

SP.764, Practical Electronics  
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**Lecture 8: Final Project – Fan Controller**

**Topics:**

- 1) Final Project Introduction
- 2) Background Information

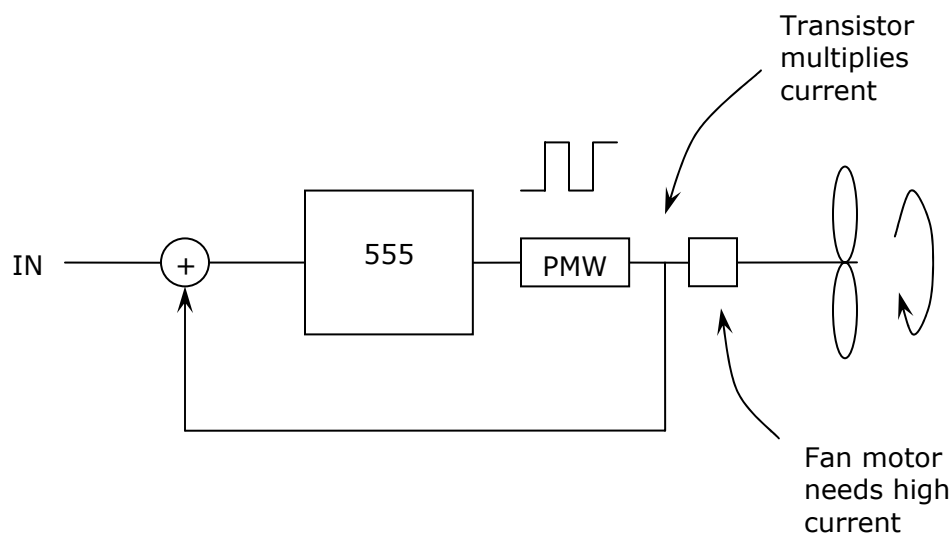
**Final Project Introduction:**

- The final project will evolve from the 555 timer circuit.
- The project will consist of building a fan controller.
- Involves giving the system a reference signal from a thermistor. (Therefore, one is expected to know how to read thermistor values.)
- Use the 555 timer circuit as a one-shot to catch any input signal and produce a fixed-width pulse output signal.
- The thermistor driving a 555 timer will give a variable frequency signal.

**Background information:**

- PWM
- How motors work.
  - o Constant current
  - o Variable voltage
  - o Behave like a LP filters
  - o Require lots of current

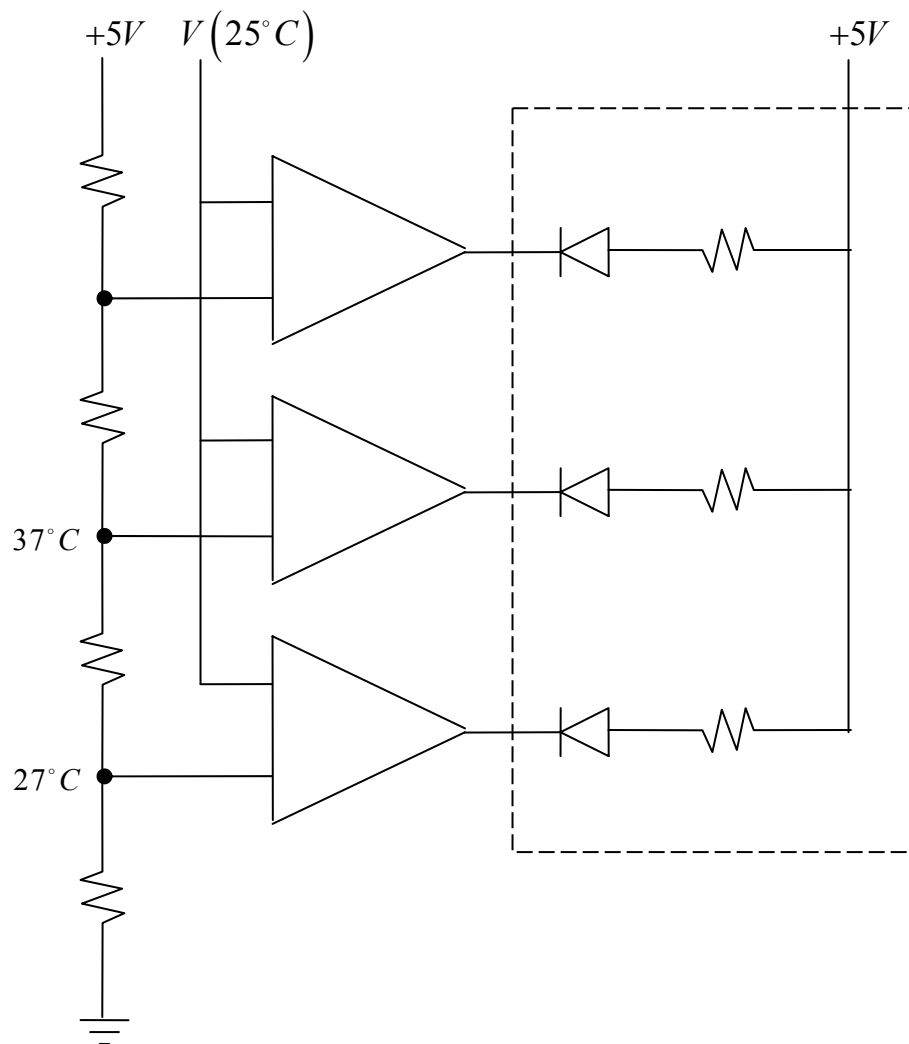
Voltage	Speed	Current
1V	2500 rpm	0.5A
2V	3500 rpm	0.5A
3V	4500 rpm	0.5A



