A Practical activity Report submitted

for Engineering Design Project-II (UTA-024)

by

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Submitted to

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Experiment: 2

Objective:

- To draw a schematic diagram of IR sensor module circuit (required to move Buggy module on a predefined the path) using CAD tool (Eagle).
- To design a printed circuit board layout of IR sensor module circuit using CAD tool (Eagle).

Software Used: Eagle Software

Component Used:

Sr. No	Name of Components	Value	Specifications	Quantity
1.	Resistor	220 Ω	Carbon Resistor with 5% Tolerance	4x
2.	Resistor	10k Ω	Carbon Resistor with 5% Tolerance	2x
3.	Potentiometer	10k Ω		2x
4.	led3mm	5V	Dome Lamp	
5.	IR Transmitter	SFH482		2x
6.	IR Receiver	BPX65	PCB Header	
7.	Operational Amplifier	LM358P	Microcontroller	2x
				2x
				1x

Theory:

1. Resistor : Resistors are tiny electronic components that limit or control the flow of electric current in a circuit. Resistors convert excess electrical energy into heat to ensure circuits work safely and efficiently.

Fig. 1.1 various types of resistors [1]

2. IR Transmitter (BPX65): The BPX65 is an IR transmitter, a device that emits infrared light not visible to the human eye. The BPX65 works by converting electrical signals into IR light, which can then be detected by an IR receiver to perform specific tasks like transmitting data or triggering actions in circuits.

Fig. 1.2 Various types of IR [2]

3. IR Receiver (SFH482): The SFH482 is an IR receiver used to detect infrared light signals, typically emitted by an IR transmitter like the BPX65. The SFH482 converts the incoming infrared light into an electrical signal, which can then be processed by a microcontroller or other electronics to trigger actions or provide input to the system.

Fig. 1.3 Various types of IR [2]

4. Led 3mm: A 3mm LED is a small light-emitting diode with a 3mm diameter. It emits light when current flows through it and is commonly used in indicators, displays, and small electronics due to its compact size and energy efficiency.

Fig. 1.4 Various types of sub miniature standard LED [3]

5. Potentiometer: A potentiometer is a type of variable resistor used to adjust the level of electrical resistance in a circuit. It typically has three terminals: two for connecting to the circuit, and one for adjusting the resistance. By turning the knob or sliding the control, the resistance can be changed, which in turn changes the voltage or current in the circuit. Potentiometers are commonly used in applications like volume controls, dimmer switches, and adjusting sensor sensitivity.

Fig. 1.5 Potentiometer[4]

Operational Amplifier (LM358P): An operational amplifier (op-amp) can act as a voltage comparator by comparing two input voltages and outputting a high or low signal depending on which input is greater. It's widely used in signal processing and control circuits The LM358P is a dual operational amplifier (op-amp) integrated circuit. It contains two independent op-amps that can be used for amplifying low-level signals, voltage comparison, or filtering applications. The LM358P is widely used in audio systems, signal processing, and sensor circuits. It operates with a wide range of voltages and is known for its low power consumption, making it suitable for battery-powered devices and various analog applications.

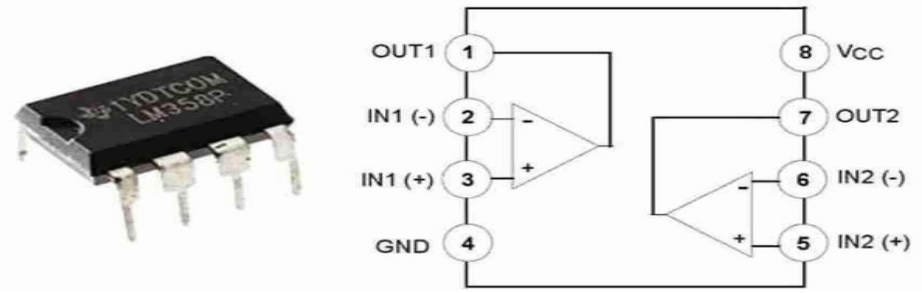


Fig. 1.6 LM358P-Operational amplifier [5]

Schematic diagram:

