

Johnson Counter

The **Johnson Ring Counter** or “Twisted Ring Counters”, is another shift register with feedback exactly the same as the standard *Ring Counter* above, except that this time the inverted output Q of the last flip-flop is now connected back to the input D of the first flip-flop as shown below. The main advantage of this type of counter is that it only needs half the number of flip-flops compared to the standard ring counter then its modulo number is halved. So a “n-stage” Johnson counter will circulate a single data bit giving sequence of $2n$ different states and can therefore be considered as a “mod- $2n$ counter”.

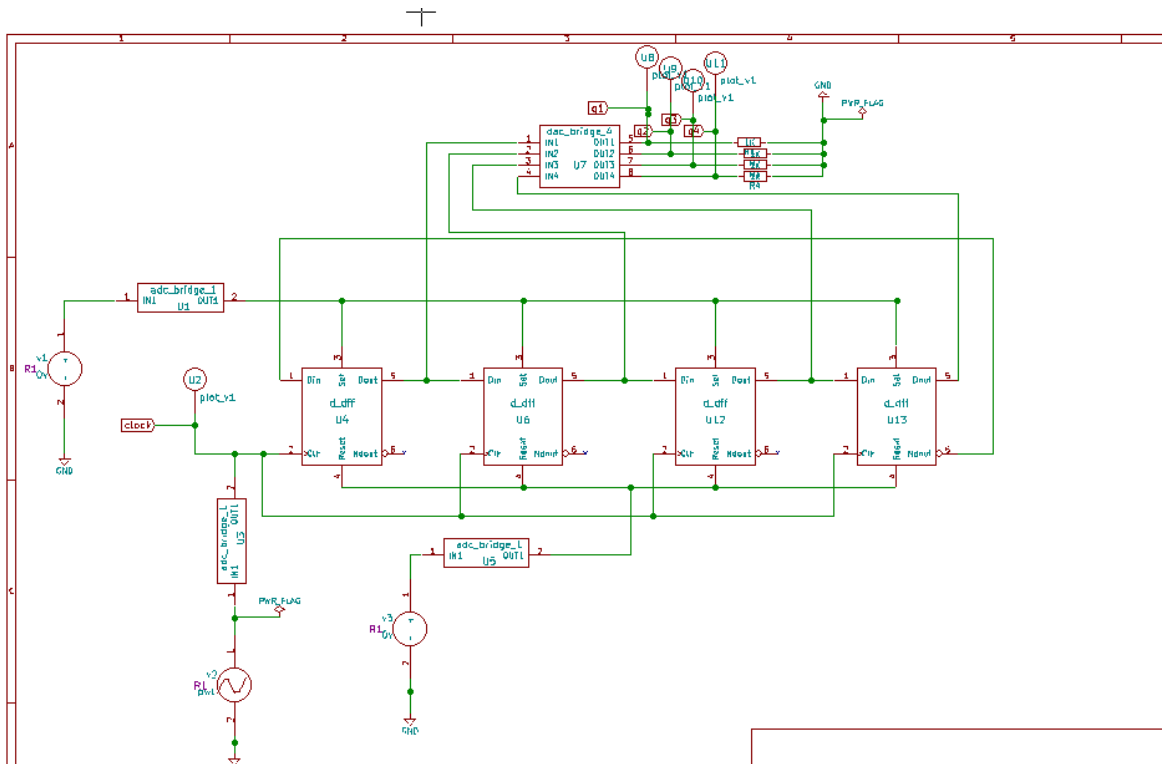


Figure1:Johnson Counter

Simulation results:

