

EW-PROJECT REPORT

TEAM MEMBERS:-

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Contents:-

- 1) Problem Statement**
- 2) Aim of the Project**
- 3) Components Used**
- 4) Circuit Schematics and Process Diagrams**
- 5) Flowchart**
- 6) Description of the Project**
- 7) Results**
- 8) Simulation and Short Video Demonstration**
- 9) Photos**
- 10) Bibliography**

1)PROBLEM STATEMENT:-

- => A line follower robot is a robotic system that can be designed to navigate along a predefined path, often marked as a visible line on the ground.
- => This line is usually black on a white surface or vice versa.
- => The robot uses sensors to detect the line and motors to adjust its direction to maintain its trajectory along the path.

- => Designing and implementing an autonomous Line follower robot capable of detecting and following predefined path.
- => The robot must use sensor inputs to navigate the path efficiently, adjust for curves and obstacles, and maintain stability and accuracy

- => In this project, we build a simple Line Follower Robot that can follow a line and avoid obstacles, demonstrating basic features of autonomous navigation.
- => This adaptable robot can handle paths and obstacles, making it useful for tasks in warehouses or participating in robotics competitions.
- => Autonomous vehicles like Tesla use sensors to navigate paths and avoid obstacles

2)Aim of the Project :-

=>To design and develop an efficient and reliable line follower robot that can autonomously navigate complex paths, which can be used for dual purpose of object detection and path following Our main aim is to make the robot run independently even in the complex paths efficiently

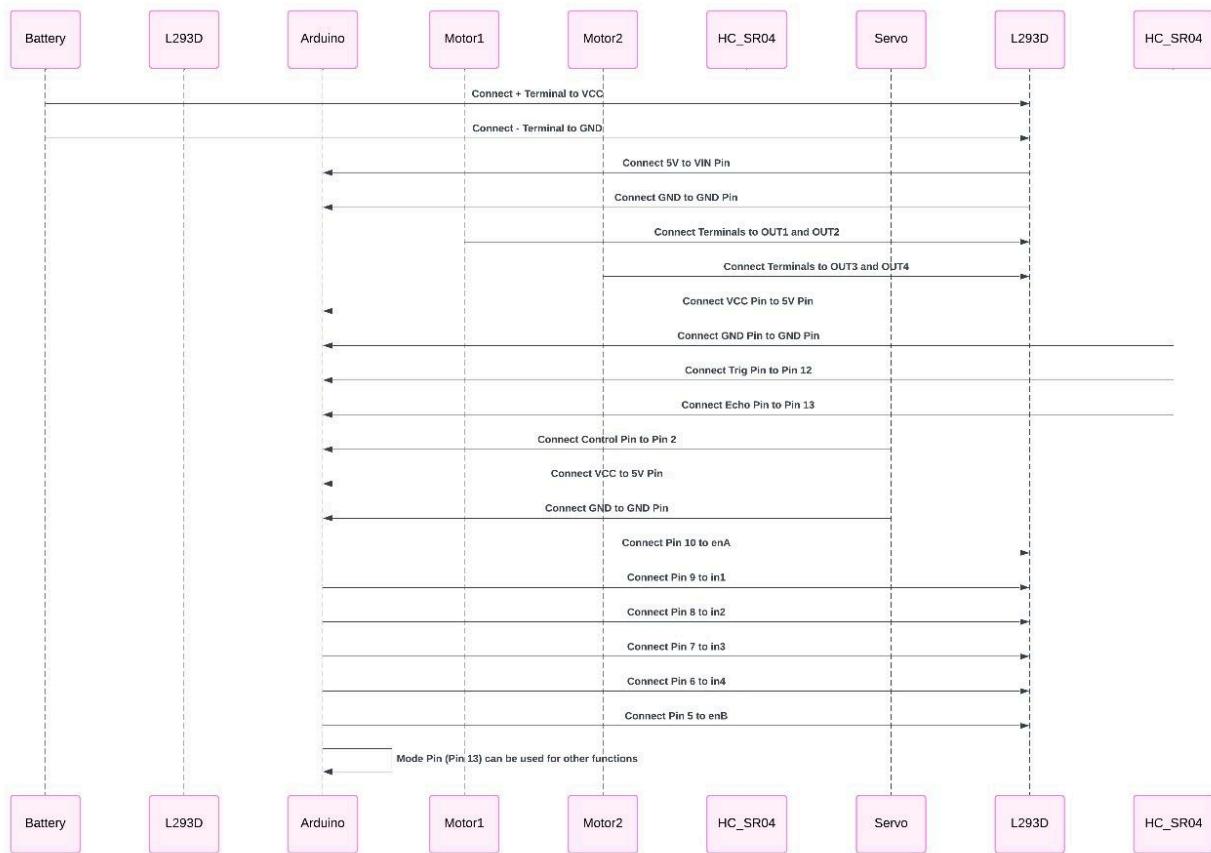
=>The other main aim of this project is to detect the object which come in the path of the robot and moving away from the object

