



Computer Engineering Department

CE 151L: Electronic Devices and Circuits Lab

Lab Project

Temperature Controlled 12V Fan

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Requirements

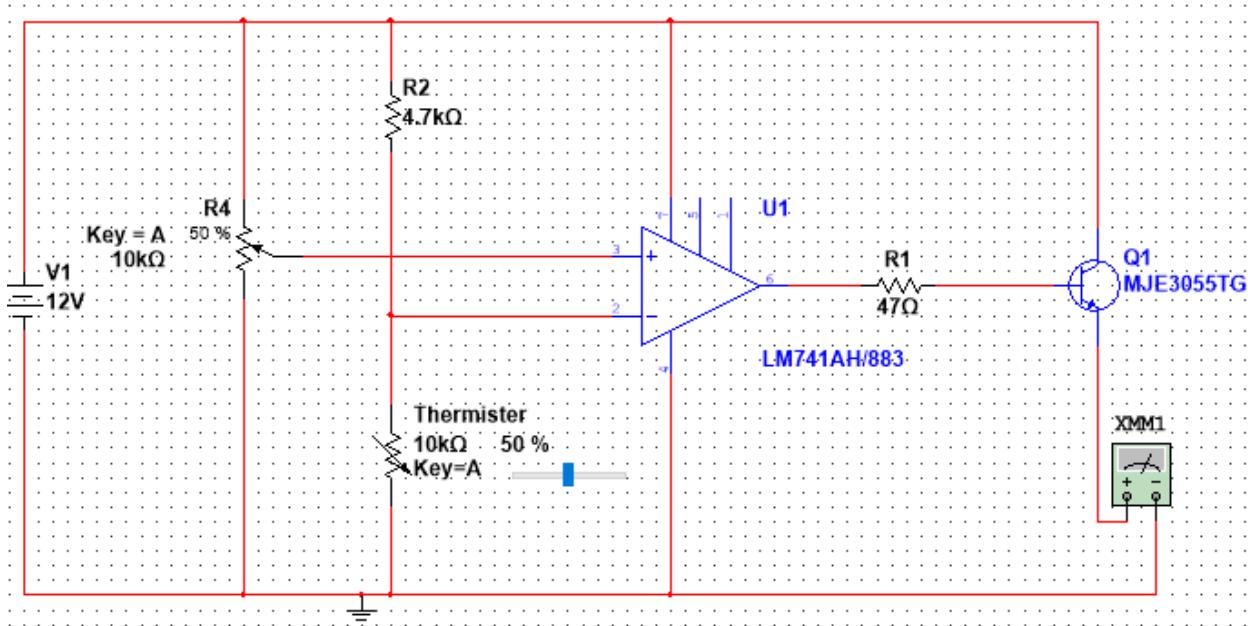
The circuit requires 12 V to operate properly. At the set temperature the circuit remains off i.e. fan does not turn on as temperature rises above the set temperature the fan turns on until temperature goes below set temperature again.

Components Selection

- 10k NTC thermistor x1
- 10k potentiometer x1
- 4.7k Ω resistor x1
- 47 Ω resistor x1
- NPN Transistor MJE3055 x1
- DC Fan (Motor) x1
- Op amp IC LM741 x1

