A Practical activity Report submitted

for Engineering Design Project-II (UTA-024)

by

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Submitted to

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Experiment: 1

Objective:

(a) To draw a schematic diagram of receiver to receive specified pulse width IR signals from gantries using CAD tool (Eagle).

(a) To design a printed circuit board layout of receiver circuit using CAD tool (Eagle).

Software Used: Eagle Software

Component Used:

Sr. No	Name of Components	Value	Specifications
1.	Resistor	120k	Carbon Resistor with 5% Tolerance
2.	Resistor	100k	Carbon Resistor with 5% Tolerance
3.	Resistor	22k	Carbon Resistor with 5% Tolerance
4.	Resistor	1k	Carbon Resistor with 5% Tolerance
5.	Capacitor	100pf	Ceramic Capacitor
6.	LM311N		Voltage Comparator
7.	BPW41N		PIN Diode
8.	22-23-2031		PCB Header

Theory :

1. **Resistor**: Resistors are electronic components that limit or regulate the flow of electrical current in an electronic circuit, commonly made of either a carbon, metal, or metal-oxide film. A thin film of conductive material is wrapped in a helix around and covered by an insulating material. Resistors are passive components, meaning they only consume power. They are usually added to circuits where they complement active components like op-amps, microcontrollers, and other integrated circuits. Commonly resistors are used to limit current, divide voltages, and pull-up I/O lines.

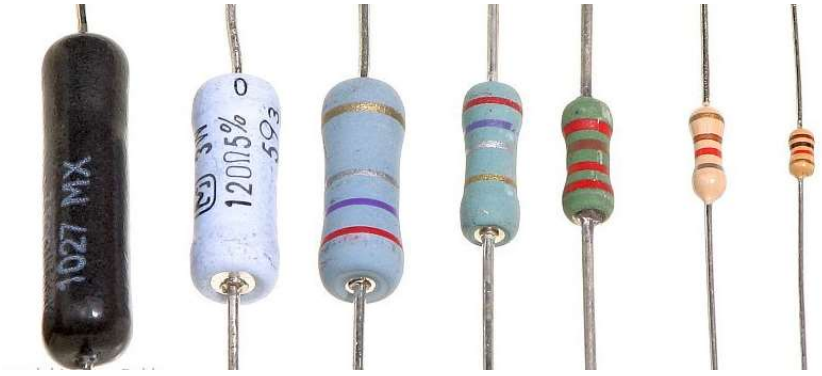

Fig. 1.1 Various types of resistors **[1]**

2. **Capacitor**: The capacitor is a component which has the ability to store energy in the form of electrical charges that creates a potential difference. The most basic design of a capacitor consists of two parallel conductors, separated with a dielectric material. When a voltage source is attached, The metallic plate attached to the positive terminal will be positively charged, and the plate attached to the negative terminal will be negatively charged. They are used for several things such as filters, energy storage systems, engine starters, signal processing devices, etc.

