Temperature Controlled DC Fan Circuit

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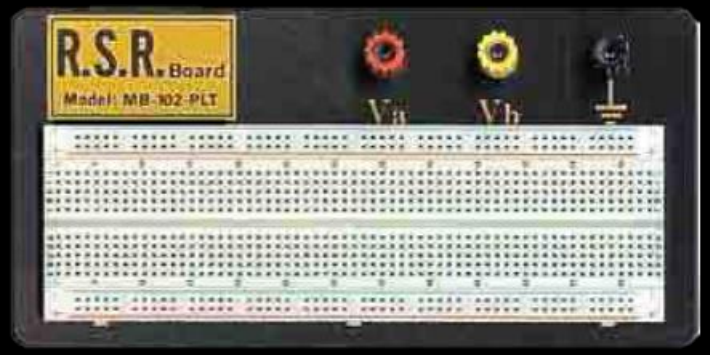
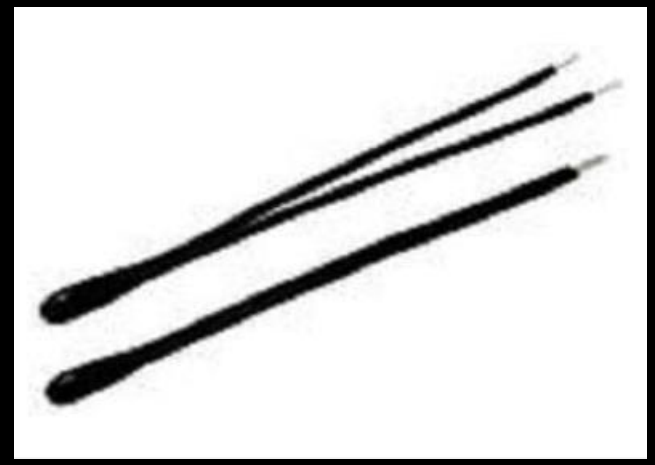
Objective

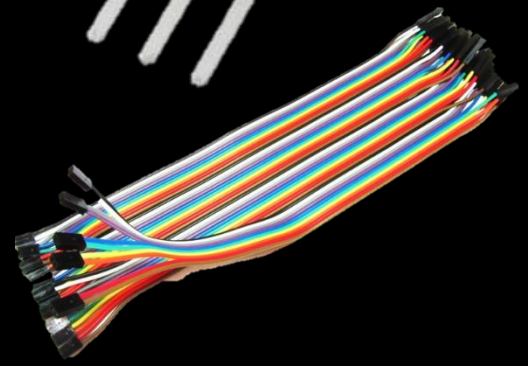
- To create an automatic circuit that will turn on a DC fan and a LED when the temperature exceeds the internal limit of a thermistor and it stops when the temperature gets back to normal.