3)Components Used

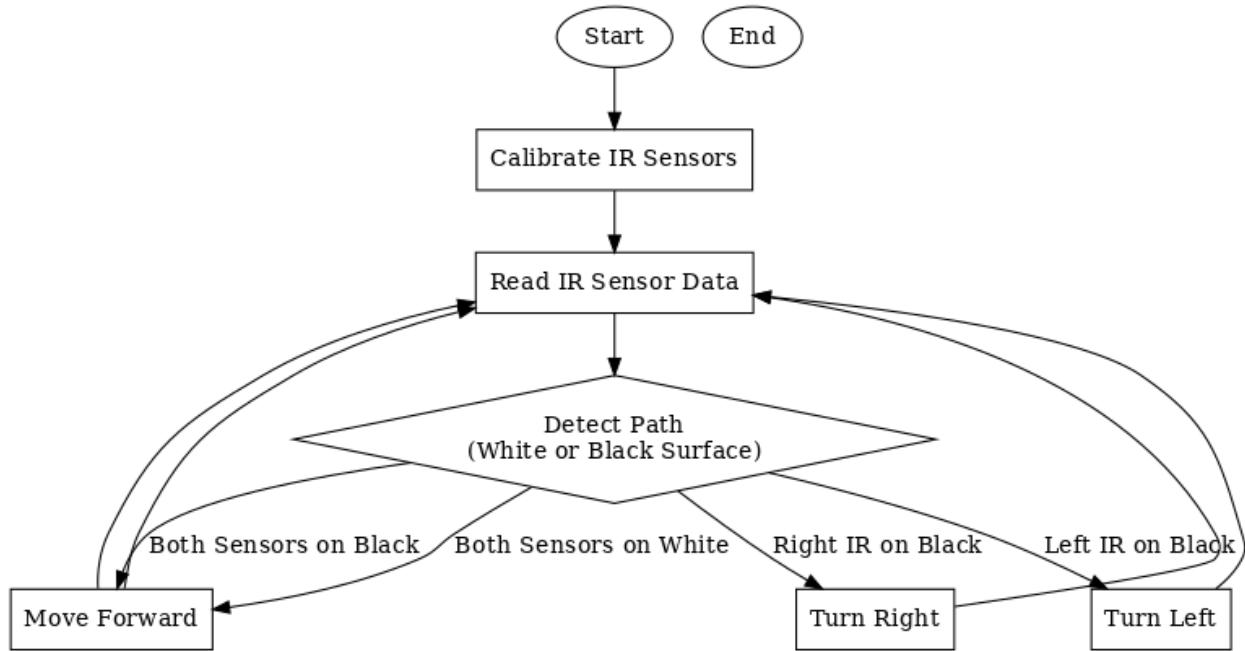
- =>Arduino UNO
- =>L293D motor driver
- =>IR sensors(2)
- =>Ultrasonic sensor
- =>jumper wires
- =>servo motor
- =>wheels
- =>caster wheel
- =>N20 motors
- =>acrylic sheet

