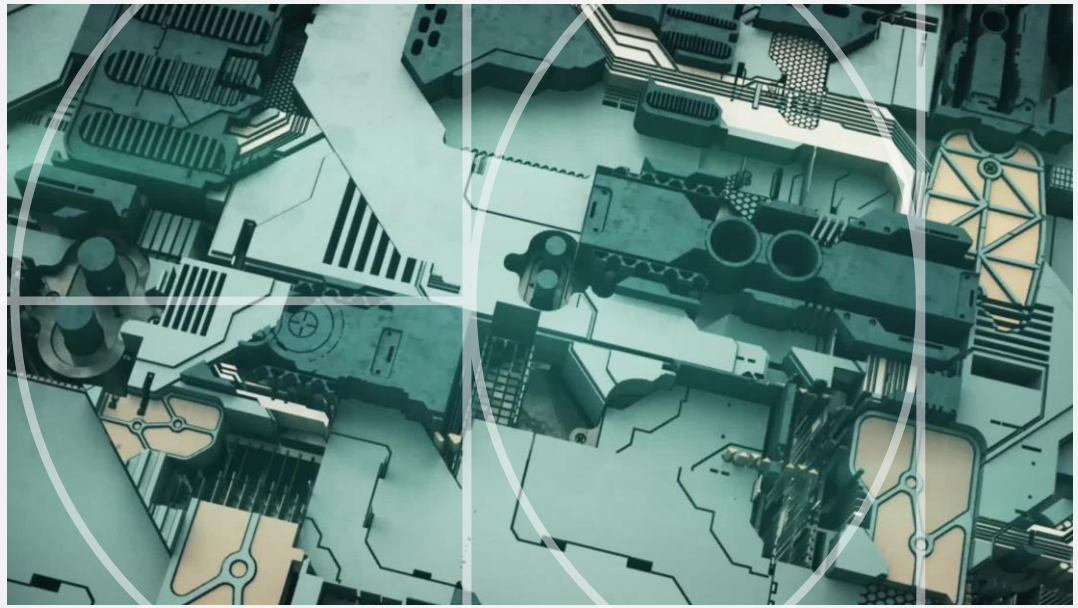
Digital logic and circuits Lab

[Section - C]

Group - 2

PROJECT TITLE

Implementation Of Fire Alarm System



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Abstract

Abstract

- The purpose of the project is to construct a circuit that can detect heat and trigger a periodic alarm when the heat reaches a certain temperature. The properties of 555 timer and thermistor was used to construct the circuit. The heat detection can alarm before the entire system catches fire or the rare and costly electronic components gets damaged beyond repair so that the damage due to overheat remains none to minimal.

Introduction

Introduction

While running, in a machine, many electrical and mechanical components get heated

Overheat can damage electrical or mechanical components beyond repair

Overheat can start fire

Heat detector circuit can alarm when the heat reaches a certain temperature

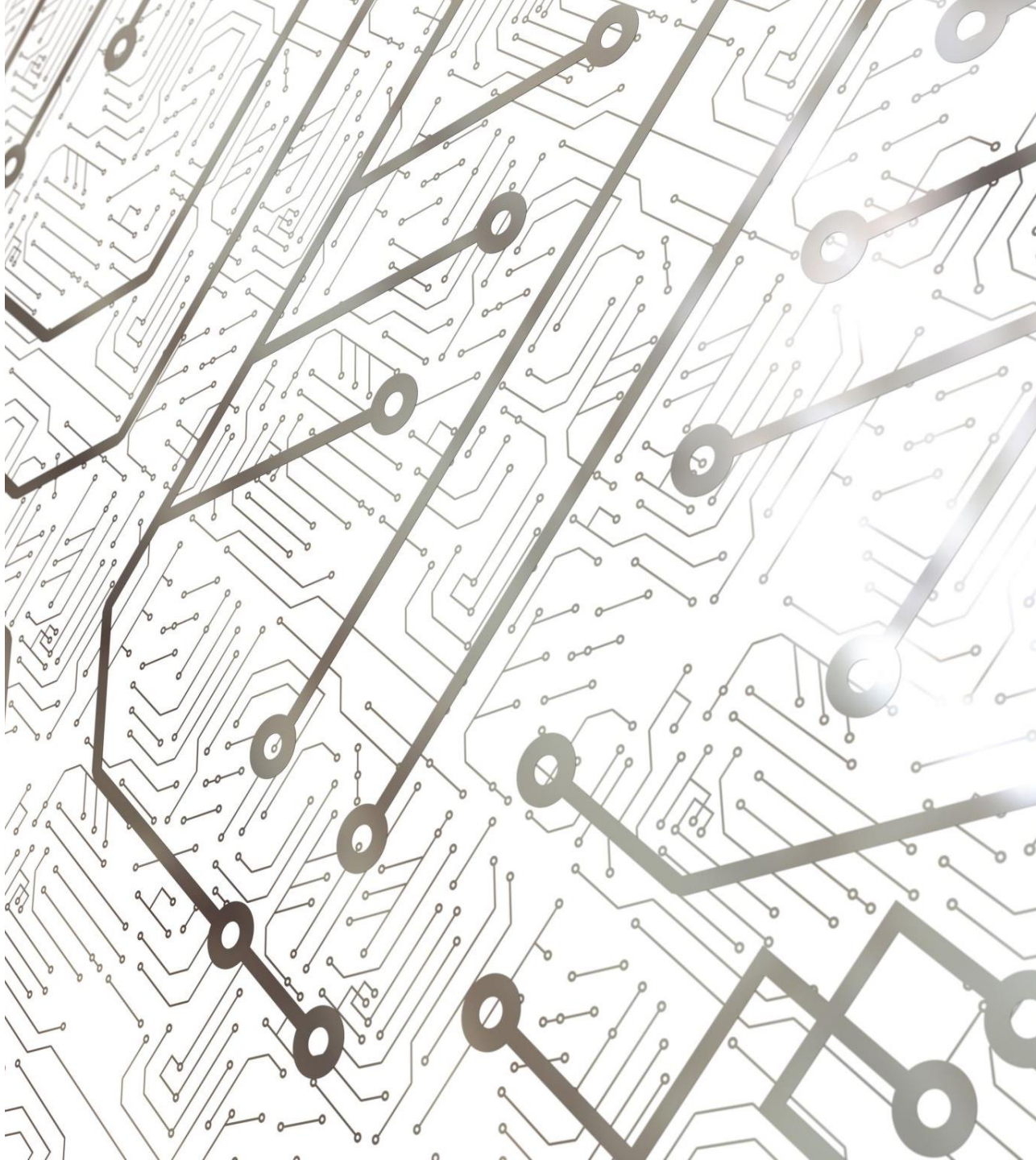
It can prevent damage and massive fire

Equipments

The Equipments-

Component Name	Quantity
Resistor 10KΩ	3
Resistor 15KΩ	1
Resistor 1KΩ	1
Resistor 100KΩ	1
IC NE555P	1
Capacitor 10µF	1
Capacitor 0.1µF	1
Thermistor 10KΩ	1
DC Power Supply (9V)	1
Connecting Wires	-
Breadboard	-