Parts Used

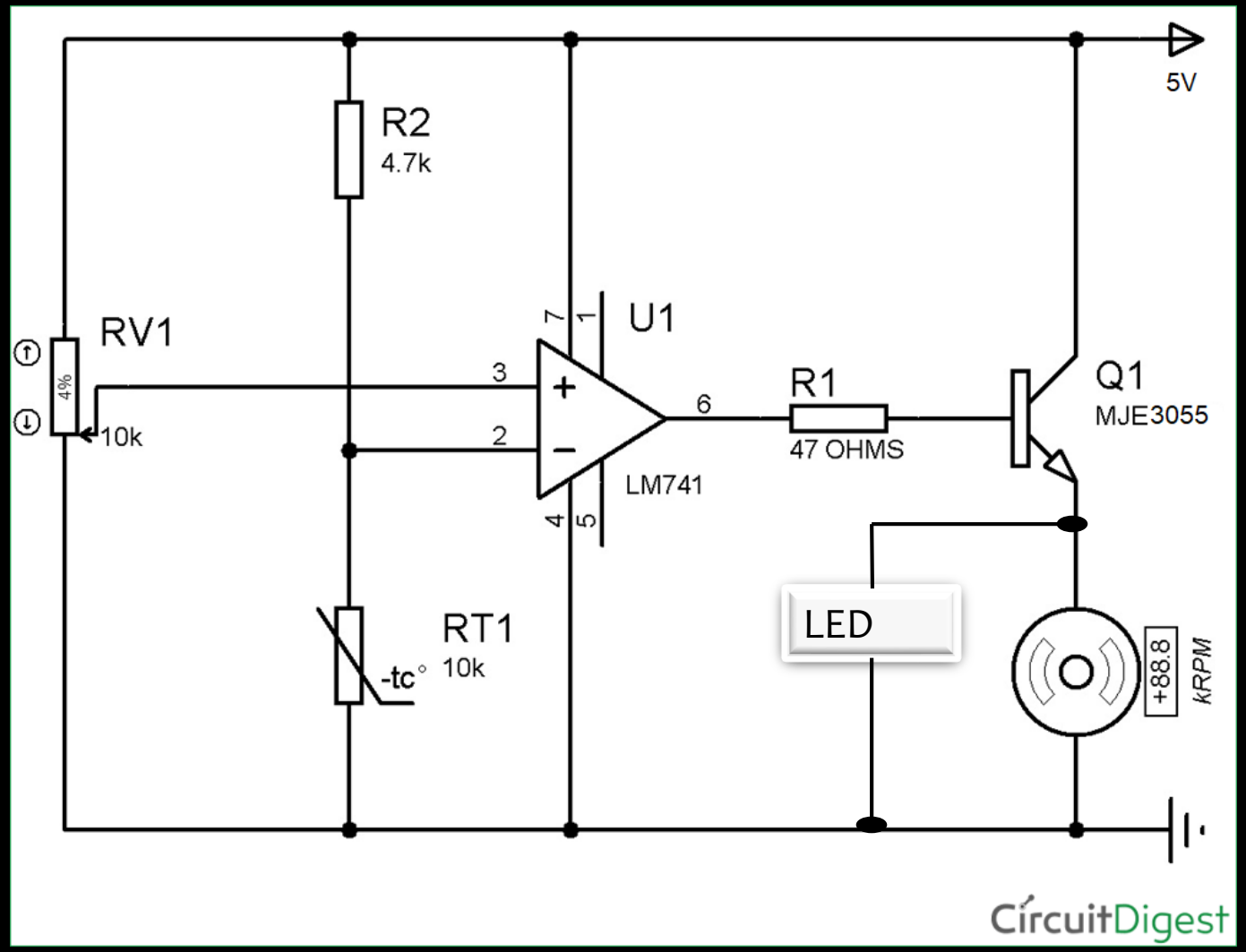
- Solderless Breadboard
- Wires
- 10k Ω Potentiometer
- 4.7k Ω and 47 Ω Resistors
- DC Fan (5VDC)
- 10k Ω NTC Thermistor
- NPN BJT MJE3055TTU
- OP-AMP LM741
- PIC16f1829 (for power)
- Lighter (for demo)
- LED



