This circuit uses time-delayed RC circuit to delay the command received from the switch. This will give enough time for the controller to switch its directions safely without interruption.

- V2: Input source is modeling the hitch switch (up down). The switch accepts a 5V input from the controller. The switch is a Double Pole Double Throw (DPDT) switch.

- R1 and R2 (variable): Voltage divider network to step down the 5V input. This will also control the speed command sent to the controller.

- C1: Energy-storing device. It is used, along with R1, to delay the command given to the controller and give some extra time for the controller to switch directions.
The charging time can be calculated as: T_charge = R1 * C1 = 200 ms
The discharge time can be calculated as: T_discharge = R2 * C2 = 220 ms

- U1: Buffering op-amp. It is used as an intermediate stage between the voltage command of the divider network and the controller. It orevents the voltage to drop at its output since it has a very high output impedence.

- R3: It models the controller. the measured resistance between the command pin and the ground was 10k ohms.

After some tests, it was seen that the discharge time is too high and the controller was also getting stuck. Hence, Q1 is added to produce a 0-resistance discharge path for C1 when the swithc goes OFF.

RESULT: The circuit is stuck on switching to back direction. The reason was, when the switch is in its OFF state, the voltage at the collector of Q2 goes to 0 and hence it operates in the Cut-off region. This will lead to Q2 not switching ON and the capacitor is not discharging quickly.

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