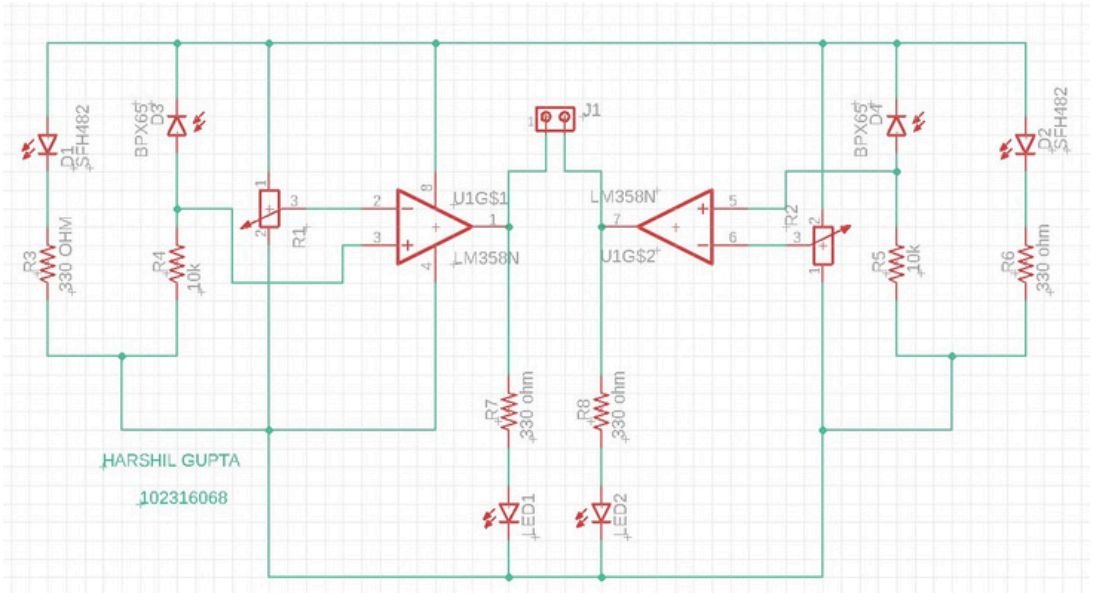


Fig. 1.7 Schematic diagram of IR circuit

Printed Circuit Board layout:

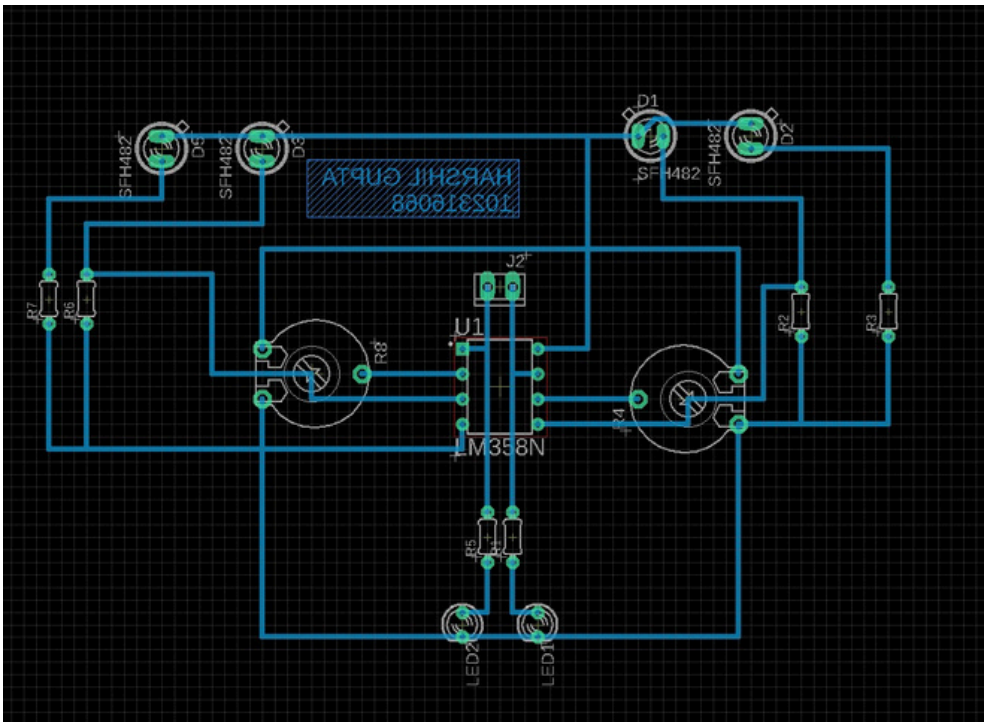
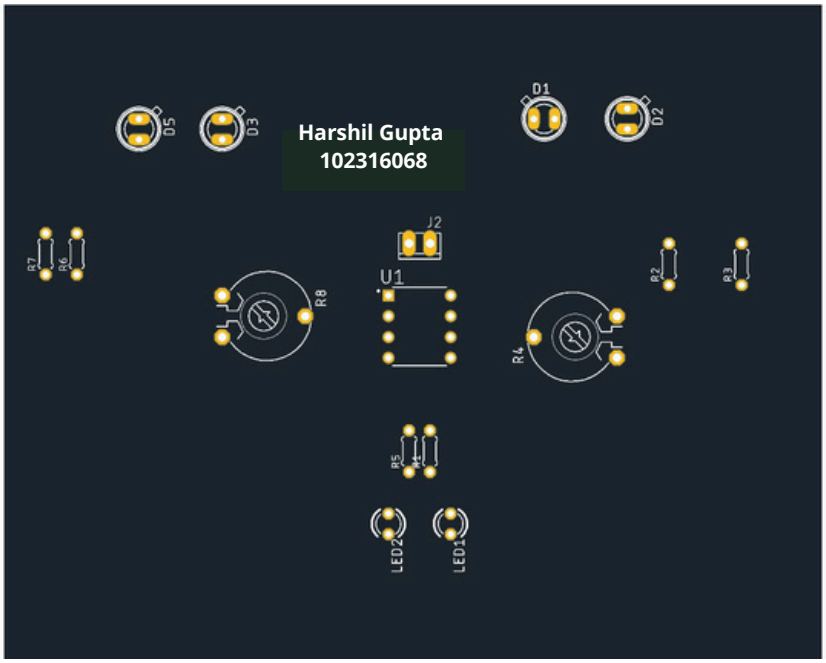
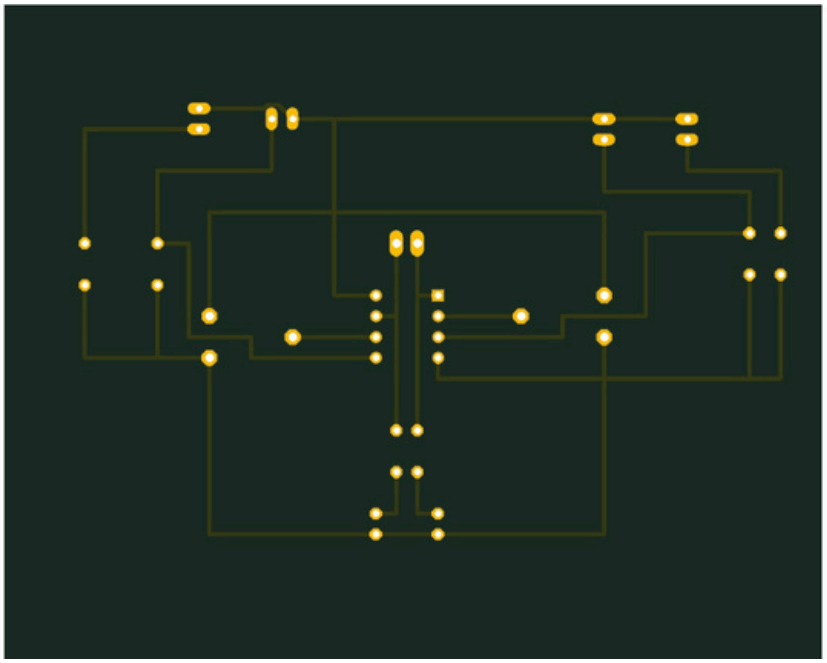


Fig. 1.8 PCB layout of IR circuit





Procedure:

- creation of a schematic diagram
- developing the PCB layout
- ensure accurate connections, and transform the schematic into a working PCB

Reference:

[1] https://www.electricaltechnology.org/2015/01/resistor-types-resistors-fixed-variable- linear-non-linear.html

[2] https://www.allaboutcircuits.com