Circuit Design & Working

Design

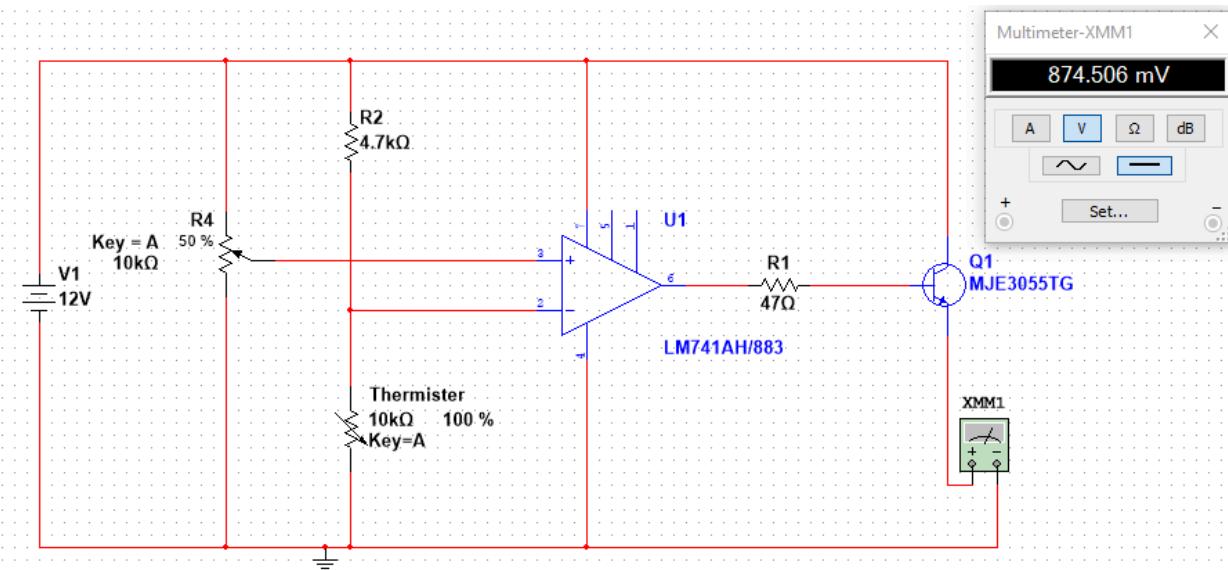


Working

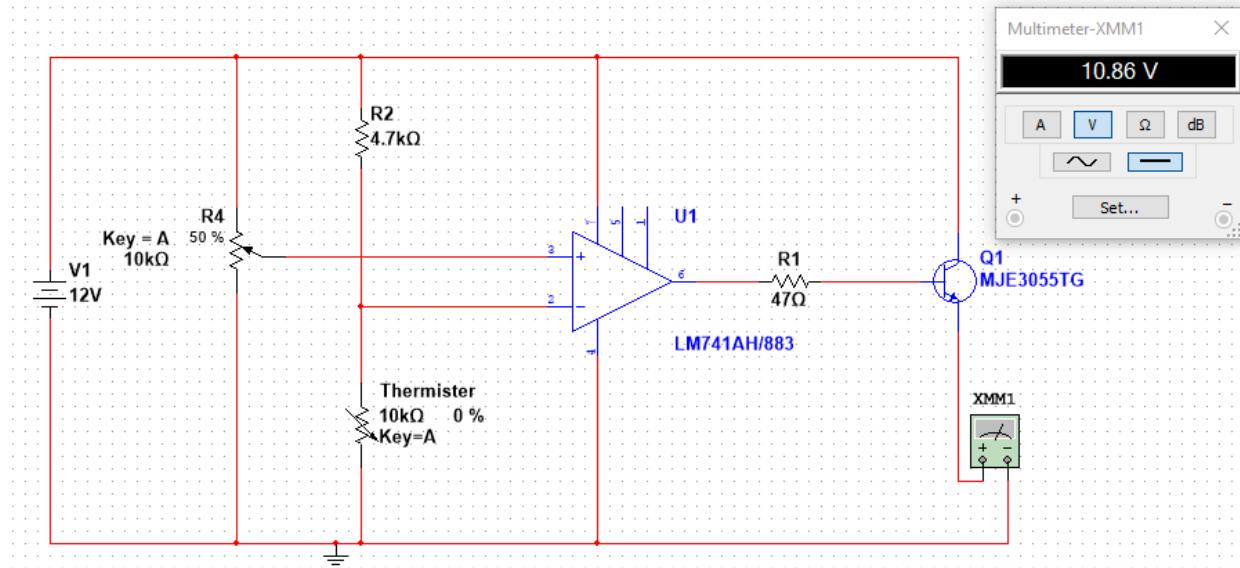
The key component here is NTC thermistor. Thermistors are of 2 type NTC and PTC. NTC (Negative Temperature Co-efficient) thermistor's resistance decreases with increase in temperature. Op amp IC 741 has two input pins, pin 2 is inverting input terminal and pin 3 is non-inverting input terminal. The output pin is pin 6. In this circuit pin 3 is connected to potentiometer while pin 2 is connected to a voltage divider consisting of thermistor and 4.7kOhm resistor. Normally output of Op amp is LOW as voltage at non inverting terminal is low than voltage at inverting terminal so no voltage is applied at the base of transistor so NPN transistor does not conduct. When temperature increases resistance of thermistor decreases so voltage at non inverting terminal becomes higher than voltage at inverting terminal due to which output of op amp becomes HIGH. NPN starts conducting and Fan turns on.

