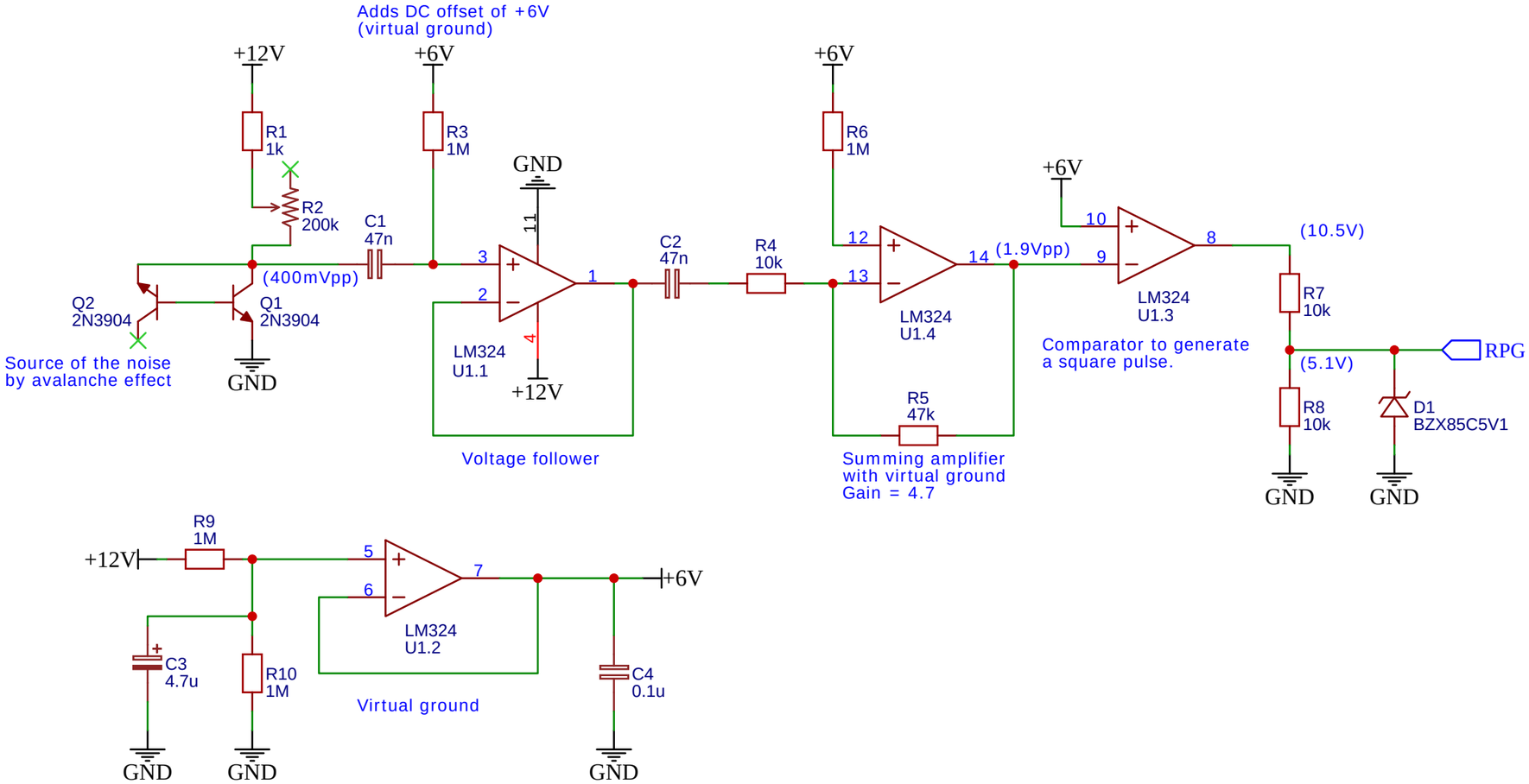

This circuit will generate a random sequence of 5ms square pulses.
The trimmer R2 controls the ammount of random pulses it is generated.

