

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

by

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Submitted to

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Experiment: 3

Objective:

- To draw a schematic diagram of receiver to receive specified pulse width IR signals from gantries using CAD tool.
- To design a printed circuit board layout of receiver circuit using CAD tool

Software Used: Eagle Software **Component Used:**

Sr. No	Name of Components	Value	Specifications
1.	Resistor(R1, R3, R4, R8)	330 ohm	Carbon Resistor with 5% Tolerance
2.	Resistor(R2)	10k ohm	Carbon Resistor with 5% Tolerance
3.	Connector (MTA02-100)		Mass Termination Assembly (MTA) Connector System
4.	IR LED (SFH482)		Infrared Emitter
5.	Photodiode (BPX65)		PCB Header
6.	LMV358		OP AMP
7.	Potentiometer (PT-10)	10 k	
8.	LED 3MM		Light Emitting Diode

Theory :

- 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.

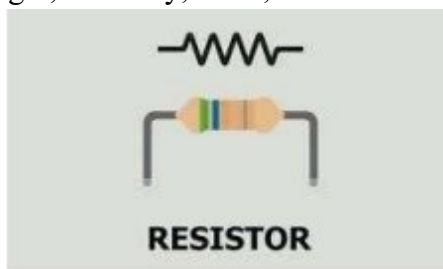


Fig. 2.1 resistors [1]

- Capacitor:** A **capacitor** is a device that stores electrical energy in an electric field. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as a **condenser** or **condensator**. This name

and its cognates are still widely used in many languages, but rarely in English, one notable exception being condenser microphones, also called capacitor microphones.



Fig. 2.2 Various types of capacitors [2]

3. **Schottky Diode:** The **Schottky diode** (named after the German physicist Walter H. Schottky), 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.

When sufficient forward voltage is applied, a current flows in the forward direction. A silicon p-n diode has a typical forward voltage of 600–700 mV, while the Schottky's forward voltage is 150–450 mV. This lower forward voltage requirement allows higher switching speeds and better system efficiency.

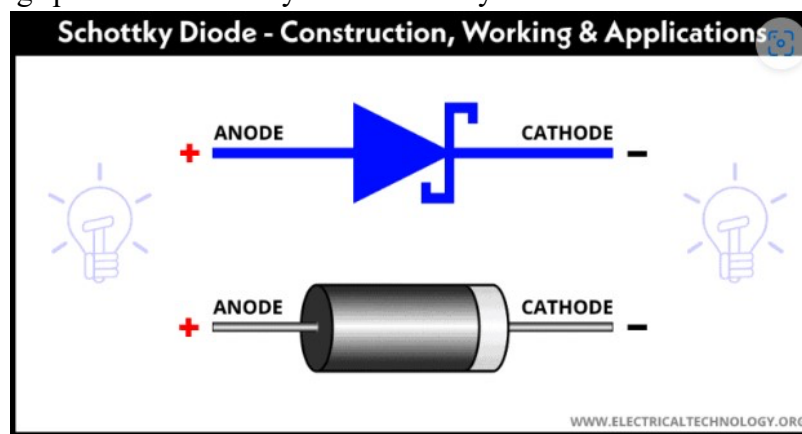


Fig. 2.3 Schottky Diode [3]

4.PCB Header: PCB (Printed circuit board) headers are a type of electrical connector that allows you to join connections to a PCB using a single block. Typically headers have one side that is designed to be surface mounted and soldered onto the board with the other side allowing connections.

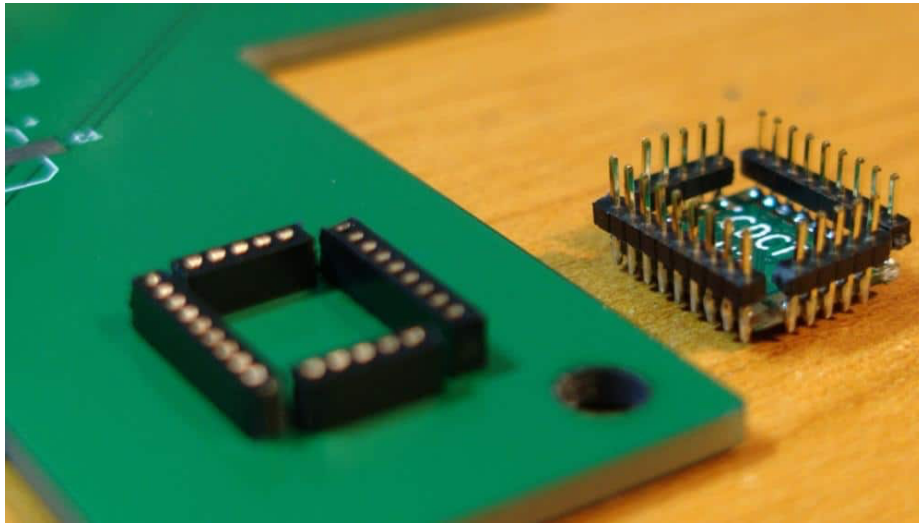


Fig. 2.4 PCB Header [4]

5.Operational Amplifier: An operational amplifier is an integrated circuit that can amplify weak electric signals.

An operational amplifier has two input pins and one output pin. Its basic role is to amplify and output the voltage difference between the two input pins.

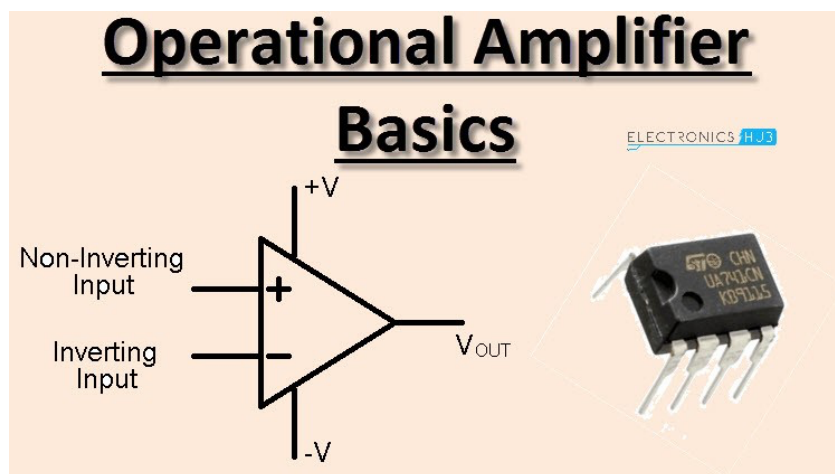


Fig. 2.5 Operational Amplifier [5]

Schematic diagram:

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

Reference:

[1] <https://www.electronicsforu.com/technology-trends/learn-electronics/determine-resistor-valuescircuit>

[2]https://upload.wikimedia.org/wikipedia/commons/thumb/b/b9/Capacitors_%287189597135%29.jpg/1280px-Capacitors_%287189597135%29

[3]

<https://upload.wikimedia.org/wikipedia/commons/thumb/c/c3/Schottky.jpg/330pxSchottky> [4] <https://www.raypcb.com/wp-content/uploads/2021/06/pcb-header-connector>

[5]<https://www.electronicshub.org/wp-content/uploads/2015/01/Operational-AmplifierBasics-Featured-Image>

Signature of Faculty member