4 Circuit Schematics and Process Diagrams:-

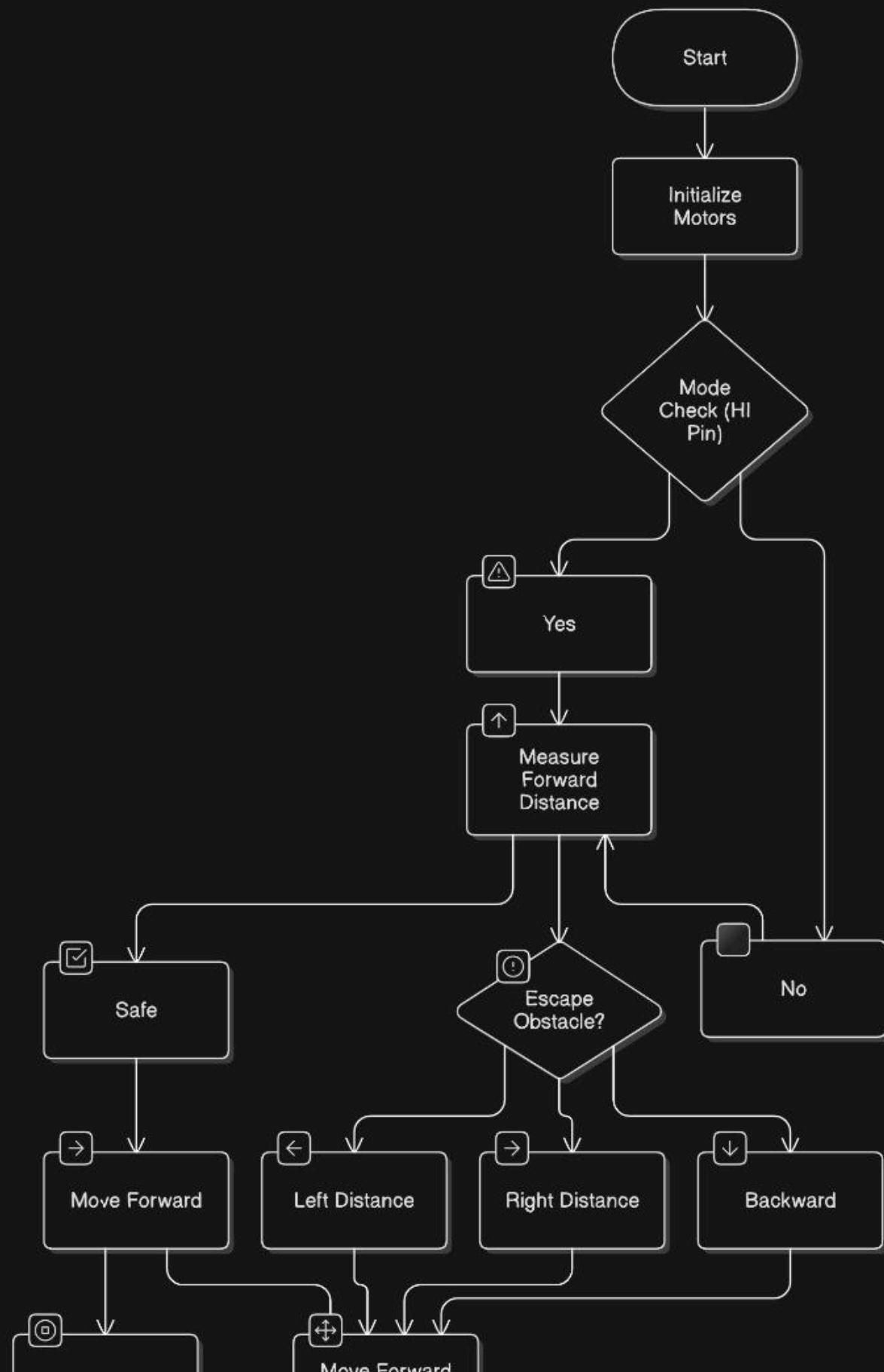
Circuit schematics:-



5 Flowchart:-



Robot Navigation Flowchart



6) Description of the Project

=>METHODODOLOGY:-

=>We have equipped the robot with two IR sensors mounted at the front
=>which always face the Ground whereby the white surface reflects more light from the IR and a black surface absorbs it.

=>the microcontroller should be programmed to interpret the sensor data in such a way that when:

- Left sensor ON, Right sensor OFF: Robot has to turn to right.
- Right sensor ON, Left sensor OFF: Robot has to turn to left.
- Both sensors ON: Robot moves forward.
- Both sensors OFF: Robot stops.

=>Using a motor driver circuit (L293D) to control the left and right motors independently.

=>Test the robot on different paths, including straight lines, curves, and intersections.

=>APPROACH:-

=>Starting with the high-level goal of enabling the robot to follow a path using minimal hardware (two IR sensors).

=>Opt for a basic control system since only two sensors are used, avoiding complex algorithms like machine learning.

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=>Controls the movement of the robot with real-time sensor feedback. This is a reactive method as it adapts instantaneously according to sensor feedback.