TITLE: Noise Source (Layer D)		REV: 1.0
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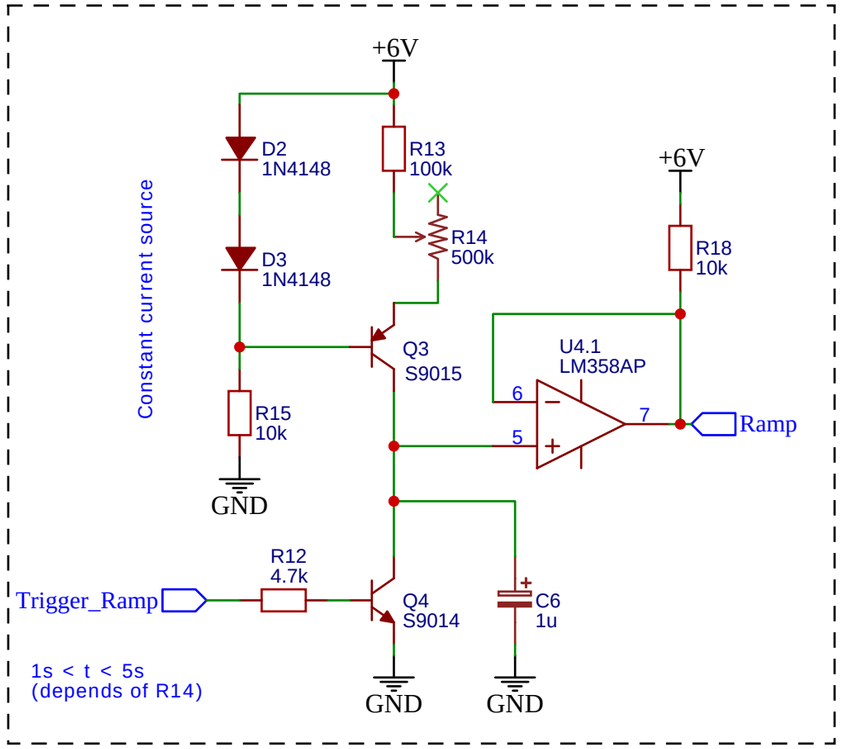
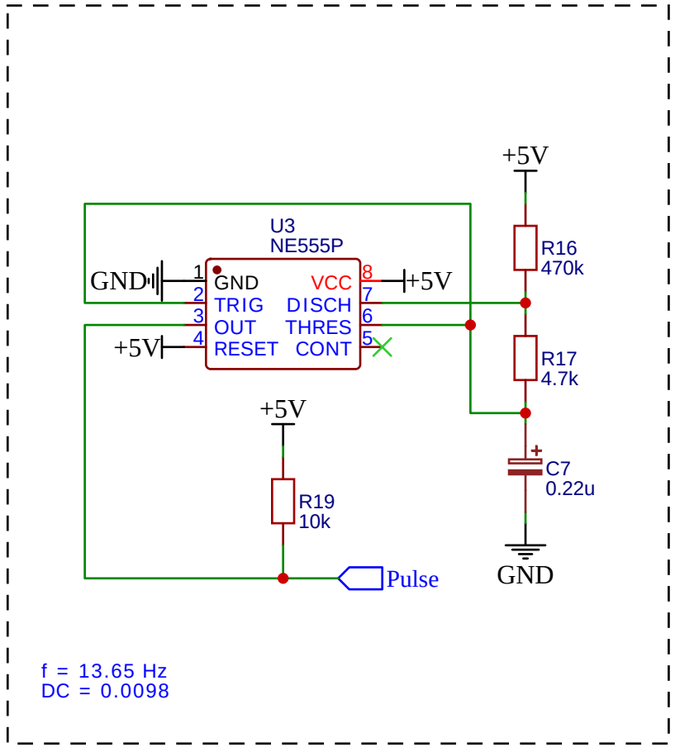
	Date: 2024-09-29 Drawn By: @dabecart	



