7 Non-linear applications

Student Group

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7. Non-linear applications

7.1 Schmitt Trigger

> - interactive animation of a trigger circuit: iPES Zurich

7.3 Timer 555

The 555 timer is sometimes referred to as “the time machine”. It has historically been of great importance in the generation and detection of temporal signal sequences.
Before discussing the device itself, the various modes should be briefly considered:

Mode^other name^explanation^application^examples^

astable	oscillator, multivibrator	output signal changes value periodically	creation of a periodic, rectangular signal, with adjustable pulse width and frequency	motor control, dimming of LEDs, generation of tones
monostable	“flip-flop”, monoflop	Output signal is triggered by a trigger and goes back to 0V after a defined time	Extending pulses that are too short, setting a fixed pulse length	Conditioning sensor signals of a proximity sensor
bistable	flipflop	set/reset when thresholds are exceeded/fallen short	bounce-free switch, circuits with hysteresis	two-point controller, e.g. for heating elements

7.3.1 Comparison 555 and Microcontroller

It can be seen that there are a wide variety of applications for this component. The question can be asked what differentiates the application of this component from a microcontroller:

Property	**Microcontroller**	**Timer 555**		
Cost (single unit, 2018)	from 3ct (chin. µC, PADAUK PMS150C)	from 29ct (western µCATtiny)		
cost (>10'000, 2018)	from approx. 2..3ct (chin. µC)	from 20ct (westl. µC)	from 2..3ct	
other components	interference suppression	interference suppression	transistors, resistors and other capacitors	depending on the application
Complexity	in software	hardly available		
Flexibility	Updates possible	if potentiometers were used, limited		
advantages for small quantities	easily changeable by programming, \no component scattering	easily changeable by reassembling on the board, \no software bugs, \no tools necessary		

For a long time, the Timer 555 was the most cost-effective solution for the tasks mentioned above. Currently (2018), Timer 555 and microcontroller prices are about the same in large quantities. Nevertheless, due to its simplicity, the Timer 555 is still found in various consumer electronic products.

7.3.2 Pinning and principle circuit