Circuit diagram



Circuit diagram

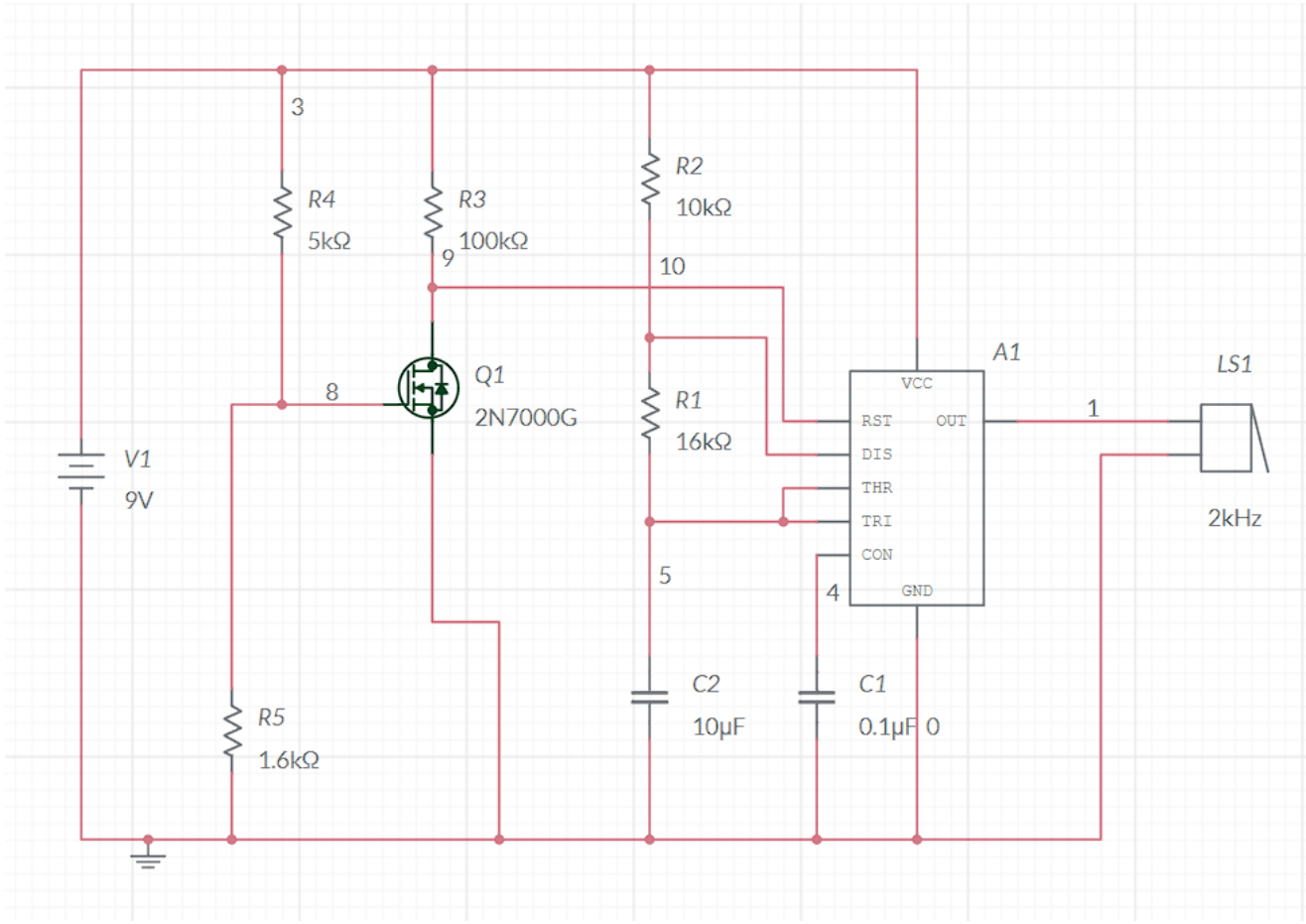


Figure: Heat and Fire Detection circuit using thermistor and 555 timer

Hardware Implementation