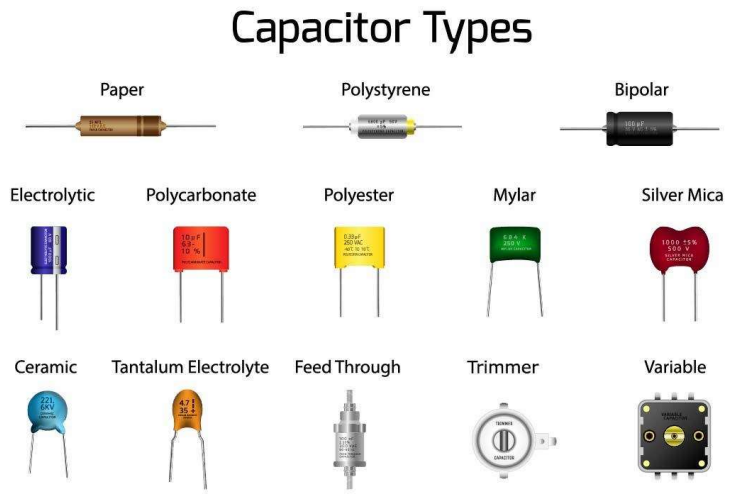

Fig. 1.2 Various types of capacitors **[2]**

3. **LM311N**: LM311N is a Voltage Comparator with a low input current. It is also designed to operate over a wide range of power supply voltage range: standard ±15V operational amplifier power supply is as low as a single. The +5V power supply is used for IC logic. Their output is compatible with RTL-DTL and TTL And MOS circuits, you can switch the voltage Up to +50V when the output current is up to 50mA.

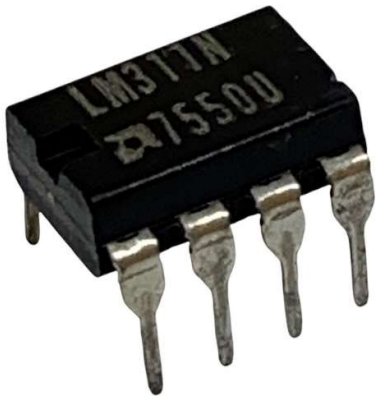

Fig. 1.3 LM311N **[3]**

4. **BPW41N**: This is a PIN Diode with high speed and is highly sensitive in a flat side view plastic package. Its filter bandwidth is matched with 900 nm to 950 nm IR emitters. Suitable applications for the BPW41N include: IR radiation detectors, IR remote control and air data transmission systems.

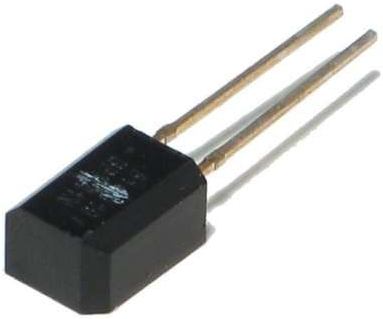

Fig. 1.4 BPW41N**[4]**

5. **22-23-2031**: 22-23-2031 is a 2.54 mm pitch wire to board connectors with pins that are crimped onto the end of each wire. The pins lock inside the housing and the housing fits onto the header. The connector is polarized, meaning it will only fit one way, and has a "locking ramp" which helps stop the connector from disconnecting unexpectedly. This header has 3 pins and fits works with the 3 Pin Housing and 2600 Series Pins.

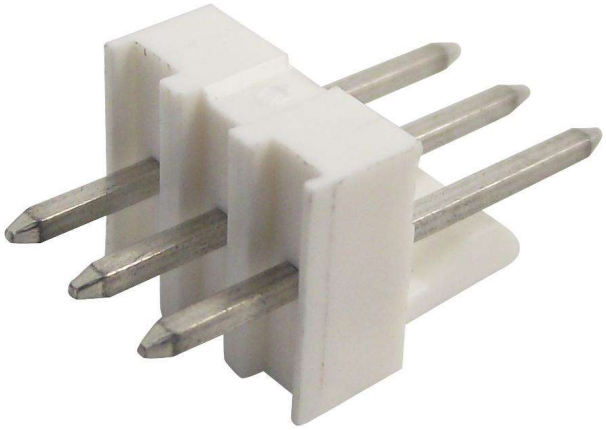

Fig. 1.5 22-23-2031**[5]**

Schematic diagram:

