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ECE 443L Digital Electronics Laboratory
Report 6

CMOS based Astable Multivibrator Circuit
Design, Simulation and Experimental Test as
well as Analysis

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Abstract:

An astable multivibrator is a cross-coupled transistor with an astable output state as the input states transition from high to low. Main utilizations of astable multivibrators can be found in pulse position modulation and frequency modulation. The construction of such circuit is simple, as the most difficult part would be to calculate the input frequency and time constant.

Key Terms:

Astable, multivibrator, modulation, pulse, time constant ($0.7 \cdot R \cdot C$)

Simulation and Experimental Result:

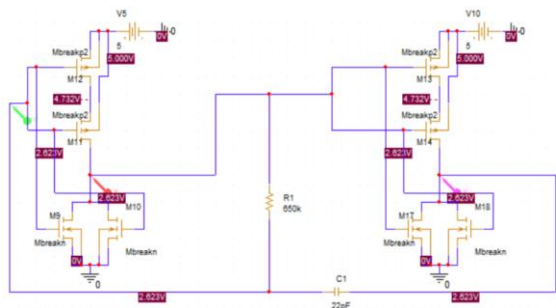
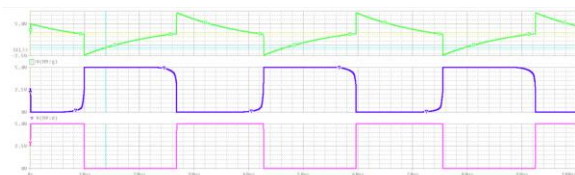


Figure 6.1: Case 1 CLAYTON Astable Multivibrator Schematic @ 100kHz



Trace Color	Trace Name	V1	V2	Y1 - Y2	Y1(Cursor1) - Y2(Cursor2)	-3.2452		
	X Values	13.830u	0.000	13.830u	626.313m	-29.000p	2.6232	4.3200m
	V1(M17.d)	4.3200m	2.6232	-2.6189	626.313m	-29.000p	2.6232	4.3200m
	V1(M9.d)	4.9937	2.6232	2.3705	5.6157	-29.000p	4.9937	2.6232
CURSOR 1,2	V1(M9.g)	-621.993m	2.6232	-3.2452	0.000	0.000	2.6232	-621.993m