Hardware Implementation

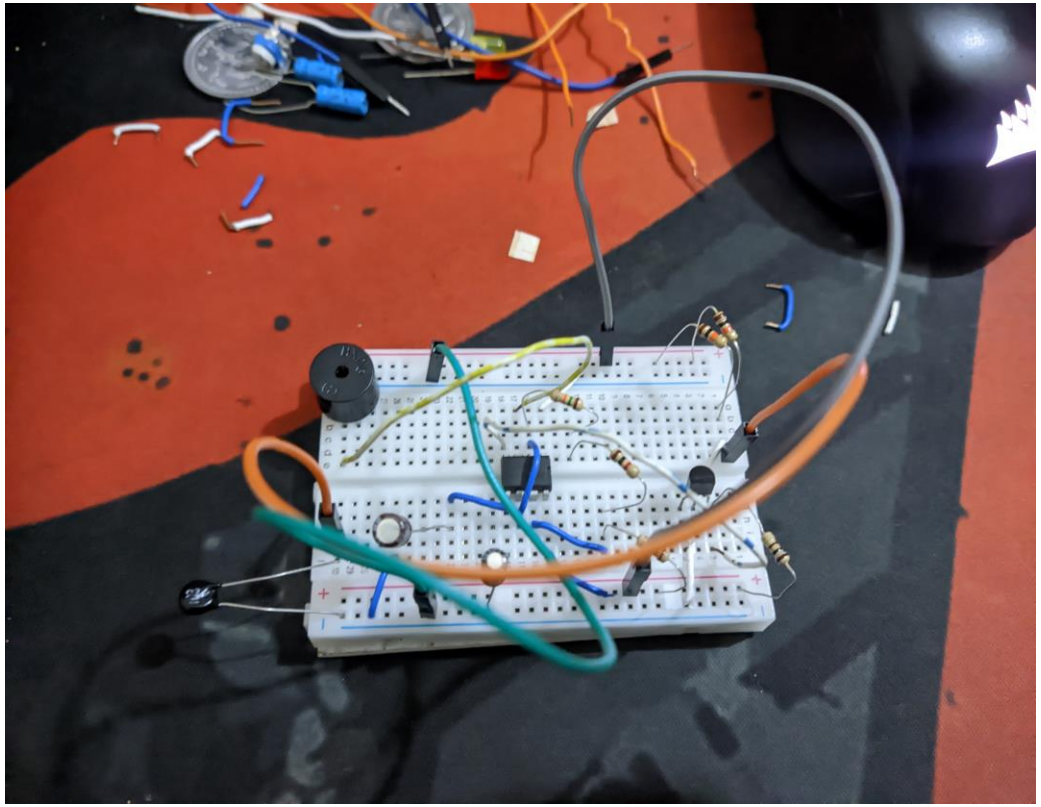


Fig: Top View

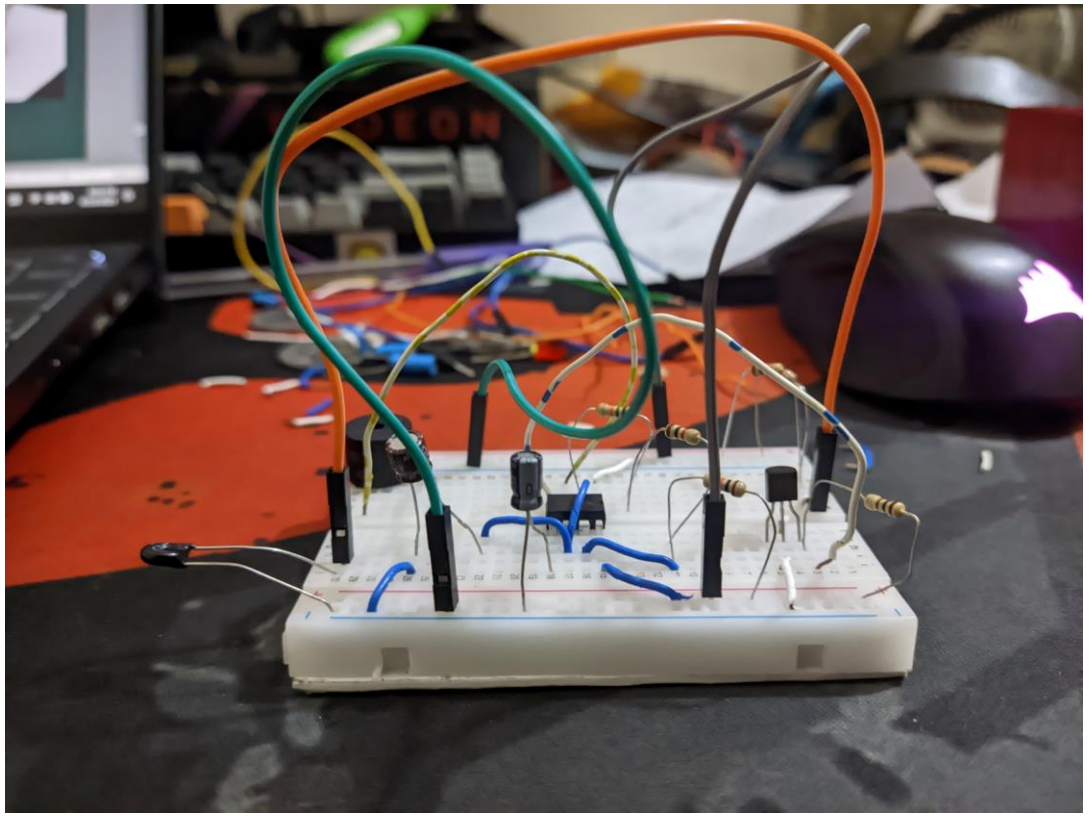
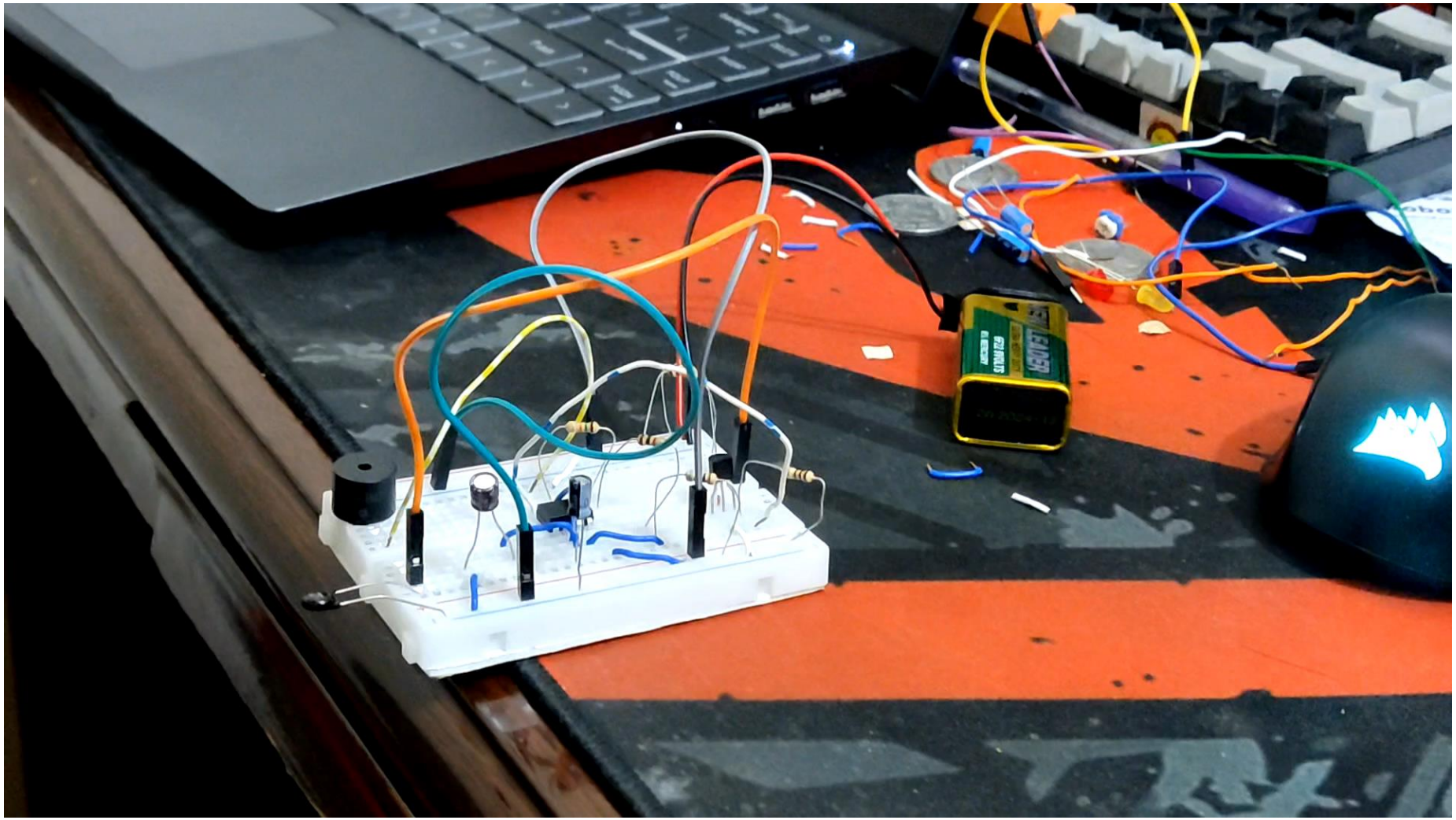


