ABOUT THE PROJECT

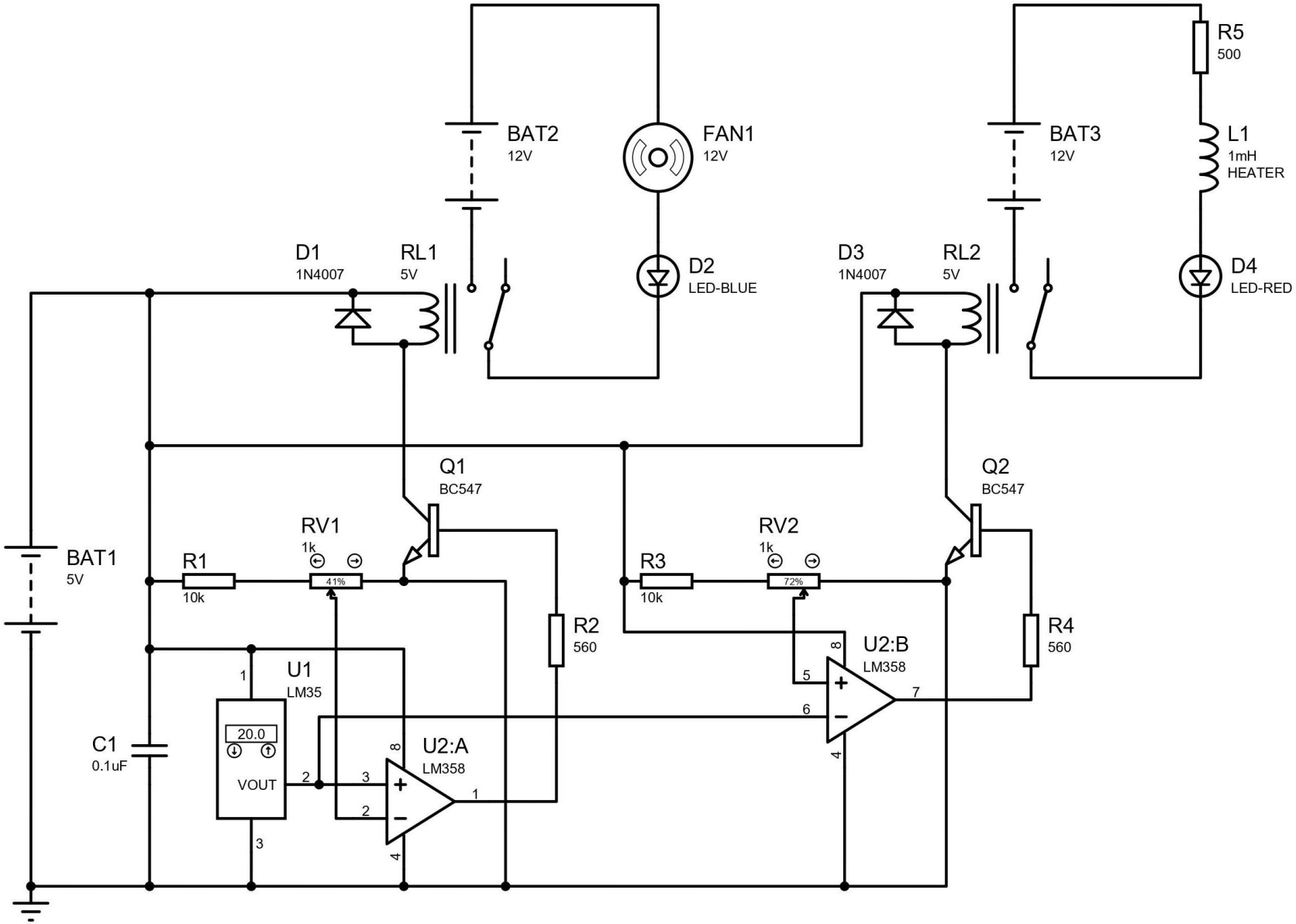
As technology continues to progress, our day to day works become easier. One of the main objective of technological devices is to eliminate the use of manual work in simple everyday activities.
Depending on the weather outside, the temperature in a room is often bound to change. We thought of designing a simple circuit where we'd be able to turn on a heater or cooler automatically at particular threshold voltages.

