

A Practical activity Report submitted
for Engineering Design Project-II (UTA-024)
by

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Submitted to
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1	1 (a)	To draw a schematic diagram of pulse width modulation (PWM) based transmitter for generating specified pulse width waveforms for gantries placed at different locations on the path using CAD tool (Eagle).
2	1 (b)	To design a printed circuit board layout of pulse width modulation (PWM) based transmitter circuit using CAD tool (Eagle).
3	2 (a)	To draw a schematic diagram of receiver to receive specified pulse width IR signals from gantries using CAD tool (Eagle).
4	2(b)	To design a printed circuit board layout of receiver circuit using CAD tool (Eagle).
5	3 (a)	To draw a schematic diagram of IR sensor module circuit (required to move Buggy module on a predefined the path) using CAD tool (Eagle).
6	3 (b)	To design a printed circuit board layout of IR sensor module circuit using CAD tool (Eagle).
7	4	To solder and test a pulse width modulation (PWM) based transmitter circuit (for gantries placed at different locations on the path to be followed by Buggy robot) on a printed circuit board (PCB).
8	5	To solder and test pulse width modulation (PWM) based receiver circuit (to receive IR signals from gantries connected to transmitter circuit) on a printed circuit board (PCB).
9	6	To solder and test an IR sensor module circuit (which helps Buggy robot to move on a predefined path) on a printed circuit board (PCB).

Experiment: 2

Objective:

- (a) To draw a schematic diagram of receiver to receive specified pulse width IR signals from gantries using CAD tool (Eagle).
- (b) 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(R1)	120k Ω	Carbon Resistor with 5% Tolerance
2.	Resistor(R2)	22k Ω	Carbon Resistor with 5% Tolerance
3.	Resistor(R3)	100k Ω	Carbon Resistor with 5% Tolerance
4.	Resistor(R4)	1k Ω	Carbon Resistor with 5% Tolerance
5.	Diode(MBD701)		Schottky Diode(Ultra High Frequency)
6.	Capacitor	10pF	Electrolyte Capacitor
7.	22-23-2031		PCB Header
8.	LM311D		OP Amp (Operational Amplifier)

Theory :

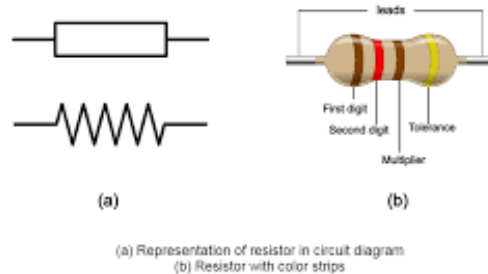
1. **Schottky diode:** The Schottky diode , also known as Schottky barrier diode or hot-carrier diode, is a semiconductor diode formed by the junction of a semiconductor with a metal. It has a low forward voltage drop and a very fast switching action. The cat's-whisker detectors used in the early days of wireless and metal rectifiers used in early power applications can be considered primitive Schottky diodes. These are a type of diodes which are made up of junction of a semiconductor and a metal. It helps the diode to maintain a low knee voltage (0.2-0.3)



[1]: Image of Schottky diode

2. **Resistor:** A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage.

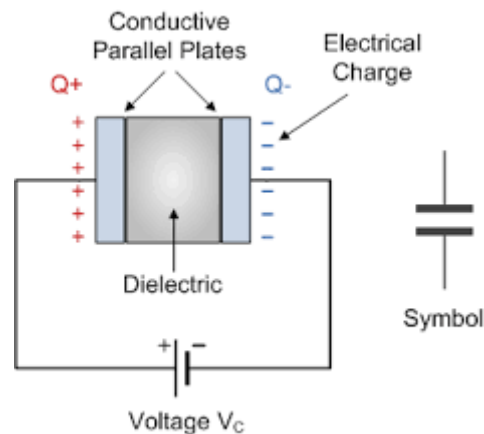
Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.



[2]: Figure of Resistor.

A resistor is the component of the circuit that limits the flow of the current. A resistor can be of five and four color bands.

3. Capacitor:



[3]: Figure of Capacitor.