Fig: Front View

Hardware Implementation(Video)



Simulation

Simulation

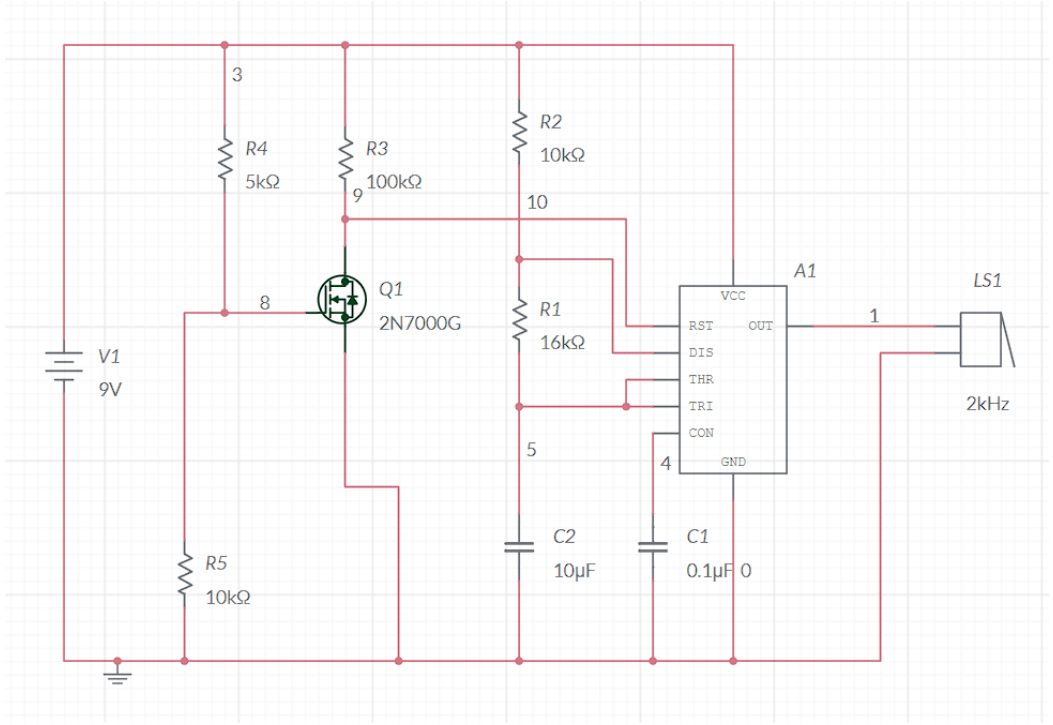


Fig: Thermistor at room temperature(25˚C) and Buzzer inactive

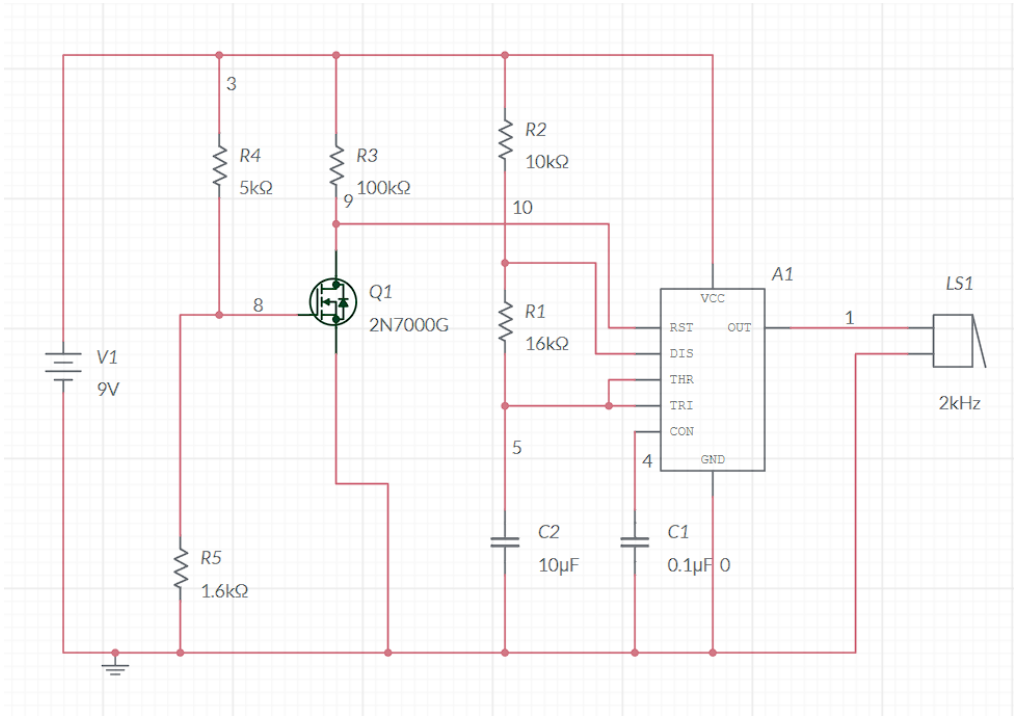
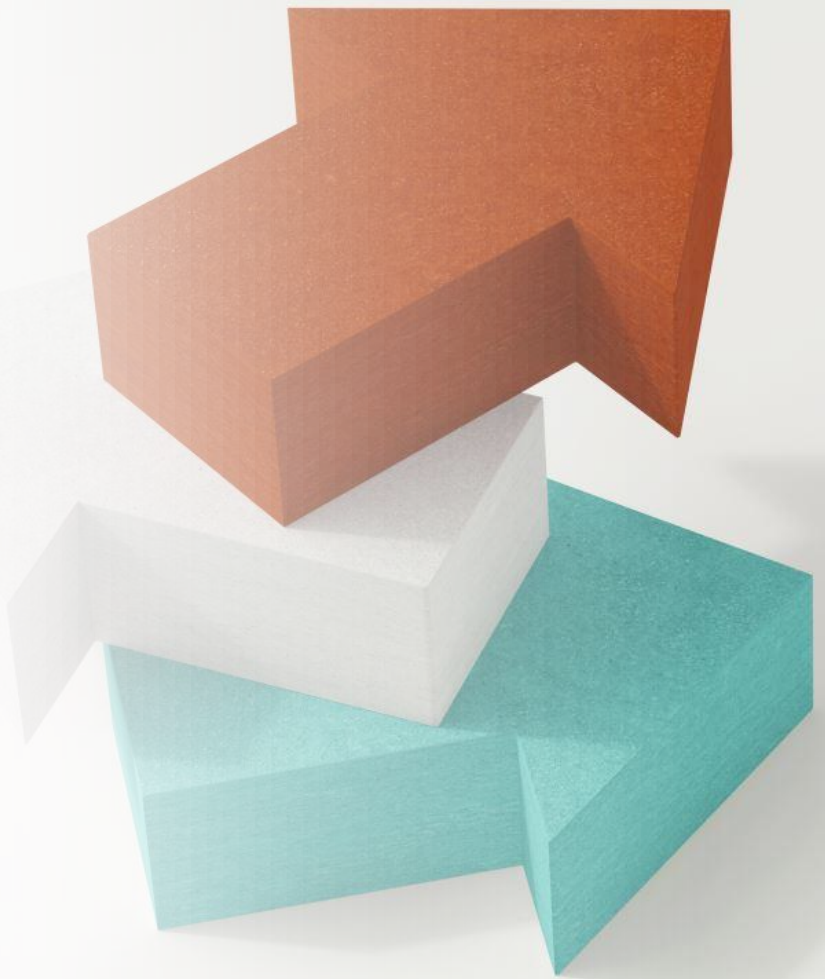