- PROJECT NAME: AUTOMATIC ROOM TEMPERATURE CONTROLLER
- PROJECT OBJECTIVE: TO MAKE A SIMULATION OF A DEVICE THAT DETECTS THE TEMPERATURE IN A ROOM. THERE IS A LOWER AND UPPER LIMIT. ABOVE A PARTICULAR TEMPERATURE, THE AIR COOLER TURNS ON. BELOW A PARTICULAR TEMPERATURE THE HEATER IS TURNED ON.

COMPONENTS USED

- BATTERY(5,12), SWITCHES
- RELAY AND NPN TRANSISTOR
- LED(RED, BLUE), HEATER, FAN
- OP-AMP(2)
- DIODES, GND, RESISTORS(5),CAPACITOR
- TEMPERATURE SENSOR
- POTENTIOMETER(2)

CIRCUIT DIAGRAM

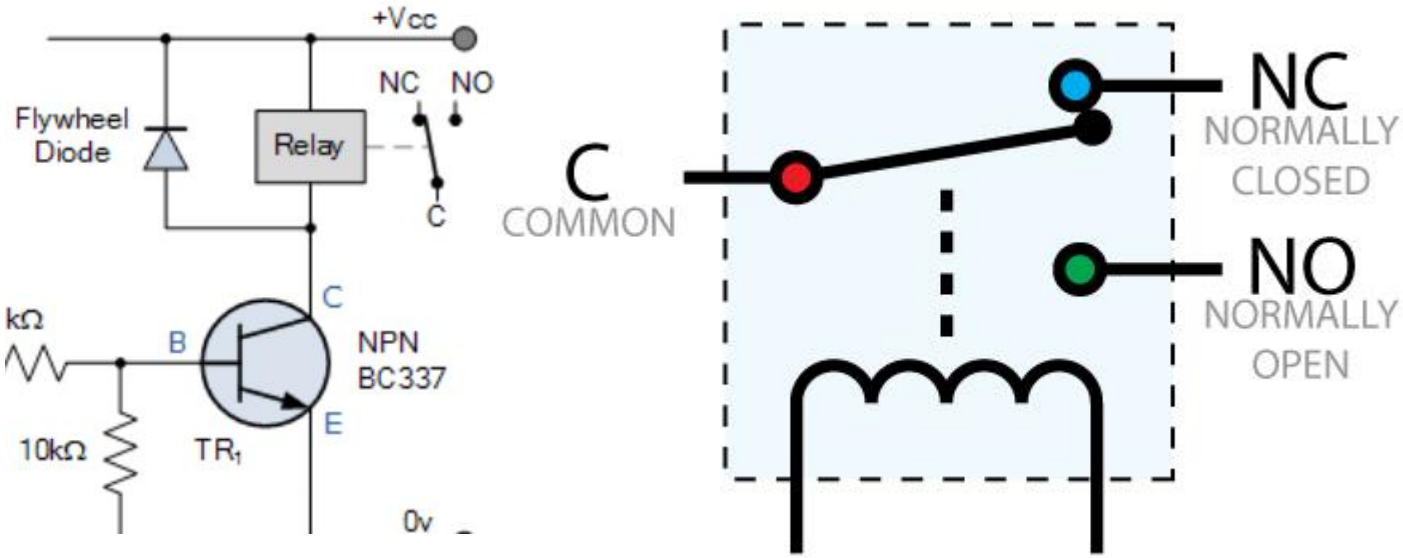


EXPLORING THE USES OF COMPONENTS

- Relay: It basically acts like a switch.
- OP-Amp: There are two op-amps that are used here in the original circuit simulation. One is responsible for the controlling of the higher value response and the other for controlling the lower value response.
- NPN transistors: Two transistors are used over here. The relays support the transistor in the switching effect.
- Resistors and Capacitors are also used.

What is the role of a relay?

