuses on the input selected through the multiplexer. It is basically focusing on mixed signal integration.

When the mux select line is 0, it selects vdc output. When is 1, it will select the integrated output from the integrator. Next stage, the output is given to the oscillator to produce the sine wave. The sine wave is given as input to schmitt trigger to produce pulse output. The pulse output is used to produce the ring counter output.

2. Reference Circuit

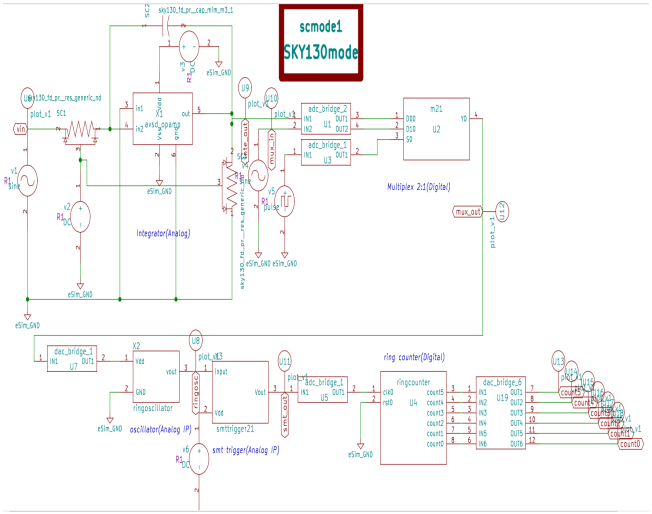

Figure 1

3. Expected Waveform Outputs:

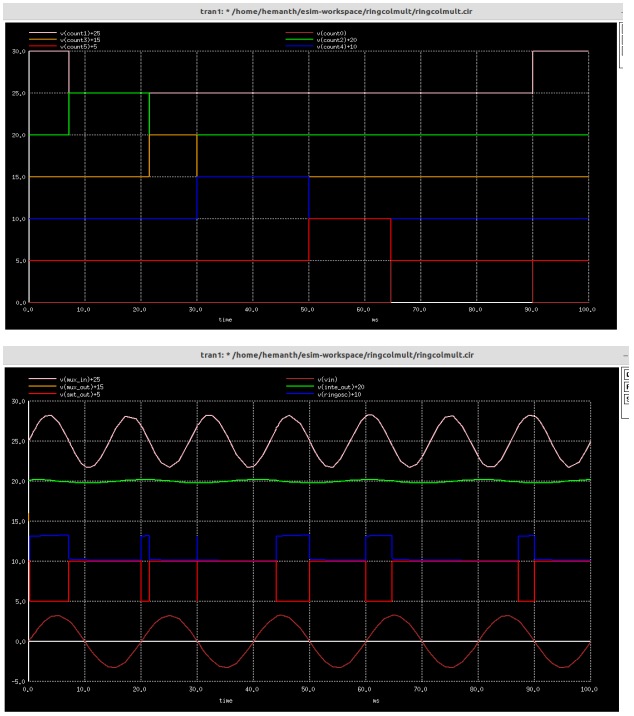

Figure2.

References:

1. Website: “www.allaboutcircuits.com”