Fig: Thermistor Heated(70˚C-75˚C) and buzzer active

Working Principle



Working Principle

- Astable Multivibrator that would make the buzzer buzz periodically
- Reset receives input 0 the IC remains inactive

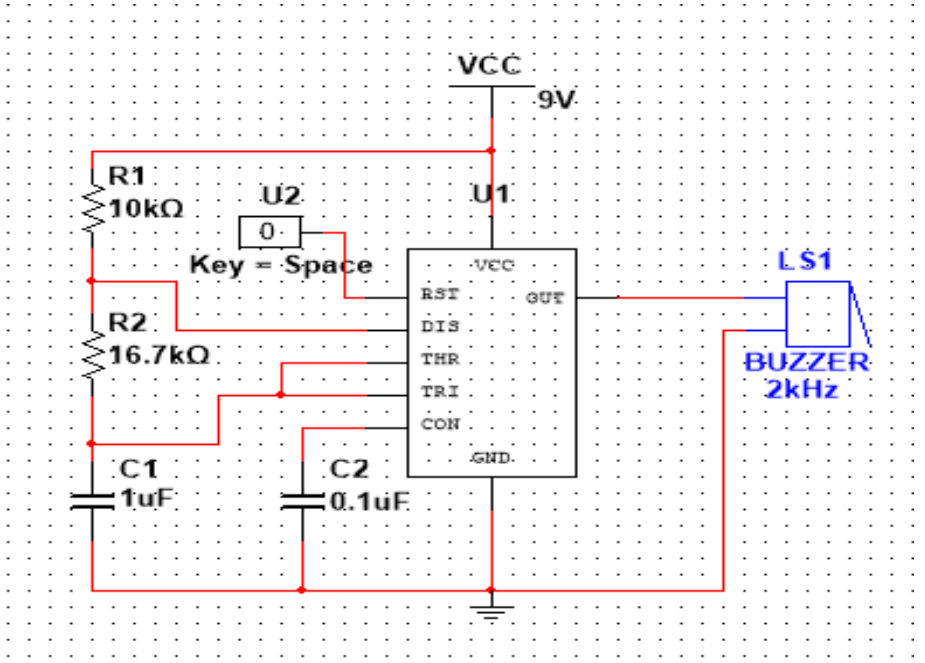


Fig: Astable Multivibrator

Working Principle(Cont.)

