A.1.4 Learning Activity

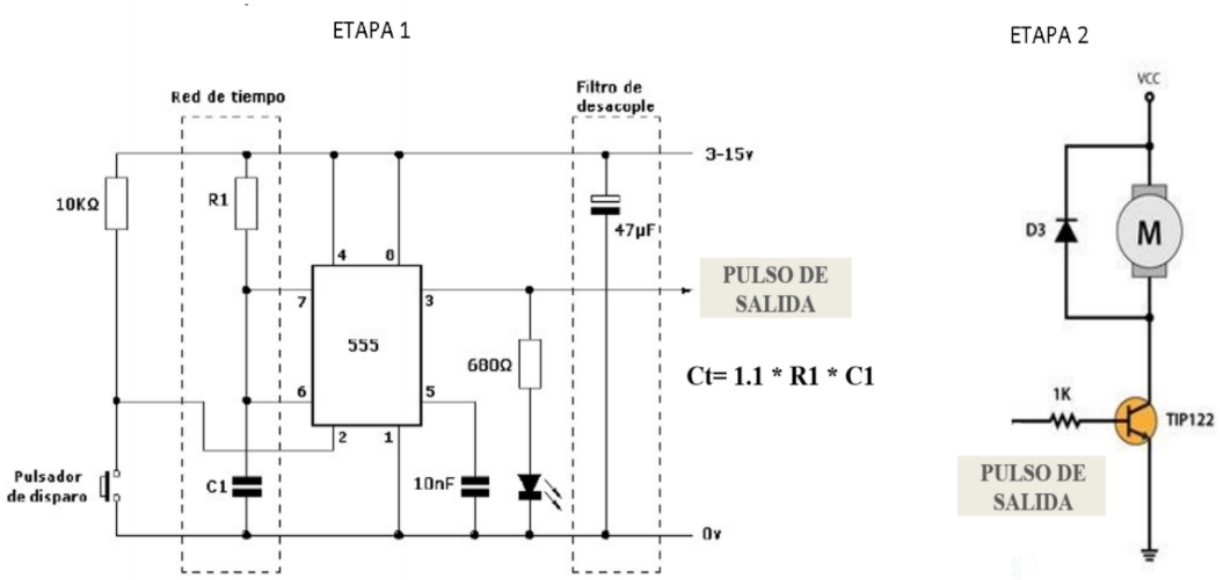
Carry out a start and ignition control system for an electric actuator through an electronic circuit, using a simulator, a **NE55s Timer** and a **DC Motor**.