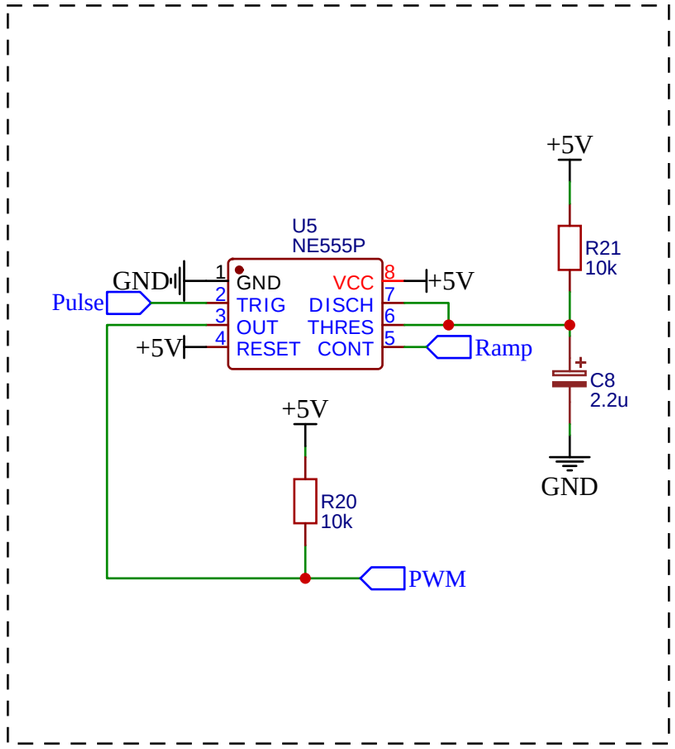
Ramp Generator

Creates a rising ramp on a falling edge.
The rise time is calculated as: t = (R13+R14)*C6*Vcc/0.7
This will be the modulating signal to control the duty cycle of the output PWM.



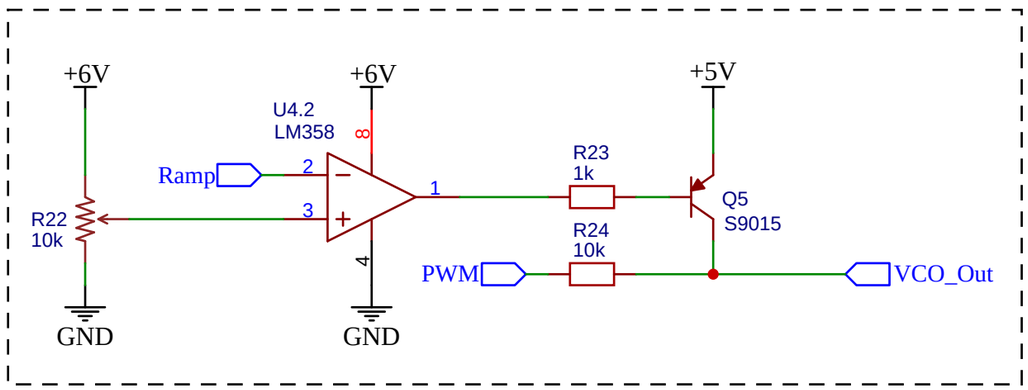
Pulse generator

Astable multivibrator with a very low duty cycle.
Gives the frequency of the output PWM.
Frequency: f=1.44/[(R16+2R17)C7]
Duty cycle: DC=Rb/(R16+2R17)



Modulator

Converts the pulse input into a PWM with its duty cycle controlled by a modulating signal. In this case, the output of the ramp generator.
If T is the pulse period, then: R21*C8=T/4
The output DC is directly proportional to the ramp input.