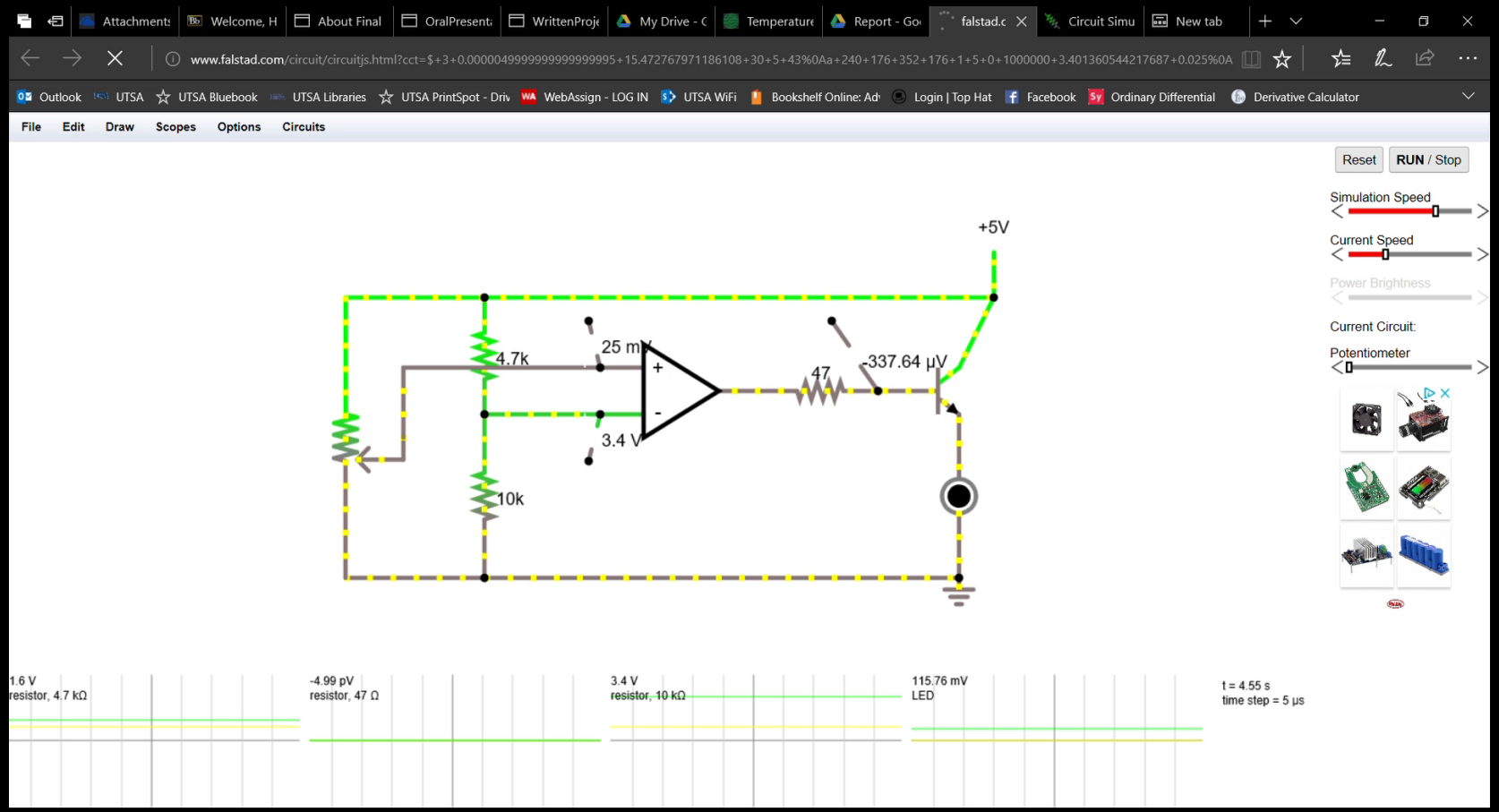




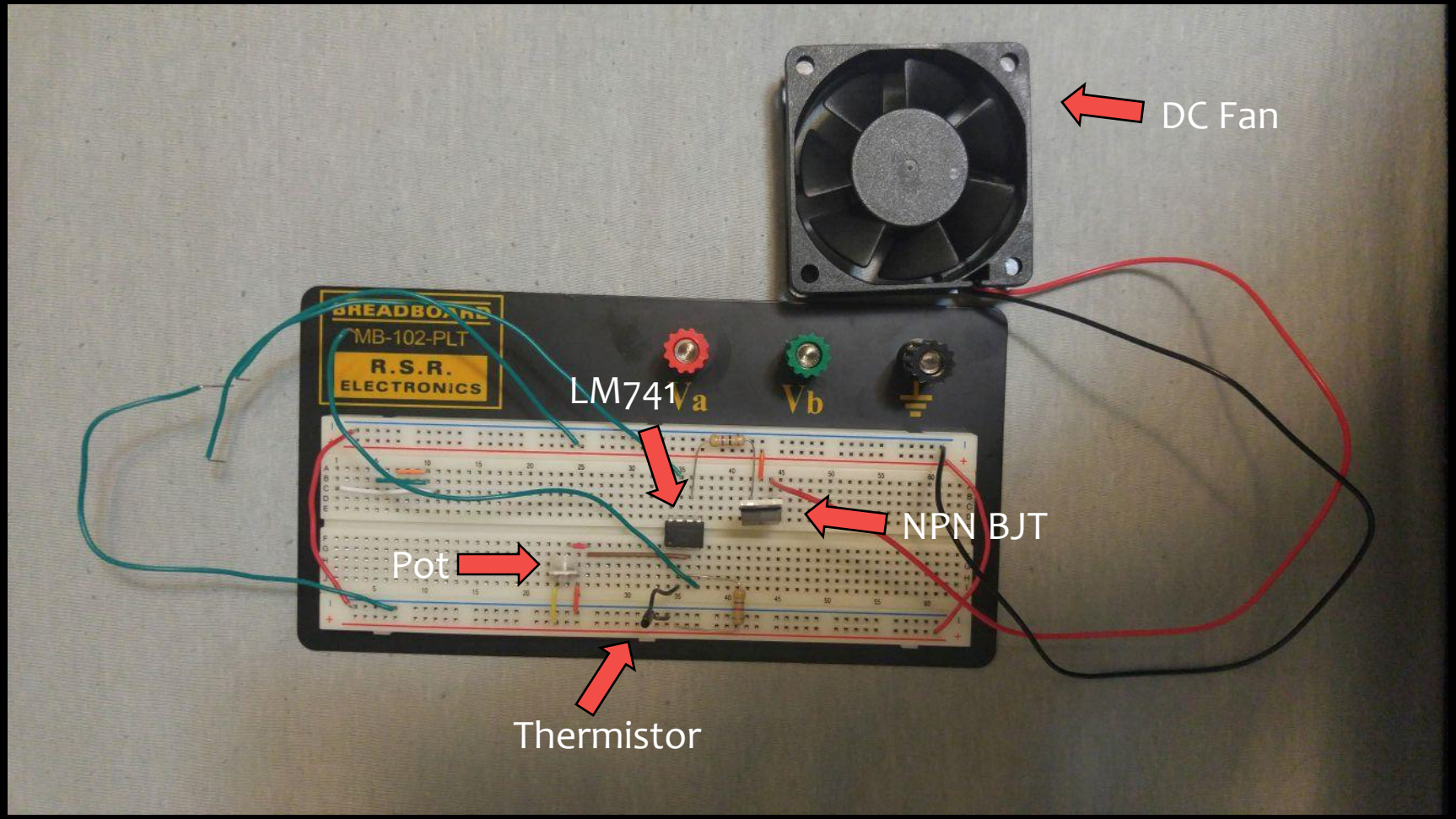
Circuit Diagram



Simulation & How does it work?



Final Circuit



Challenges & Highlights

What was easy?

- Getting the appropriate parts for the circuit online and examining datasheets.
- Allocating time to meet up.
- Learning how thermistors work.

What was hard?

- Surprisingly, grounding the circuit. The ground pin from the board wasn't working, switched to Vss from microcontroller.
- Giving a 5 volts supply to the DC fan.

Line Number	Mouser Part Number Customer Part Number Manufacturer Part Number Description	Estimated Shipment Date(s)	Quantity	Unit Price (USD)	Extended Price (USD)
1	NTCLE413E2103H400 NTCLE413E2103H400 10kohms 3%	NOV 29, 2017	3	0.980	2.94
2	562-FAD1-06020CSHW11 FAD1-06020CSHW11 DC FAN 60x20mm	NOV 29, 2017	1	2.150	2.15
3	926-LM741CN/NOPB LM741CN/NOPB Op-Amp	NOV 29, 2017	3	0.730	2.19
4	512-MJE3055TTU MJE3055TTU NPN Sil Transistor	NOV 29, 2017	3	0.670	2.01
5	562-FAD1-06020BSHW11 FAD1-06020BSHW11 DC FAN 60x20mm	NOV 29, 2017	1	2.150	2.15
	1 RoHS: Compliant				
Shipping Notes			Merchandise Total (USD)		$11.44
			Shipping		$4.99
			8.25% Estimated Tax		$0.94