- Astable Multivibrator that would make the buzzer buzz periodically
- Reset receives input 1 the IC gets activated
- Property: IC active/inactive based on Reset input

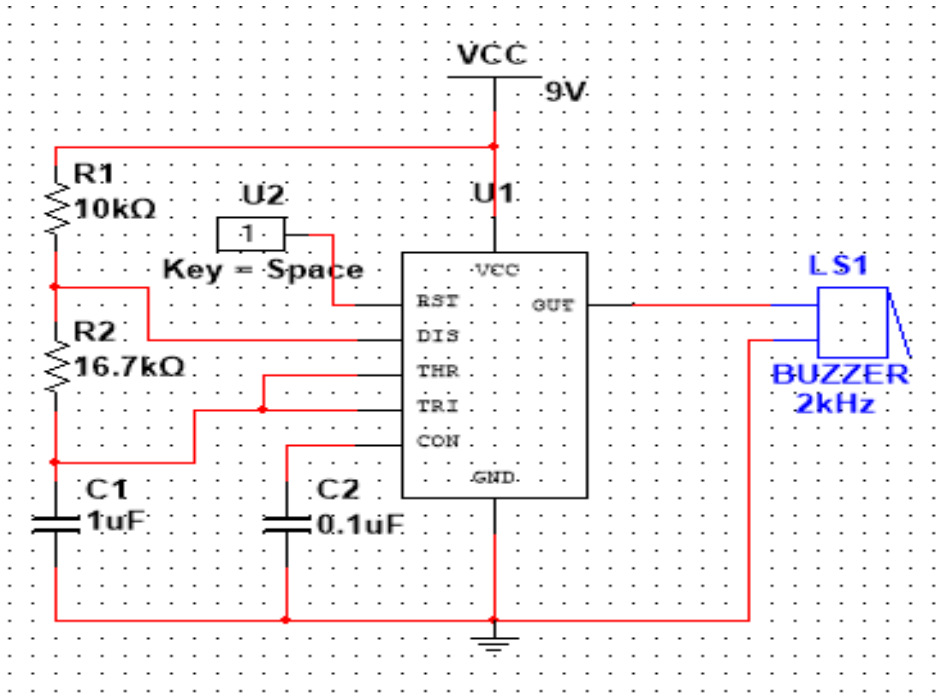


Fig: Astable Multivibrator

Working Principle(Cont.)

- Heat Detection Property
- Thermistor (NTC MF-52 100KΩ)
- Property: Temperature increase causes its resistance to decrease

R25 / B / T(℃) / Rt	10 KΩ
	3950
-30	181.70
-25	133.30
-20	98.88
-15	74.10
-10	56.06
-5	42.80
0	98.96
5	25.58
10	20.00
15	15.76
20	12.51
25	10.00
30	8.048
35	6.518
40	5.312
45	4.354
50	3.588
55	2.974
60	2.476
65	2.072
70	1.743
75	1.473
80	1.250
85	1.065
90	0.911
95	0.7824
100	0.6744
105	0.5836
110	0.5066

Specification Chart for NTC MF-52 100KΩ

Working Principle(Cont.)

- NMOS Inverter with Resistive Load

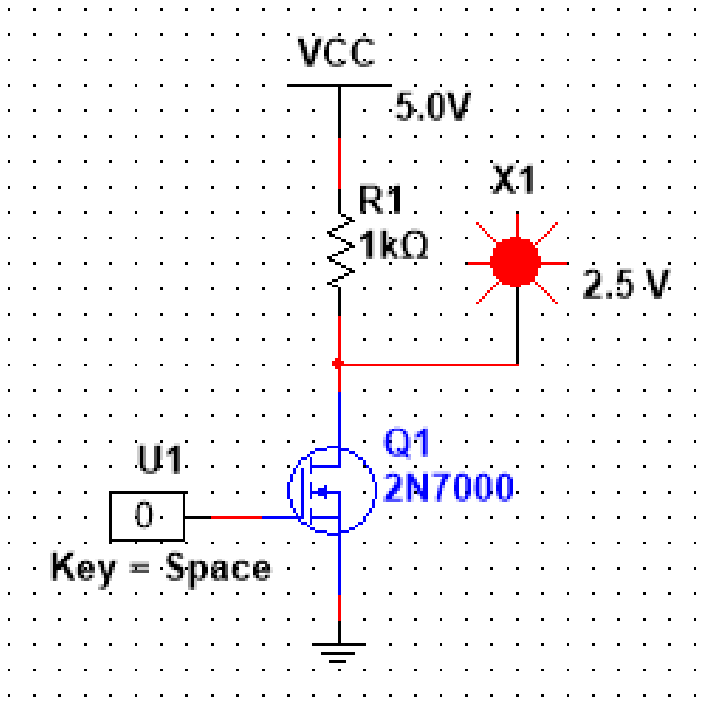


Fig: Inverter input = 1, Output = 0

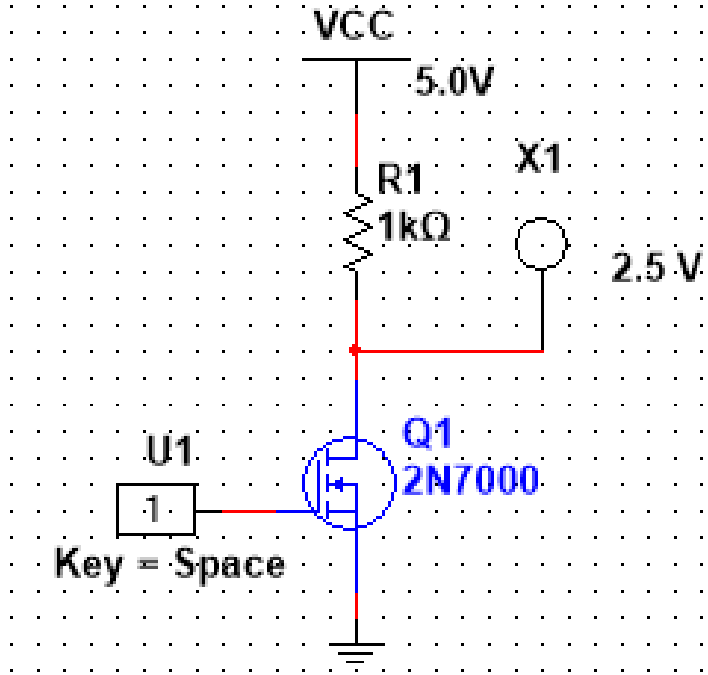


Fig: Inverter input = 0, Output = 1

Working Principle(Cont.)