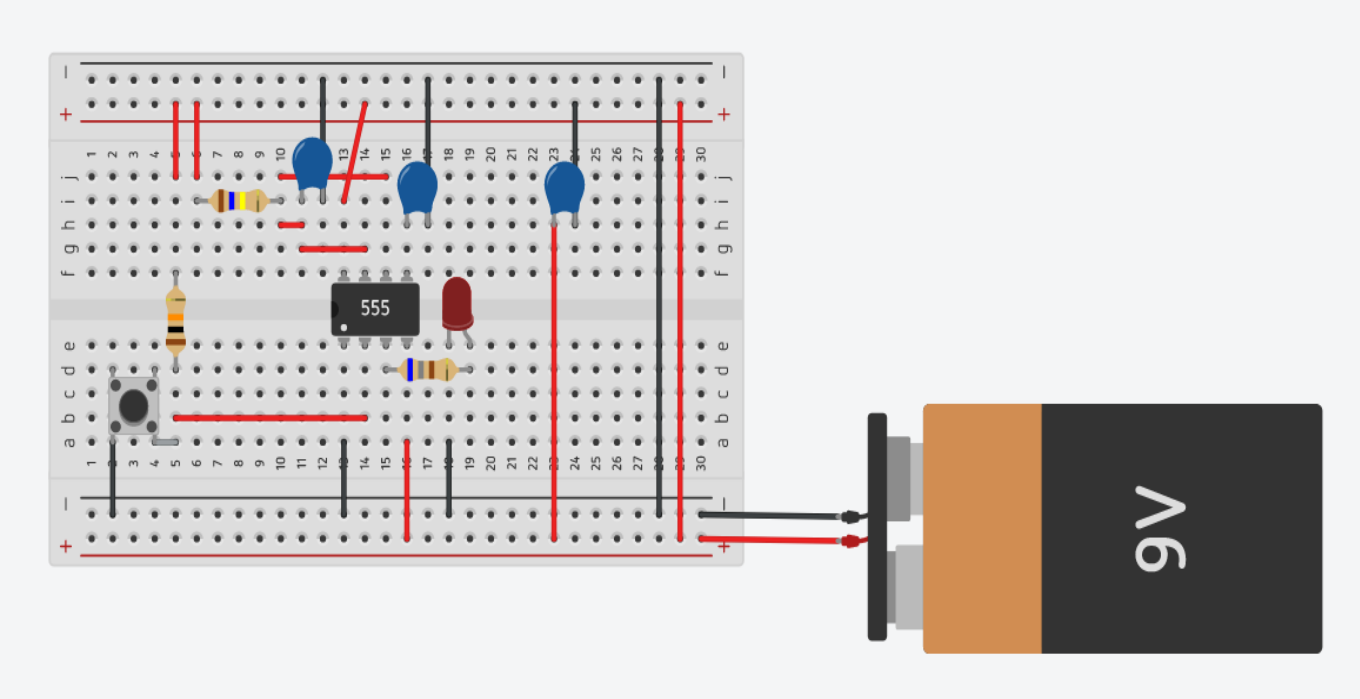
Development

1. Use the following list of materials to prepare the activity

Amount	Description
1	Circuito integrado LM555
1	Capacitor electrolítico de 47uf
1	Condensador cerámico de 10nf
1	Fuente de voltaje de 9V
1	Transistor de poder TIP122
1	Diodo 1N4001 o equivalente
1	Mini Motor DC
3	Resistencias 680,1k,10k Ohmios de 1/4w
1	Pulsador de disparo
1	Diodo Led Rojo

2. Use the electronic circuit in the picture below and assemble stage 1 inside the simulator.





3. As can be seen in the previous circuit, there is an area identified as "Time network" and another "Decoupling filter", **explain the purpose of both terminologies**.

   The time network determines the duration of the output ignition, and varies depending on what we need

   The decoupling filter is used to eliminate noise from the output signal, so that it can be read more easily by the next part of the circuit.

4. Continuing with the previous image, observe the equation Ct = 1.1 * R1 * C1 is shown, which is used to establish the **on time of the output pulse**. Based on this previous equation, calculate the values of **R1 and C1** if it is desired to keep the output pulse on, given the 3 conditions required in the attached table.

Number	Condition	R1 value	C1 value
1	3 seconds	58KΩ	47µF
2	5 seconds	97KΩ	47µF
3	8 seconds	155KΩ	47µF

   R = 3s / (1.1 * 0.000047 F)

   R = 58,027 ohms

   Comercial resistance

   56komh + 2kohm = 58kohm

   Ct= 1.1 * 58,000ohm * 0.000047F = 2.998s

   R = 5s / (1.1 * 0.000047 F)

R = 96,711 ohms

Comercial resistance

82komh + 15kohm = 97kohm

Ct= 1.1 * 97,000ohm * 0.000047F = 5.014s

R = 8s / (1.1 * 0.000047 F)