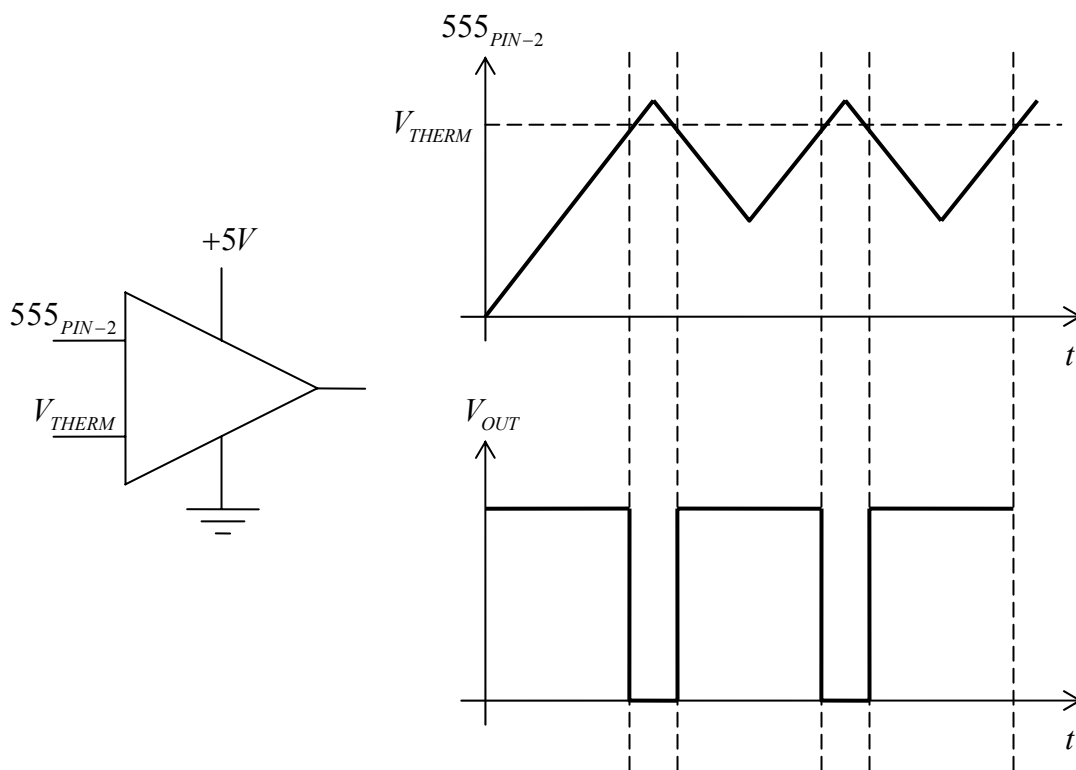
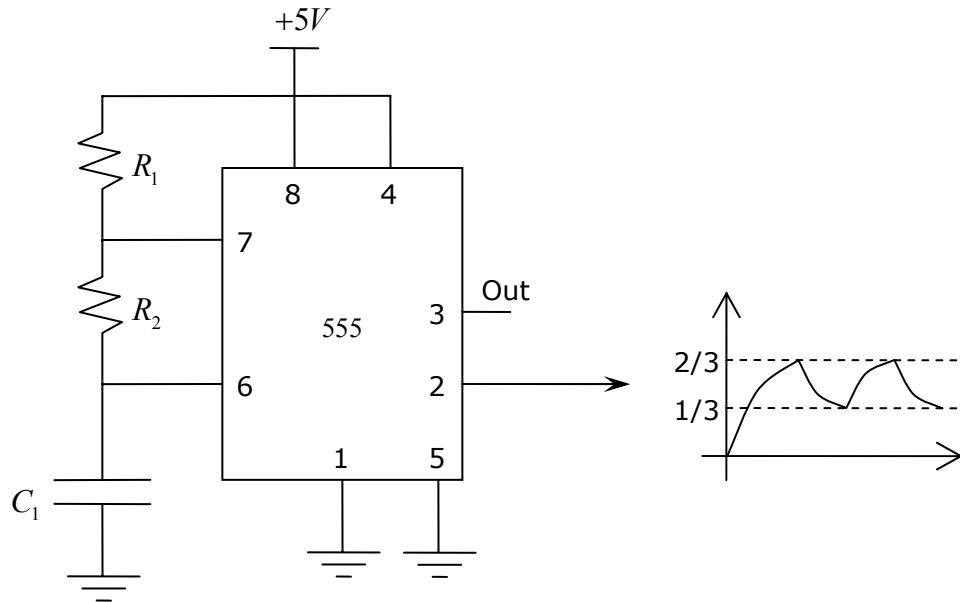
### Controlling the fan:

- Measure temperature
  - o Thermometer
- Measure revolutions per minute (RPM)
  - o Photo-transistor

### Displaying temperature values:



Connect the input of a series of op-amps in such a way that there is a common voltage ( $V_{THERM}$ ) reaching the inputs of all op amps. Choose resistor values to create reference voltages that represent different temperature values. Since the 555 is better at sinking current rather than sourcing it, connect LEDs as shown above.



Since  $V_{THERM}$  is a variable voltage, use a comparator to control the average voltage delivered to the motor. If  $V_{THERM}$  increases (implying higher temperature), the output of the comparator will have a higher duty cycle and the motor will spin faster. If  $V_{THERM}$  decreases, the duty cycle of the output decreases and the motor spins slower.