Inverter Circuit

Periodic Buzzer Circuit

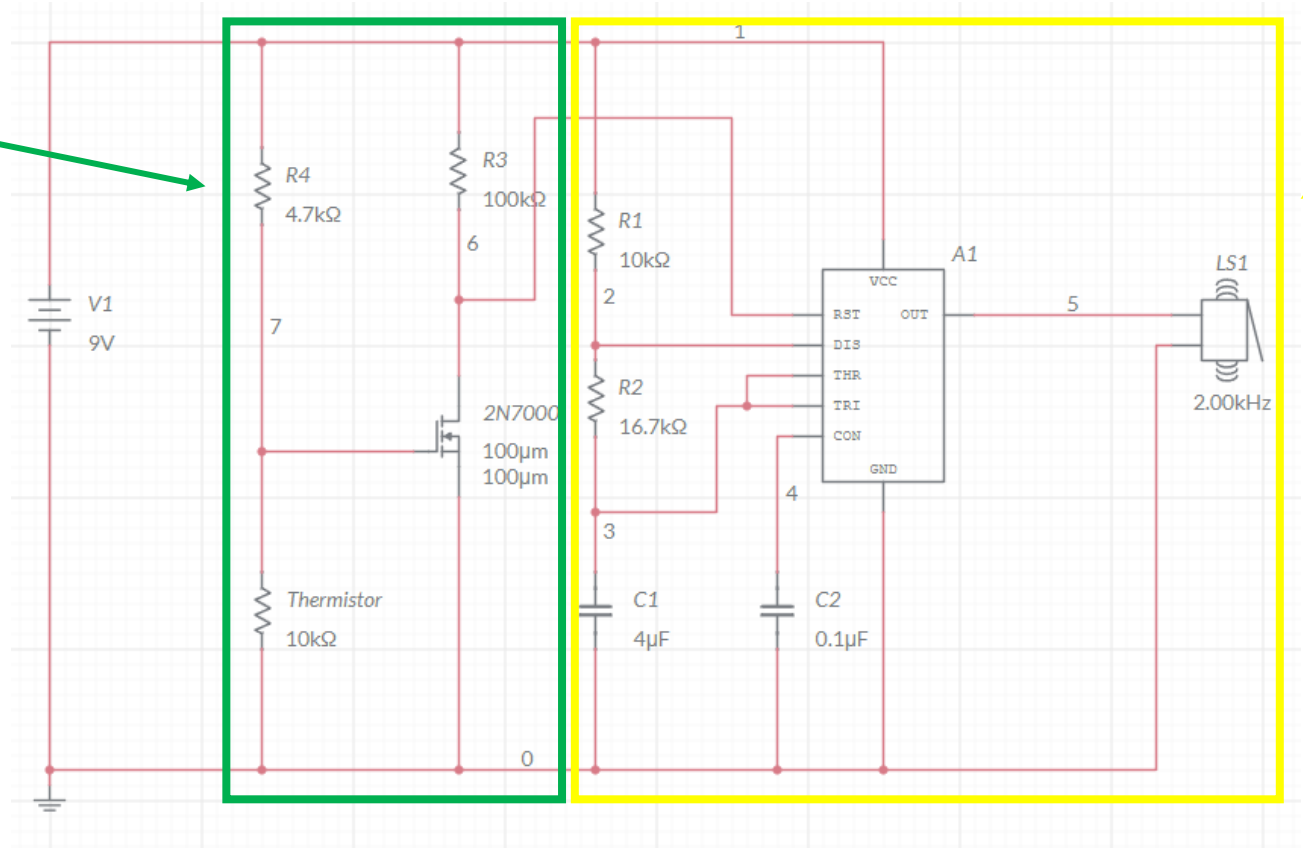
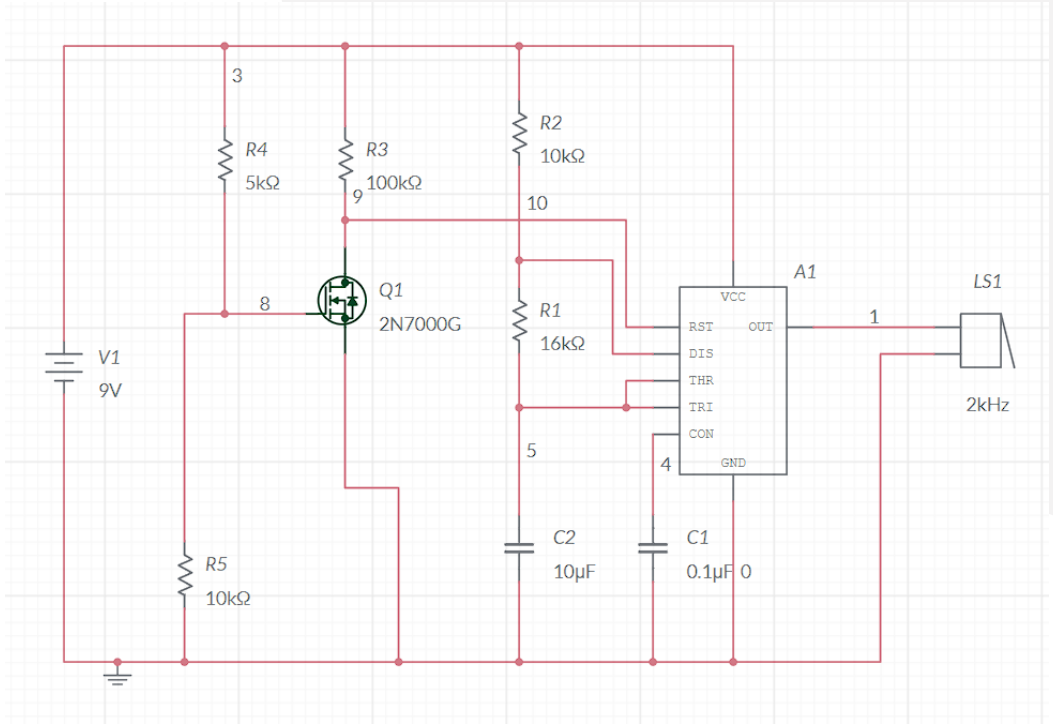