R = 154,738 ohm

Comercial resistance

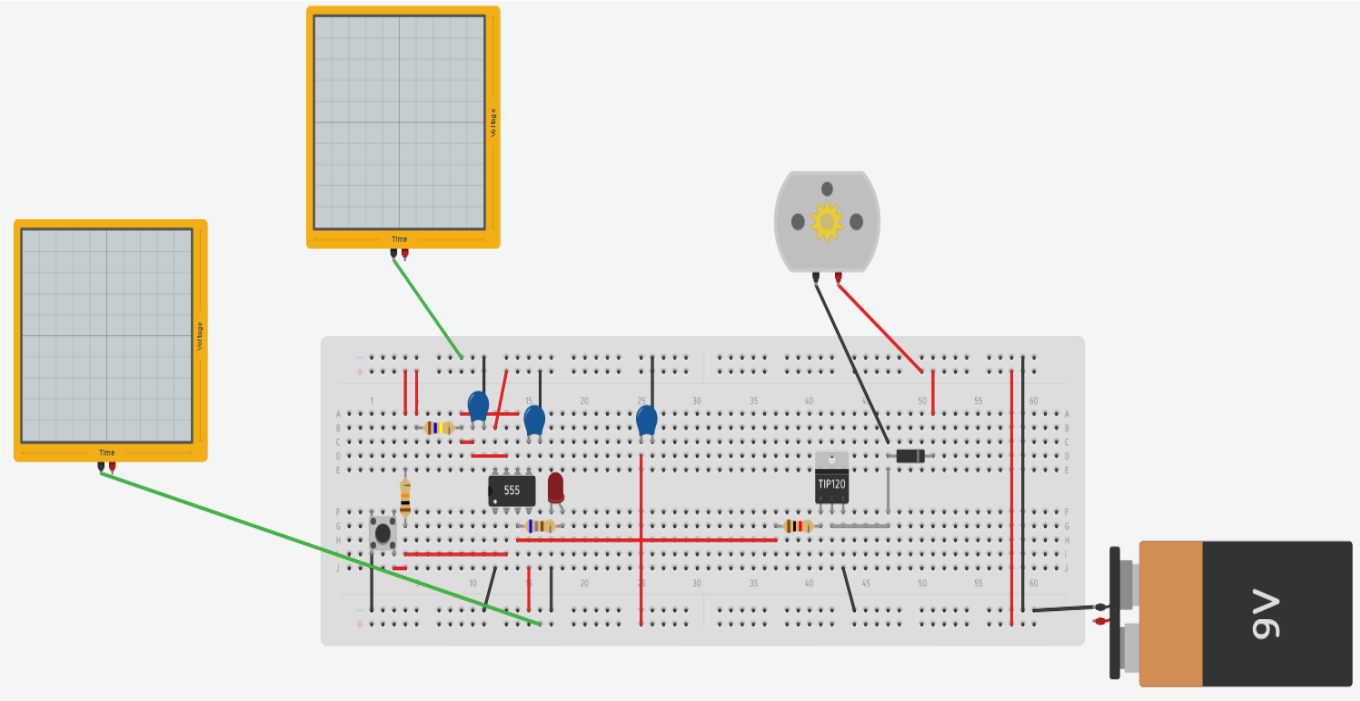
150komh + 5kohm = 155kohm

Ct= 1.1 * 155,000ohm * 0.000047F = 8.013s

5. Once the above table is completed, start the simulation for any of the three conditions and observe the behavior of the Led; **explain your observation**.

   For each of the calculations we can see that little by little the LED goes off since the charging time it has decreases unless we restart it with the button

6. Assemble stage 2 and integrate the terminal of the output pulse to the input of the base of the transistor of this second stage.