Figure 6.2: Case 1 CLAYTON Astable Multivibrator Waveform @ 100kHz

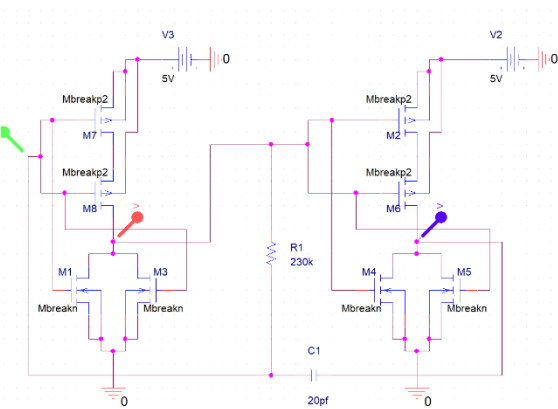


Figure 6.3: Case 1 EVAN Astable Multivibrator Schematic @ 111kHz

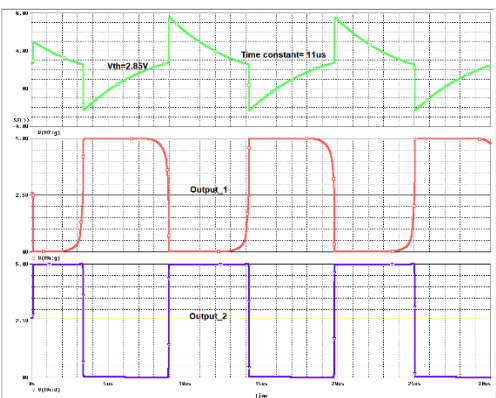


Figure 6.4: Case 1 EVAN Astable Multivibrator Waveform @ 111kHz

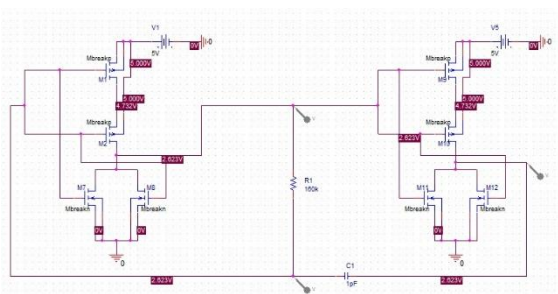


Figure 6.5: Case 2 HAROUTUN Astable Multivibrator Schematic @ 500kHz

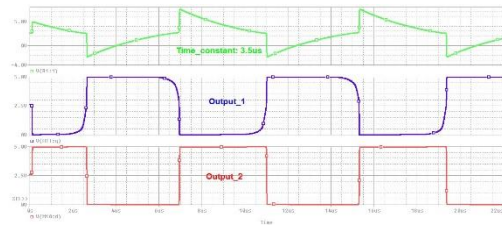


Figure 6.6: Case 2 HAROUTUN Astable Multivibrator Waveform @ 500kHz

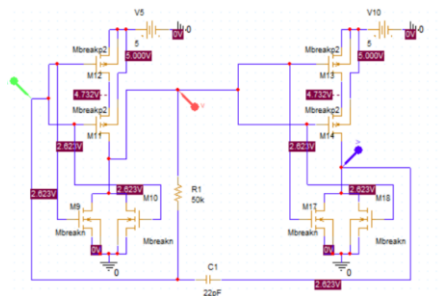


Figure 6.7: Case 3 CLAYTON Astable Multivibrator Schematic @ 670kHz

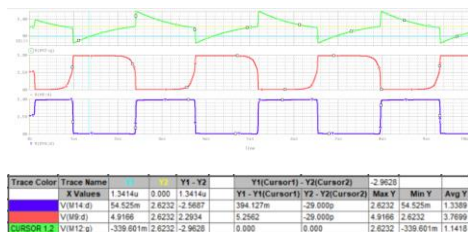


Figure 6.8: Case 3 CLAYTON Astable Multivibrator Waveform @ 670kHz

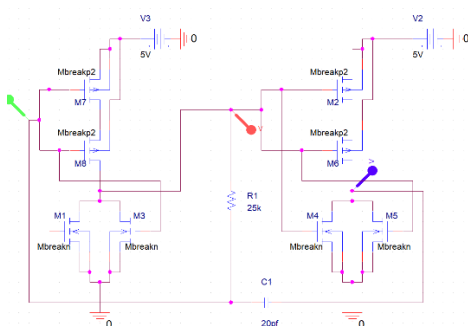


Figure 6.9: Case 3 EVAN Astable Multivibrator Schematic @ 800kHz

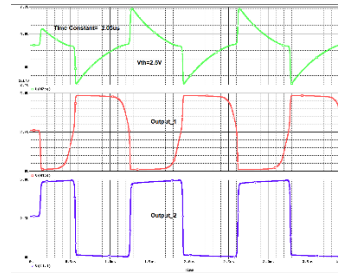


Figure 6.10: Case 3 EVAN Astable Multivibrator Waveform @ 800kHz

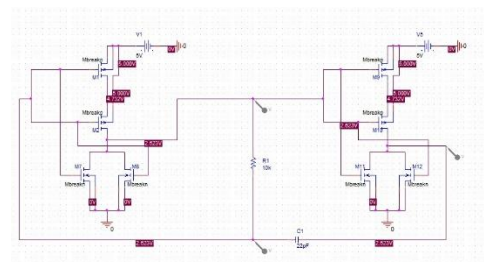


Figure 6.11: Case 4 HAROUTUN Astable Multivibrator Schematic @ 1Mhz

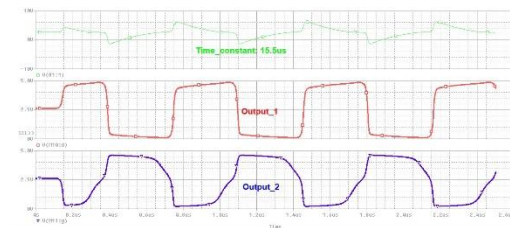


Figure 6.12: Case 4 HAROUTUN Astable Multivibrator Waveform @ 1Mhz

Conclusion:

Astable Multivibrators, although aren't found in everyday electronics, are very useful within the medical field. Such circuits are utilized in heartbeat sensor machines and any modulation device. Pulse synchronization is a common area for such circuits.