=>We can also perform further improvements by adding ultrasonic sensor for detecting the obstacles and many more sensors

=>steps involved:-

- =>designing a process for path following robot
- =>fixing the IR sensors at the front of the car for detecting the path
- =>the IR sensors are set at the both edges of the black path
- =>when the left IR detects black path
The right wheel moves forward and the left wheel moves backward which makes it to turn left similarly for right IR when detected black path which makes it to move along the black path
- =>the outputs of the IR sensors are given to the motor driver which decides the forward and backward movement of the wheels based on the outputs
- => now let us combine an ultrasonic sensor with servo motor and attach it to the front of the car

=>the servo motor rotates when an object is detected which makes it to choose the best path according to the least distance

=>now writing the code according to the requirements then dumping into the arduino

7)RESULTS:-

The results of the project are

Path Detection:

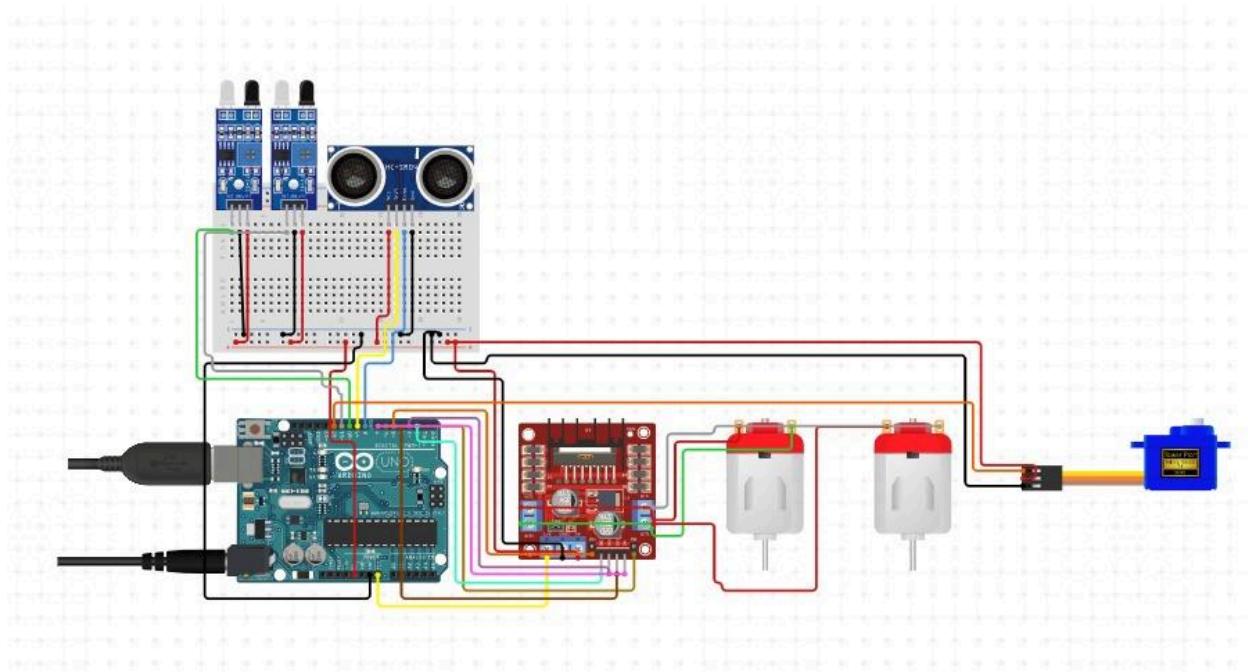
=>The robot successfully detects the black line against the white surface using two IR sensors.

Obstacle Detection:

=>The robot successfully detects the obstacles coming across the path of the robot

=>With just two sensors, the robot struggles to follow sharp turns or intersections without additional logic or sensors.