Output saturation

The modulator is incapable of fully generating a duty cycle of 0% or 100%, therefore this stage pulls high the VCO when the ramp is in its idle voltage (HIGH too). R22 will have to be adjusted so the normal output of this stage (VCO_Out) is +5V.

These circuits are used to create a PWM signal whose duty cycle will normally be 100%. When the tilt switch is triggered, it will make the duty cycle of the PWM fall to almost 0% and then raise slowly when no shaking is applied to the dice.
This PWM will be ANDed to the PWM so that the number stop increasing slowly, but still randomnly until they eventually stop. In other words, when the PWM's DC is 0% (almost) all random pulses will be passed to the counter. When the DC starts raising, less pulses will get through simulating a slow down of the dice, similar to a roullete.

TITLE: VCO (Layer D)		REV: 1.0
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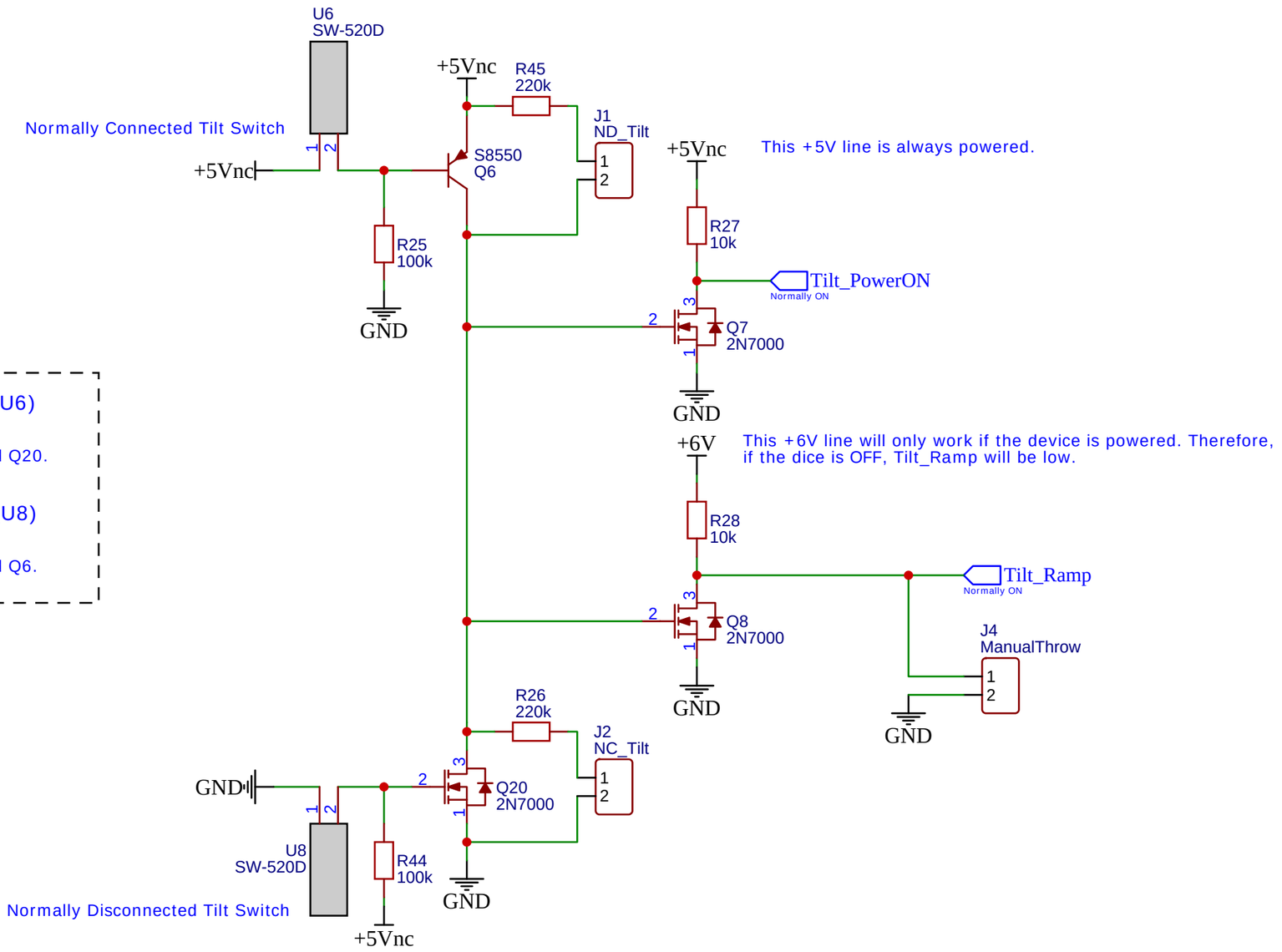
	Date: 2024-09-29 Drawn By: @dabecart	