1.Ngspice plot

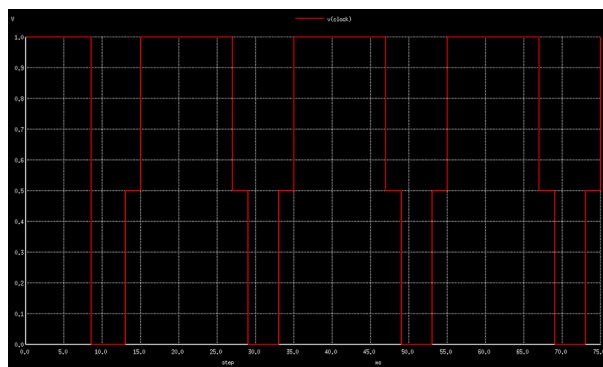


Figure2:Clock

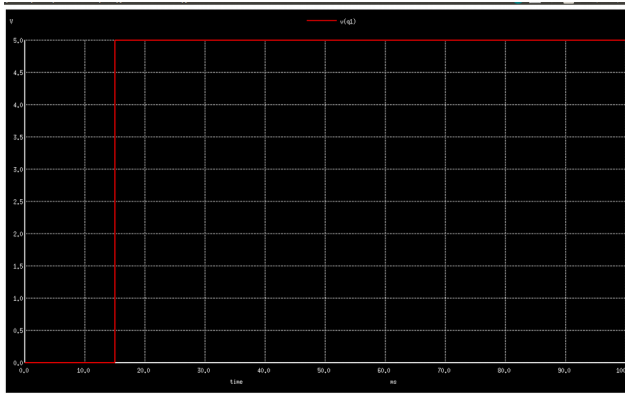


Figure3: q1 output

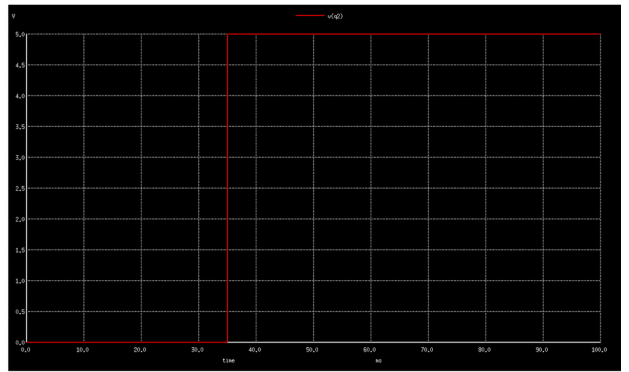


Figure4: q2 output

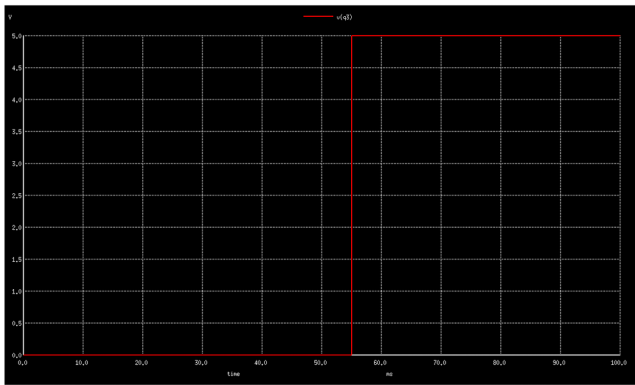


Figure5: q3 output

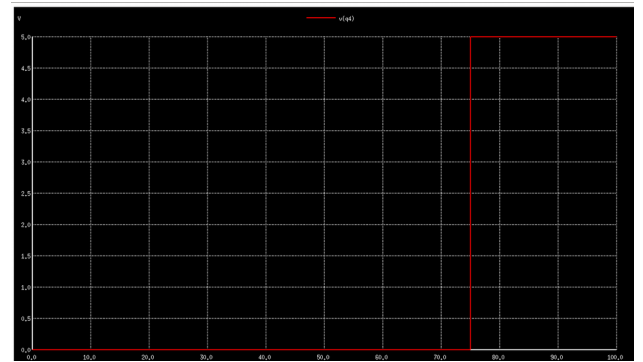


Figure6: q4 output

2. Python plot

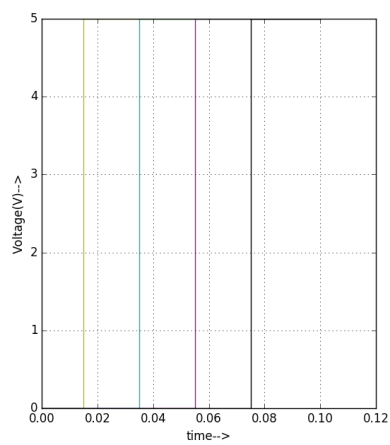


Figure7: output

3. Reference

- [1] http://www.electronics-tutorials.ws/sequential/seq_6.html on 11/12/2017.
- [2] https://en.wikipedia.org/wiki/Ring_counter