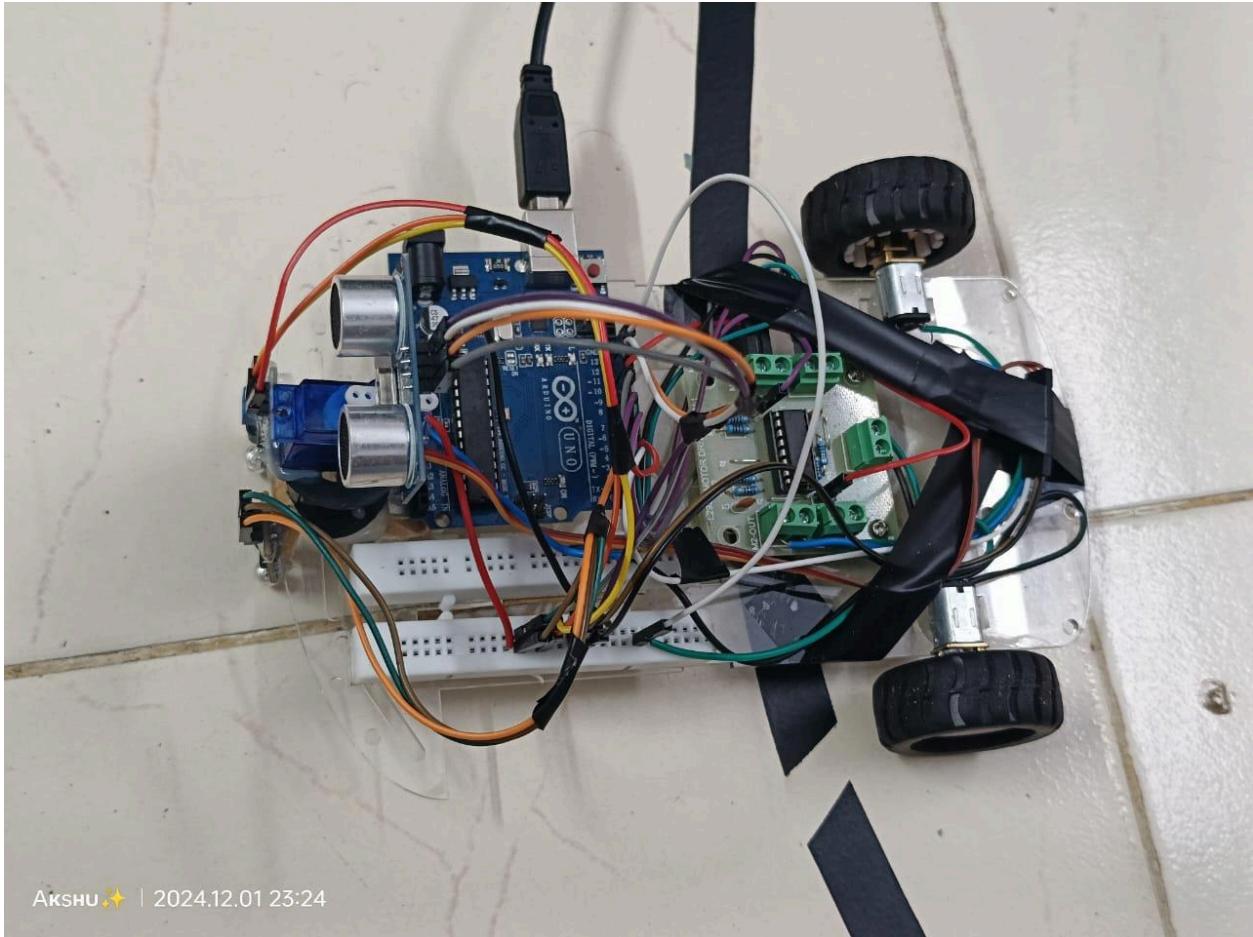
8) Simulation and Short Video Demonstration:-



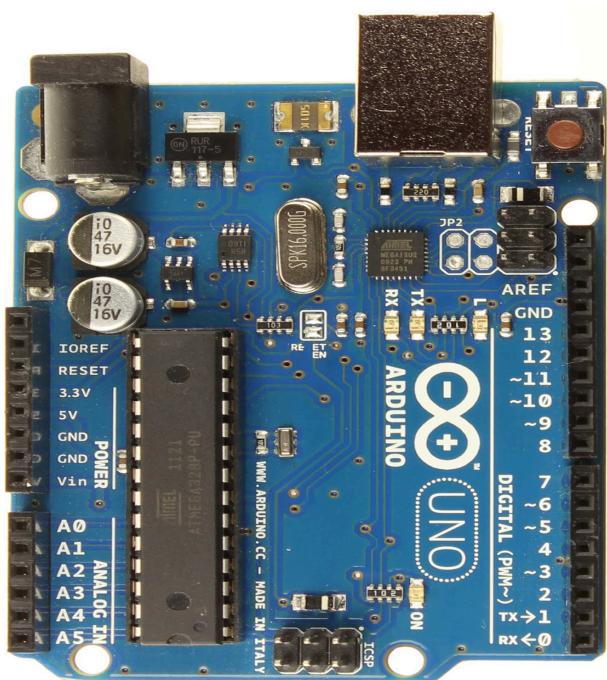
LINK OF THE VIDEO:-

https://drive.google.com/file/d/1DFGaNHDDuN59o46vxIJ-JiGGBEK6L6xz/view?usp=drive_link

9)Photos:-



Akshu ✨ | 2024.12.01 23:24





10)BIBLIOGRAPHY:-

- 1)Instructables(internet website)
- 2)pololu & geeksforgeeks (components usage)

Above all sources are from internet