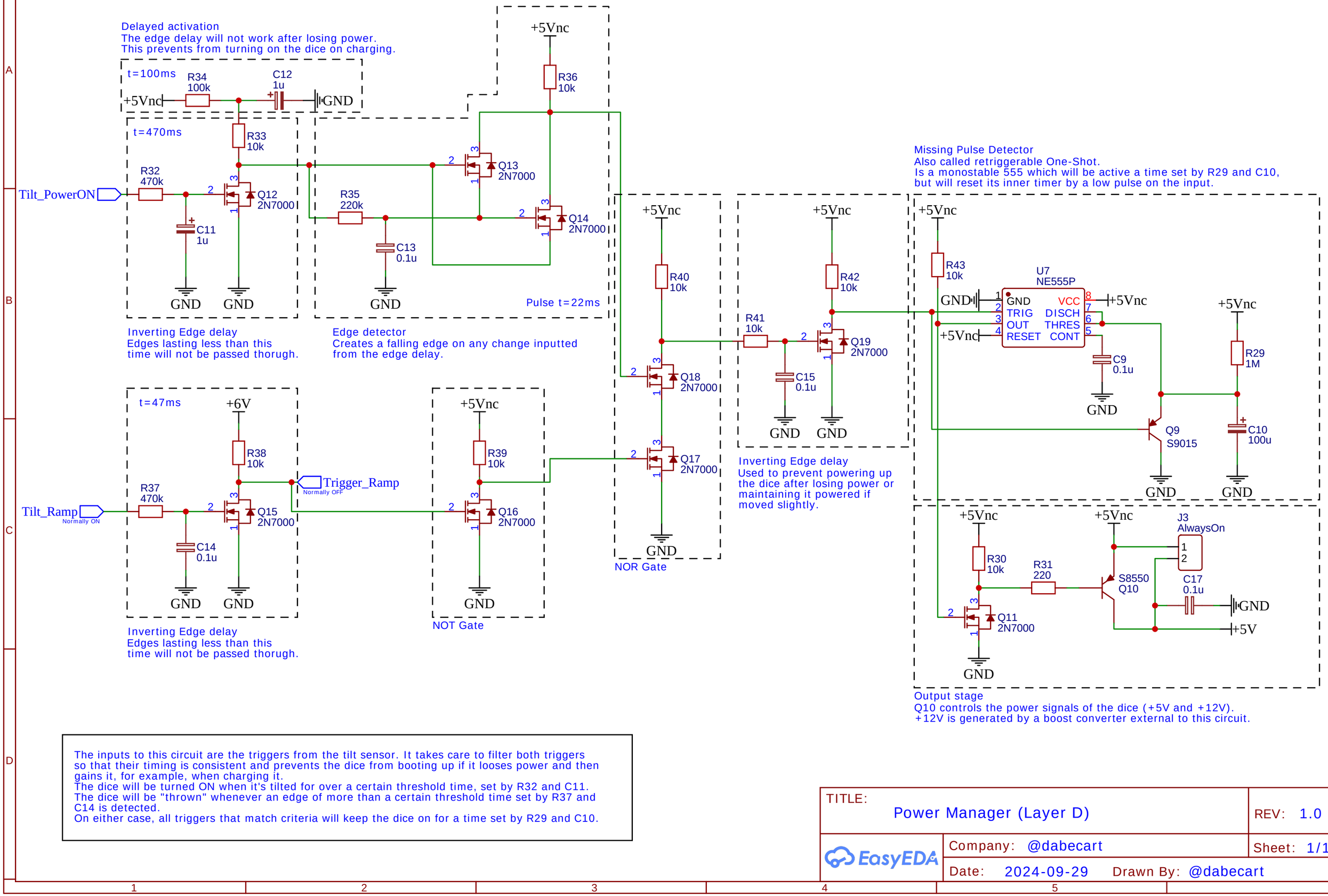


Using a NC Tilt Switch (U6)
- Shortcircuit J2.
- Put U6, R25, R26 and Q6.
- Don't put U8, R44, R45 and Q20.

Using a ND Tilt Switch (U8)
- Shortcircuit J1.
- Put U8, R44, R45 and Q20.
- Don't put U6, R25, R26 and Q6.

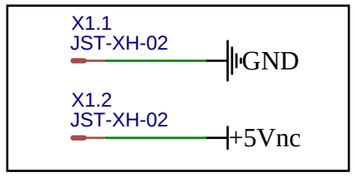
The tilt switch is a normally closed element. For this circuit we need something that is normally open.
This simple circuit achieves just that.
It generates two triggers (which are normally HIGH): the PowerOn is used to wake up the dice, the tilt ramp trigger is used to generate the ramp, which basically emulates throwing the dice.
Both these triggers should maintain the dice powered son on "PowerManager" these signals are filtered and joined.

TITLE: Tilt Switch (Layer D)		REV: 1.0
EasyEDA	Company: @dabecart	Sheet: 1/1
	Date: 2024-09-29 Drawn By: @dabecart	