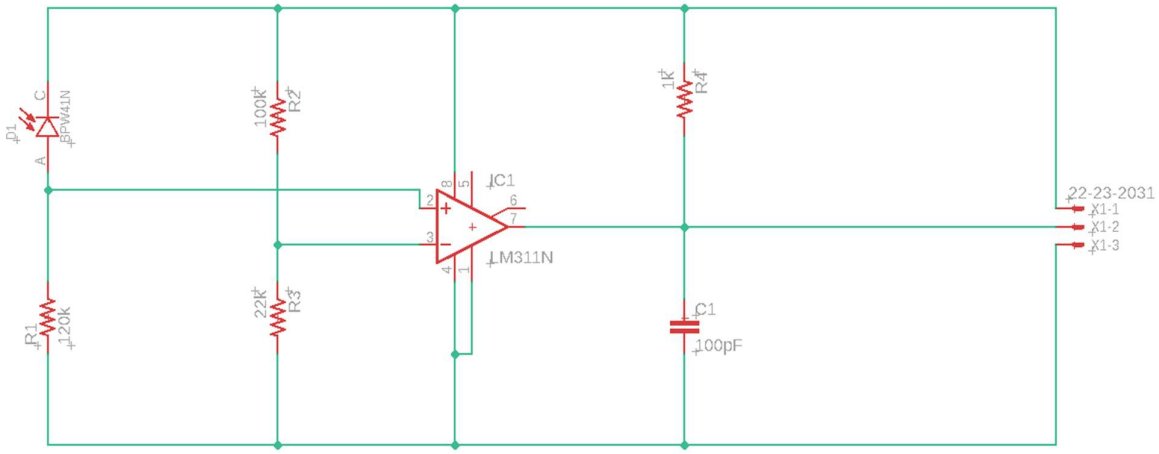

Fig. 1.6 Schematic diagram of Receiver circuit

Printed Circuit Board layout:

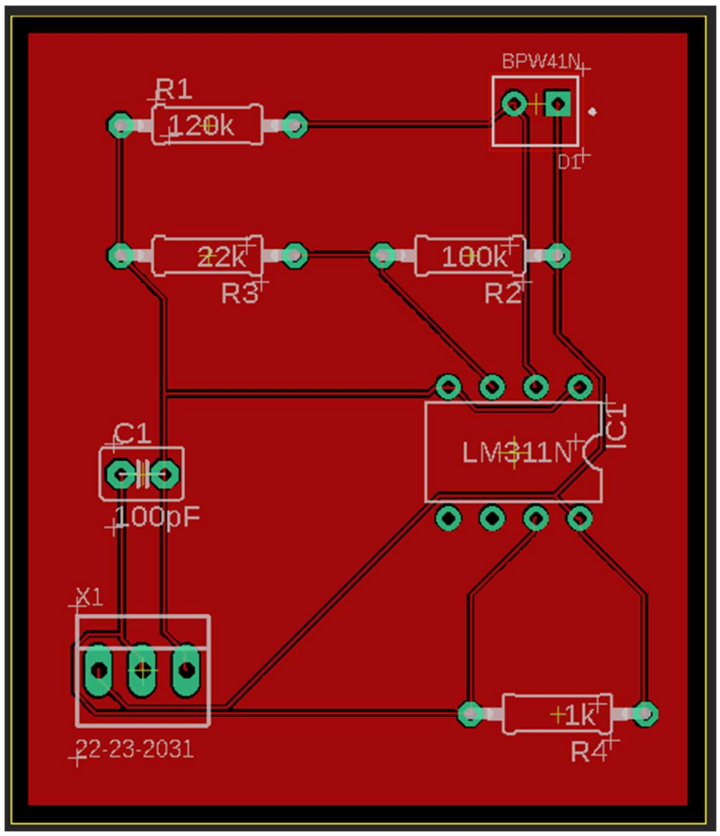

Fig. 1.7 PCB layout of Receiver circuit

Discussion:

In this experiment, we have learnt how to integrate the mentioned components to create a receiver circuit using EAGLE , which is used in the buggy. The receiver receives different signals from different gantries. A Schottky diode is used for low turn-on voltage, capable of rectifying a current by facilitating a quick transition from conducting to blocking state. An operational amplifier (op-amp) amplifies the difference in voltage between two inputs.

Reference:

[1] **https://www.electronics-notes.com**

[2] **https://www.learn.sparkfun.com**

[3] **https://www.techtarget.com**

Signature of Faculty member