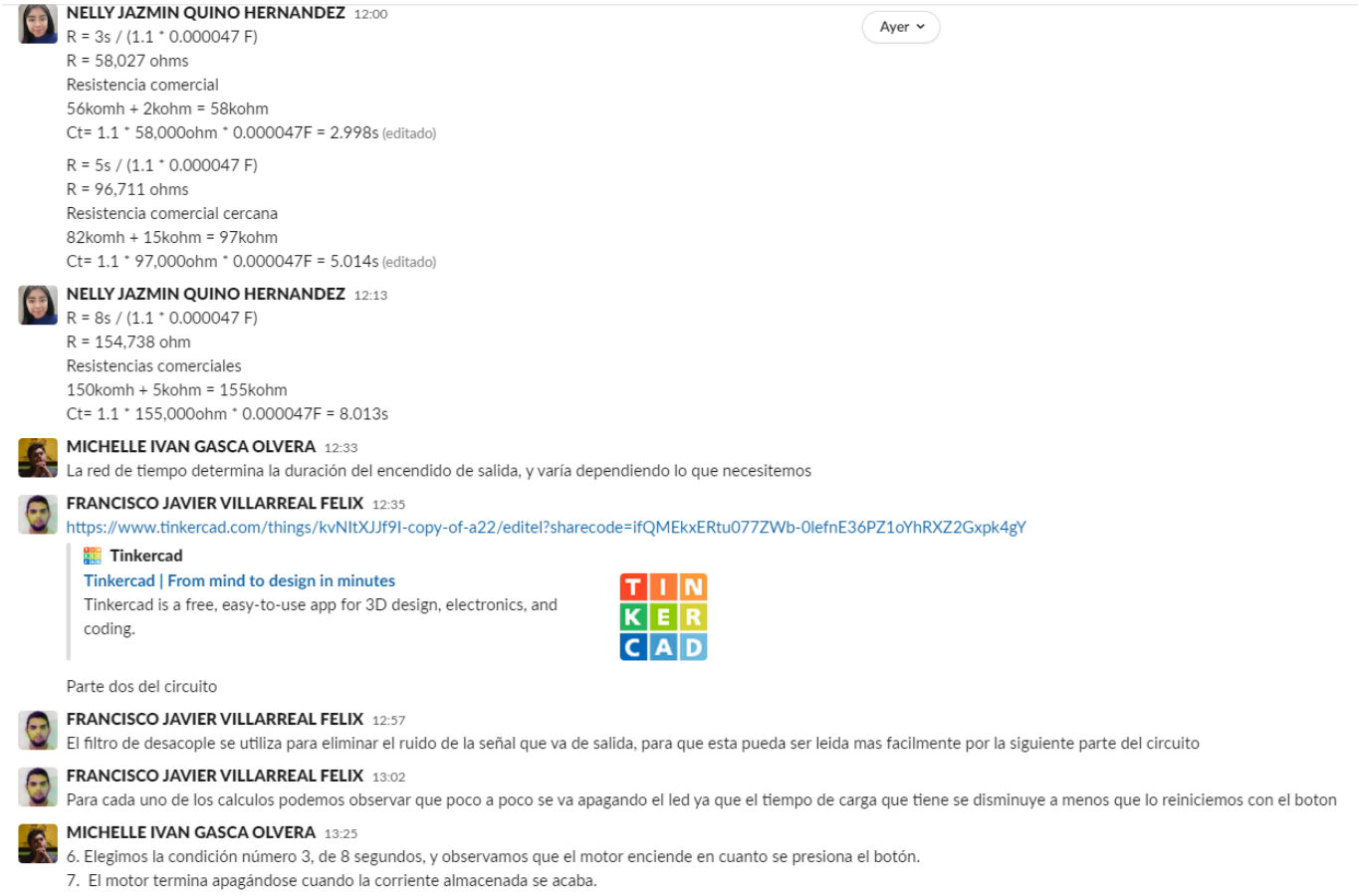
7. After completing the previous step, choose one of the 3 conditions recorded in the table above and observe the behavior of the DC motor; **explain your observation**.

   We choose condition number 3, of 8 seconds, and we observe that the motor starts as soon as the button is pressed.

8. Once the stage 1 output pulse on time is complete, **what happens to the DC motor? Explain the reason for this behavior?**

The motor ends up shutting down when the stored current runs out.

9. Insert images of **evidence** such as meetings of the team members held for the development of the activity



Nelly Quino

In the first part I observe how was the switch off the led after passing current with the pushbutton due to how were we varying size the resistance and the capacitor wich are connected to a timer 555, we used it for 3,5 and 8 seconds. In second part we added a DC motor to the circuit and in a on an oscilloscope watched how it was vary the signal.

Michelle Gasca

The 555 timer provides extensive control in different practices such as time delay control, it can also generate pulses and oscillations, as it can be deactivated at different times depending on the determined time.

Francisco Villarreal

The 555 timer helps us a lot to carry out practices or systems where we occupy an activity to be carried out during a certain time, although we must always take into account the precautions that must be taken that is why the use of capacitors was necessary to help calculate the time that wanted to have the engine and LED turned on.

Rubric

Criteria	Description	Score

Criteria	Description	Score
Instructions	Do you fulfill each of the points indicated in the instruction section?	10
Sevelopment	Did you answer each one of the points requested in the development of the activity?	60
Demonstration	Was the student present in the explanation of the functionality of the activity?	20
Conclusions	Se incluye una opinión personal de la actividad por cada uno de los integrantes del equipo?	10

Members repositories

Nelly Quino

Michelle Gasca

Francisco Villarreal