Simulation Results

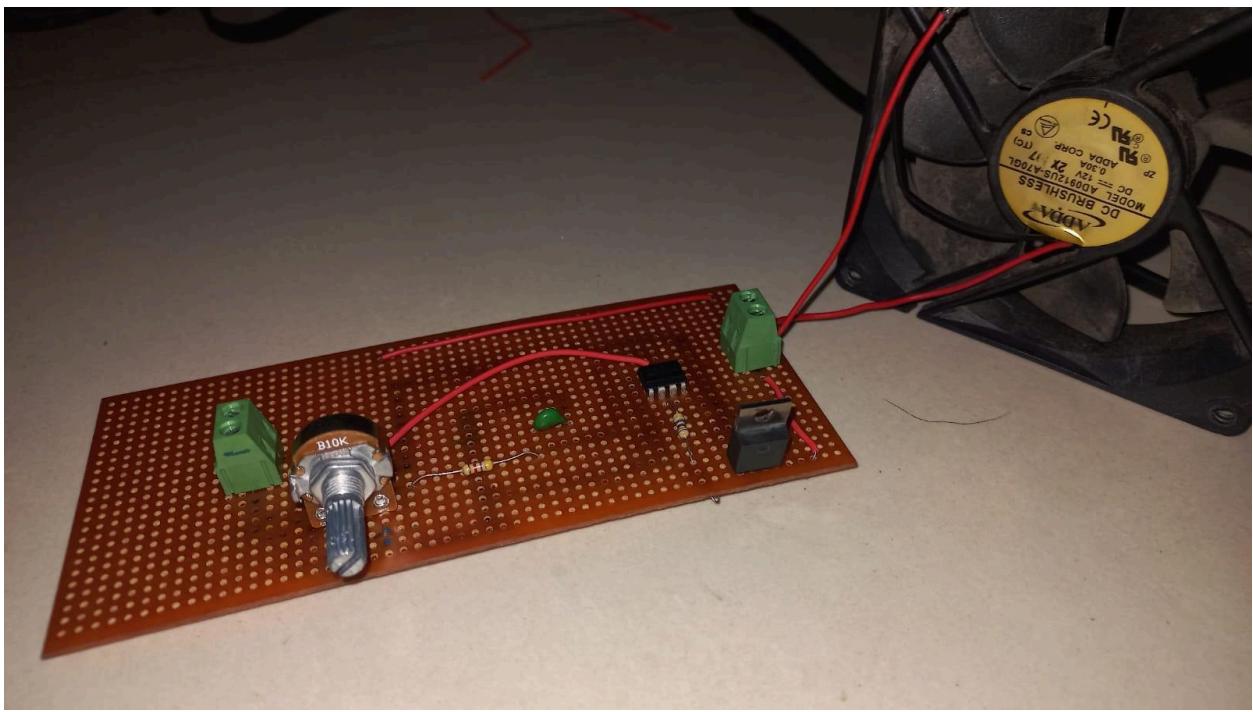
Fan is off

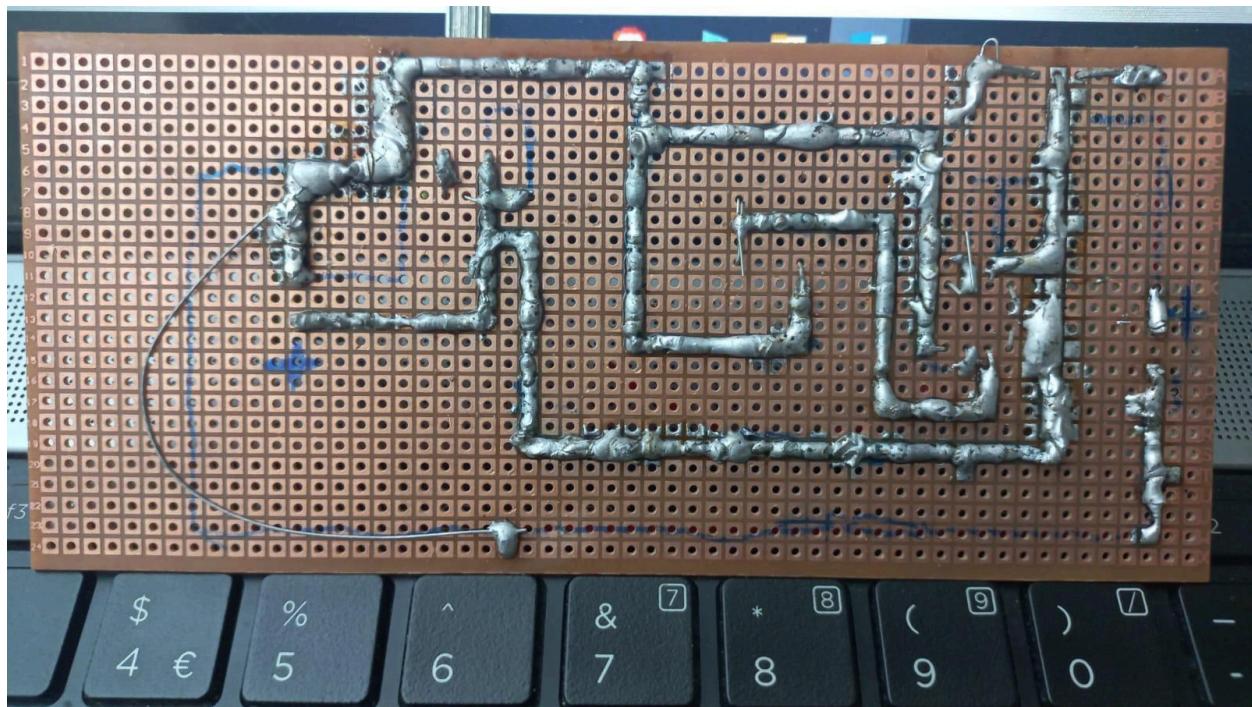


Fan is on

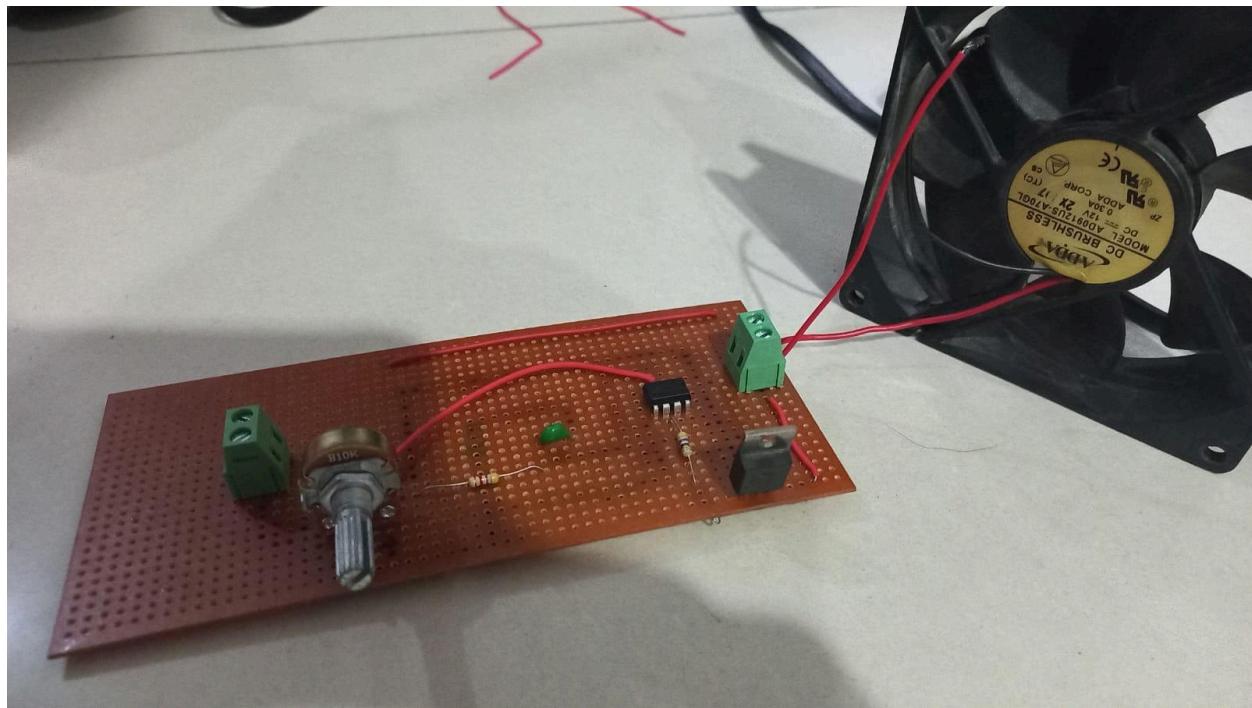


Hardware Implementation





Results



The circuit is working properly, at and below set temperature the fan stays off but as temperature increases the fan starts working.