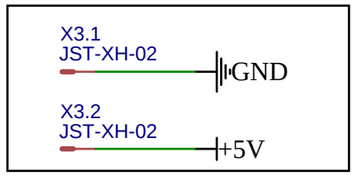


The inputs to this circuit are the triggers from the tilt sensor. It takes care to filter both triggers so that their timing is consistent and prevents the dice from booting up if it looses power and then gains it, for example, when charging it.
The dice will be turned ON when it's tilted for over a certain threshold time, set by R32 and C11.
The dice will be "thrown" whenever an edge of more than a certain threshold time set by R37 and C14 is detected.
On either case, all triggers that match criteria will keep the dice on for a time set by R29 and C10.

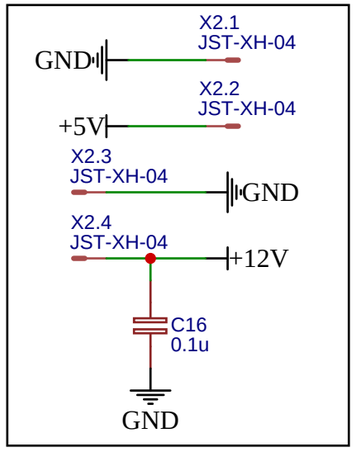
TITLE: Power Manager (Layer D)		REV: 1.0
EasyEDA	Company: @dabecart	Sheet: 1/1
	Date: 2024-09-29 Drawn By: @dabecart	



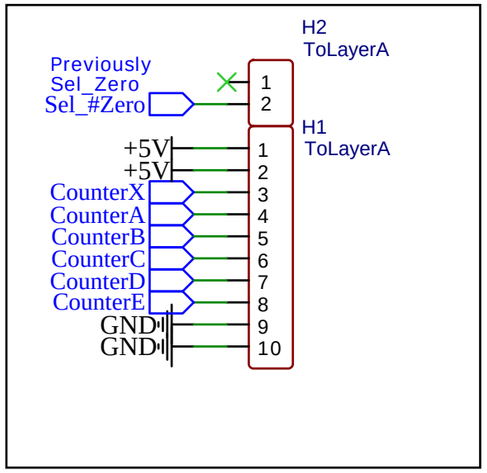
+5V Input
From +5V Boost Converter.