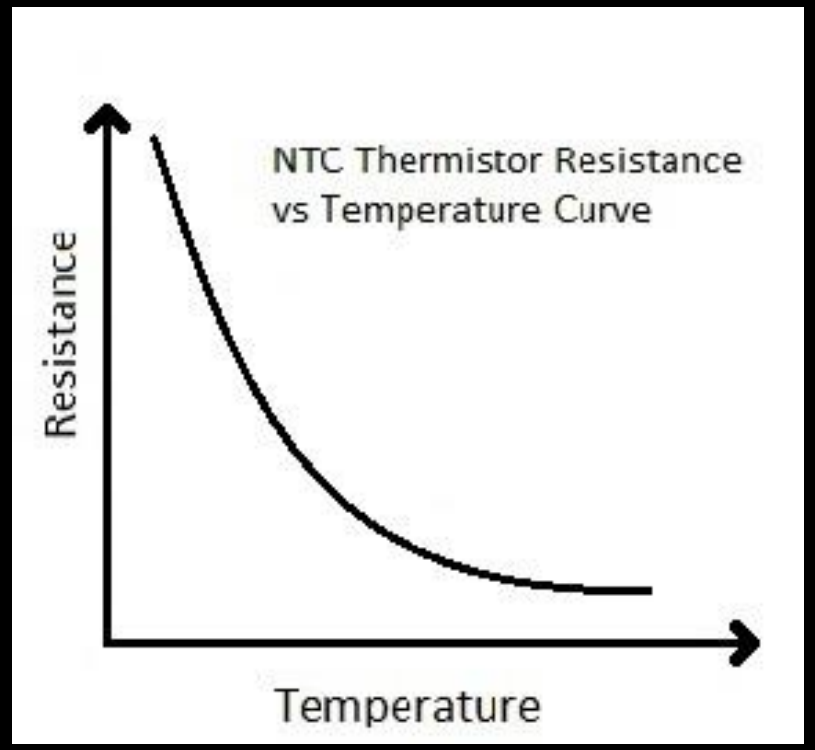
Costs

- Shipping was almost a third of the total.
- Purchased in groups of three in case parts came In defective or we burned them.

Lessons Learned

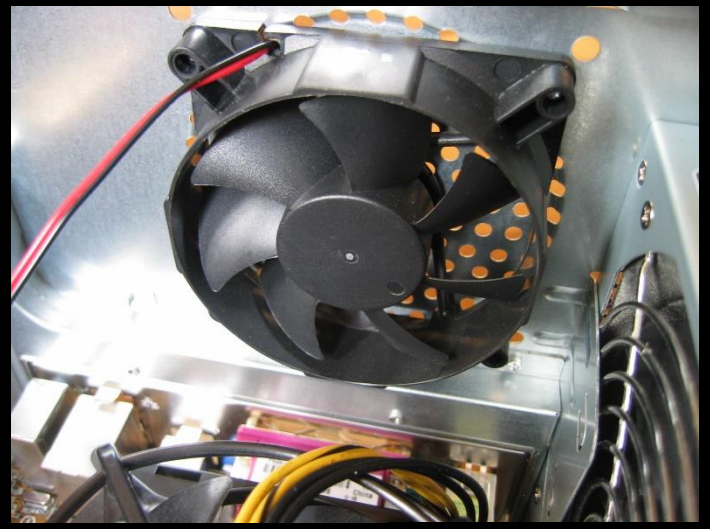
How NTC thermistors work:

- As seen from the graph, as temperature increases, the resistance decreases for NTC thermistors.
- NTC stands for “Negative Temperature Coefficient”.



Applications

- Internal fans for PCs, gaming consoles, and laptops.
- According to Circuit Digest, this is the same circuit used for cooling car engines.
- Graphic Cards



References and Photos

Kathri, P. (n.d.). Temperature Controlled DC Fan using Thermistor. Retrieved December 04, 2017, from https://circuitdigest.com/electronic-circuits/temperature-controlled-dc-fan-using-thermistor

Photos: Google Pictures


Questions & Demo