Fig: Final Circuit

WORKING PRINCIPLE



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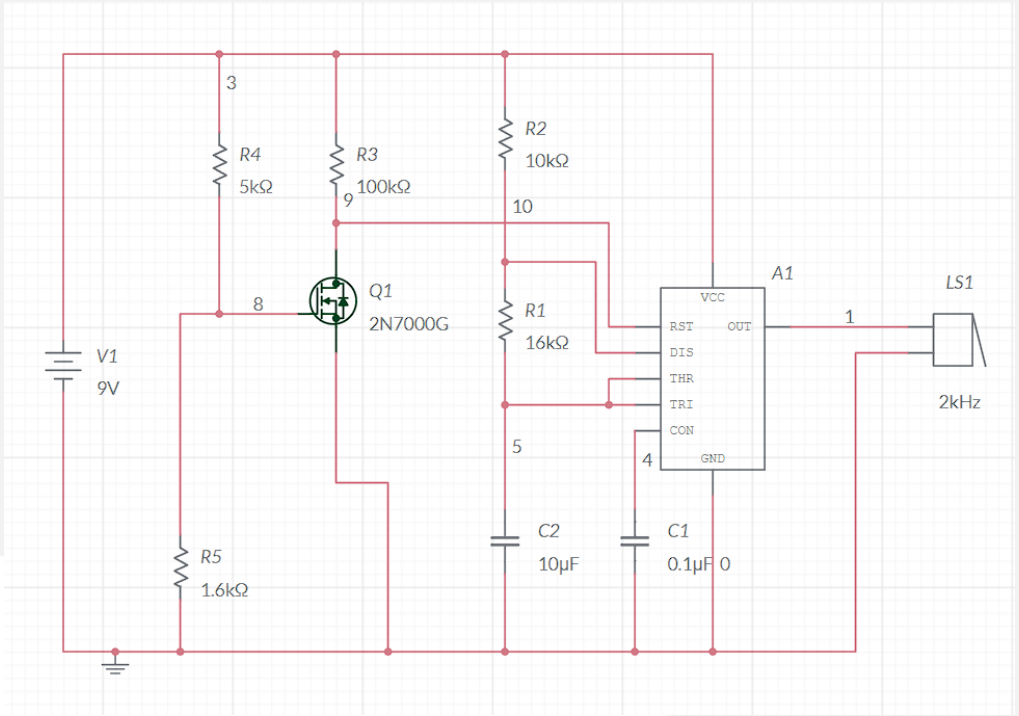


Fig: Thermistor Heated(70˚C-75˚C) and buzzer active

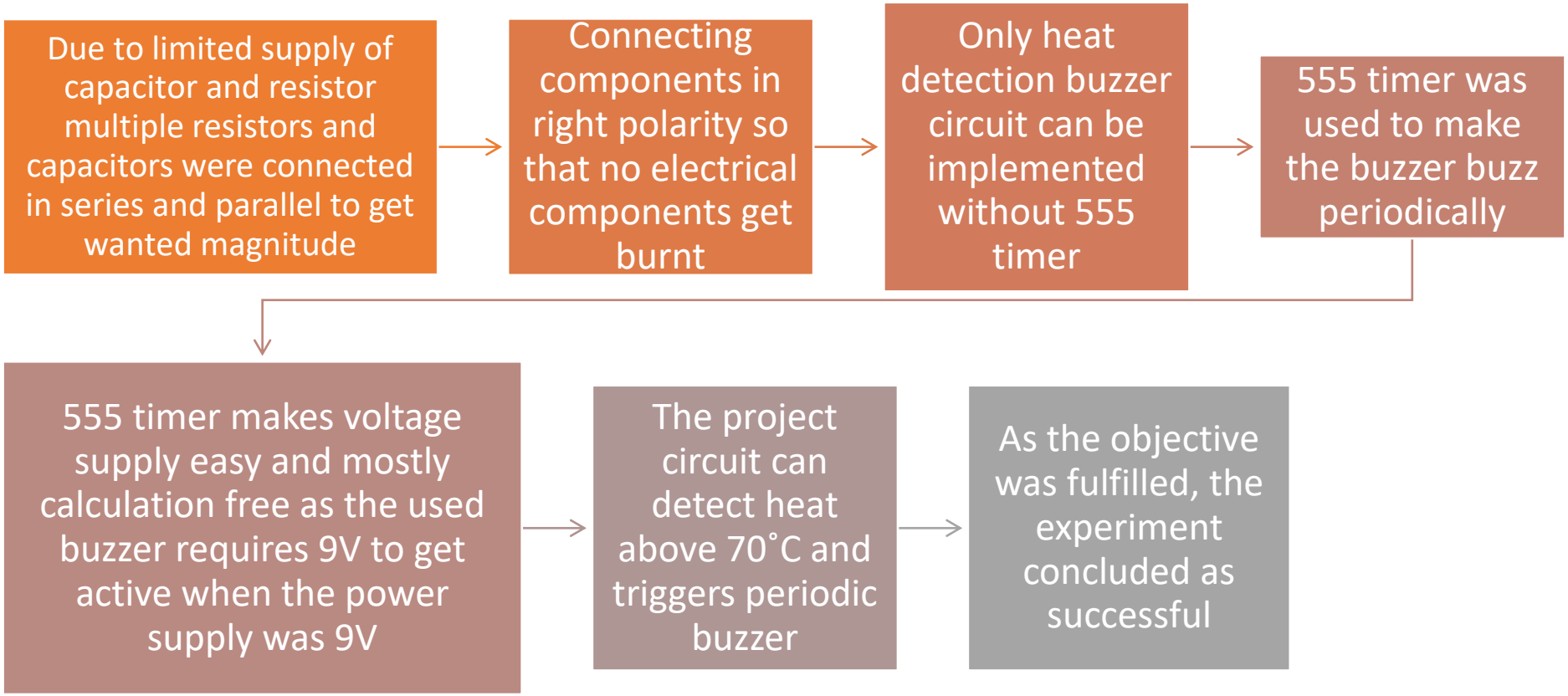
Result

Result

- The designed circuit will alarm when the thermistor gets heated and its temperature reaches 70˚C-75˚C
- The buzzer will not get triggered if the temperature of the thermistor is below 70˚C
- The buzzer receives periodic voltage from the 555 timer and buzzes periodically
- Result: The heat detection project circuit triggers periodic buzzer when the wanted temperature gets above 70˚C

Discussion & Conclusion

Discussion & Conclusion



Thank You

Reference

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices And Circuit Theory, 2006, Pearson Prentice Hall.

2. Thomas L. Floyd, Digital Fundamentals, 9th Edition, 2006, Prentice Hall.