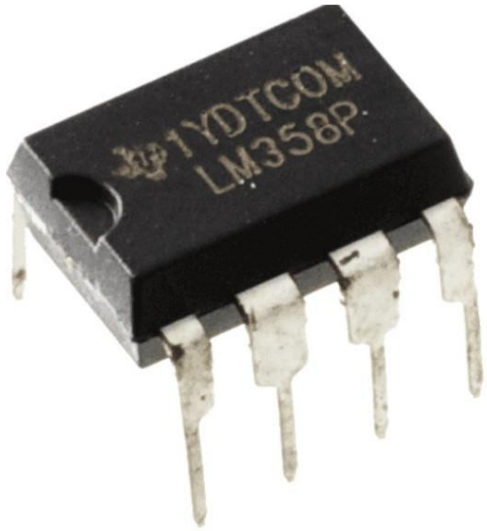
The relay is basically an electromagnetic switch. Here we have used an NPN relay switch circuit.
The relay coil is basically an electromagnet, and the core's magnetic flux plays an important role.
The current through the coil creates a magnetic field which attracts a lever and changes the switch.
When no current flows in the base, no current will flow in the relay coil. When enough current flows in the base, a larger current flows through collector and controls the relay coil current.
The transistor used here is a BC547 transistor.



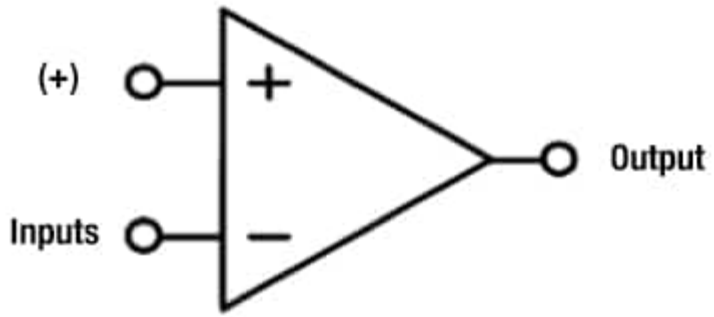
COM- the moving part of the switch
NC- normally closed
NO- normally open

WHAT IS THE ROLE OF AN OP-AMP?

- We have used an LM358 OP-AMP here. It is dual in nature, so it has two inputs and one output.
- While building the circuit, we used two op-amps, and the output from temperature sensor was connected to both the op amps.
- Depending on the temperature given, if the output of the op-amp becomes high, then this makes NPN transistor conduct and activate the relay.
- When voltage at non-inverting input (+) is higher than the voltage at inverting input (-), then the output of comparator is high. And if the voltage of inverting input (-) is Higher than non-inverting end (+), then output is low.

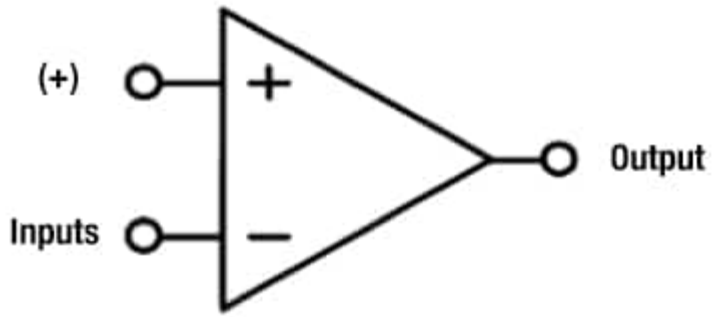


UPPER LIMIT- CONTROLS FAN



The output of the temperature sensor is connected to the non inverting input and the connection from the potentiometer is connected to the inverting input. When the temperature becomes high, the non inverting input becomes greater and the output becomes high.

LOWER LIMIT- CONTROLS HEATER



The output of the temperature sensor is connected to the inverting input and the connection from the potentiometer is connected to the non inverting input. When the temperature becomes low, the input at the inverting part becomes low and the non inverting input becomes relatively greater, thus the output becomes high.

LEARNING OUTCOMES AND SCOPE OF THE PROJECT:

- We learnt the various roles of devices in a circuit and their applications.
- This served as an opportunity to explore various functionalities in Proteus.
- With a few modifications, we can use the same component combinations for heat sensors, alarms and much more.
- The LM35 and LM358 combination can be used to create:

  •HVAC Systems
  •Power Supplies
  •Water Tanks
  •Freezers
  •Battery Management Systems
  •Industrial Applications like Boilers, steamers, chillers etc.

THANK YOU