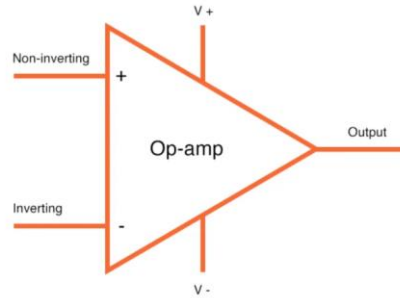
It is an instrument used to store electrical energy. It is a passive electric component.

4. **PCB Header:** A **pin header** (or simply **header**) is a form of electrical connector. A **male pin header** consists of one or more rows of metal pins moulded into a plastic base, often 2.54 mm (0.1 in) apart, though available in many spacings. Male pin headers are cost-effective due to their simplicity. The female counterparts are sometimes known as **female socket headers**, though there are numerous naming variations of male and female connectors.



[4]: Image of PCB Header

5. **Operational amplifier:** Operational Amplifiers, also known as Op-amps, are basically a voltage amplifying device designed to be used with components like capacitors and resistors, between its in/out terminals. They are essentially a core part of analog devices. Feedback components like these are used to determine the operation of the amplifier. The amplifier can perform many different operations (resistive, capacitive, or both), giving it the name Operational Amplifier.



[5]: Schematic Diagram of Operational Amplifier.

Schematic diagram:

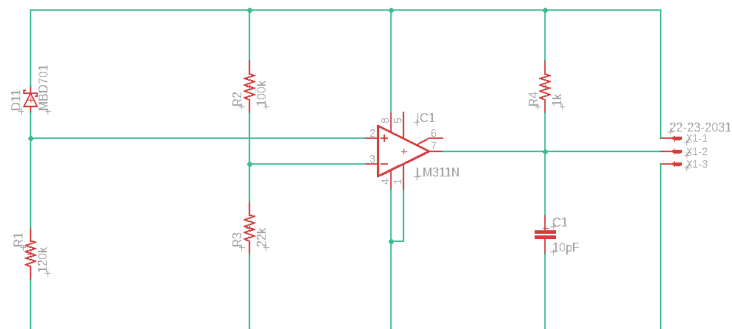


Fig: Schematic diagram of Receiver circuit

Printed Circuit Board layout:

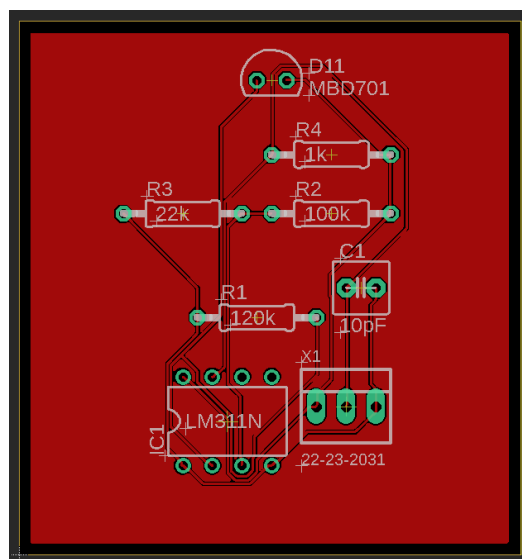


Fig: PCB layout of Receiver circuit

Discussion:

In the receiver circuit we have used different components such as resistors, capacitors, operational amplifier, Schottky diode and PCB Header. The receiver circuit will be attached on the buggy and will accept signals from gantries of various pulse widths. The Schottky diode is used as it has a low knee voltage so we will be able to get the signals easily. Circuit also involves of an operational Amplifier which gives different output signals in different conditions.

Reference:

- [1] <https://www.veswin.com/uploads/package/TO92.jpg>
- [2] <https://images.app.goo.gl/Q4MGKt8qMHuhA89g9>
- [3] <https://images.app.goo.gl/qG62vH38xfZdihwx9>
- [4] <https://images.app.goo.gl/JZ6JBi6vaCdnJiGo8>
- [5] <https://images.app.goo.gl/CosfT27PgMRRvdMW9>

Signature of Faculty member