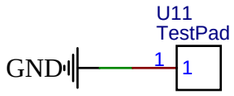
+5V Output
Spare output.



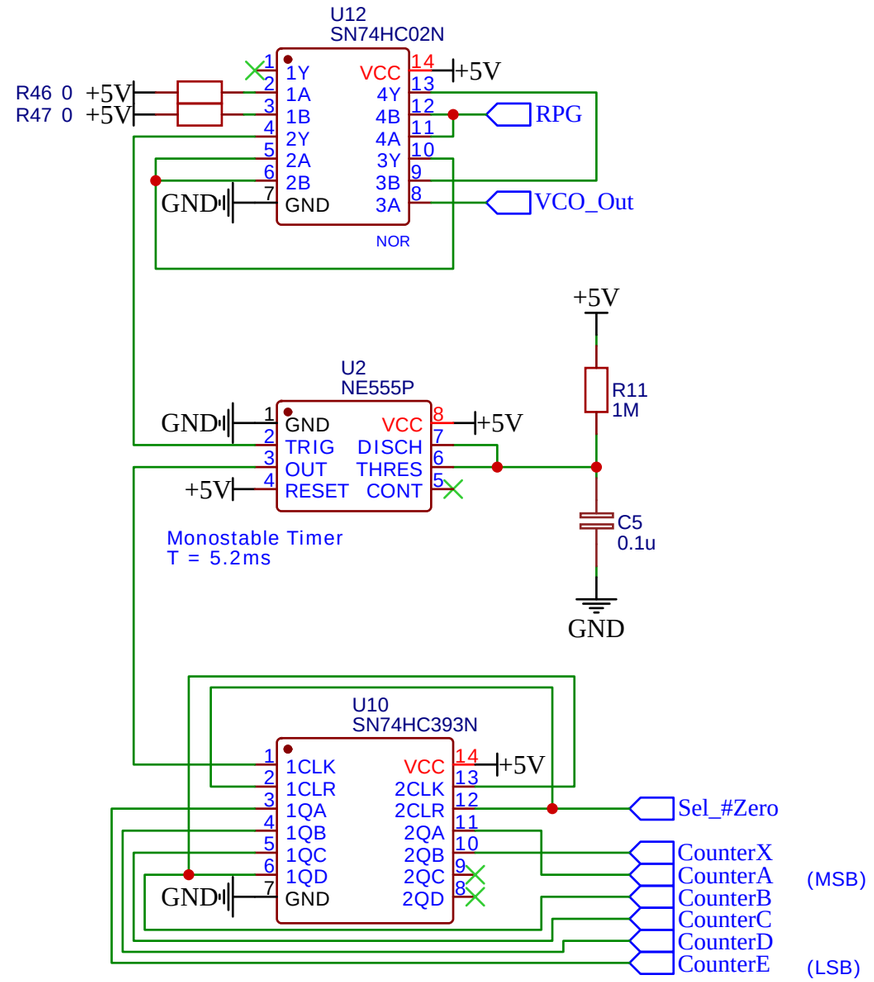
+12V Boost Converter
Input the controlled +5V to generate +12 V.



Binary Comparator
Compares the binary counter with the number set by the switches.



TITLE: Connections (Layer D)		REV: 1.0
EasyEDA	Company: @dabecart	Sheet: 1/1
	Date: 2024-09-29 Drawn By: @dabecart	



TITLE: Random Pulse Generator (Layer D)		REV: 1.0
EasyEDA	Company: @dabecart	Sheet: 1/1
	Date: 2024-09-30 Drawn By: @dabecart	