EW1: Final Evaluation

- PATH FOLLOWER ROBOT

- TEAM MEMBER NAMES:-
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Motivation or Background

1) The thought process behind this project started with creating a simple line-following algorithm, then adding obstacle detection to make the robot more adaptable. We used an Arduino for its ease of programming and flexibility.
2) The L293D motor driver controls motor movement, while IR sensors detect the black line for path-following.
3) An ultrasonic sensor detects obstacles, allowing the robot to adjust its direction accordingly.
4) Our aim is to create a reliable and efficient robot capable of autonomous navigation with minimal human intervention.

Uses of path following robot in daily life:-

1)Self-Driving Cars:

Basic path-following principles are applied in autonomous vehicles for lane following and navigation.

2)Courier Robots:

Robots delivering packages or food (e.g., Starship Technologies robots) use path-following algorithms for navigation.

3)Crop Monitoring:

Robots equipped with line-following systems navigate through crop rows to monitor and perform tasks like spraying or harvesting.

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 IR 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

Proposed Design

1)Mapping of requirements from problem statement

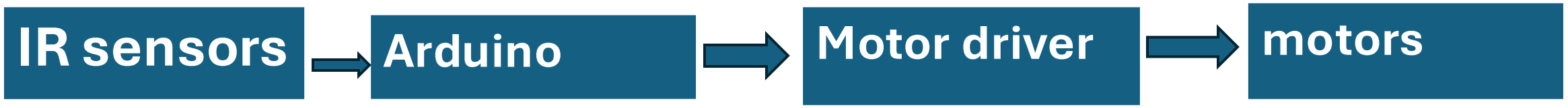
=>The main problem with path follower robot are the curves in the paths which can be resolved by using the IR sensors

=>the IR sensors present at the front of the robot detects the path for every instant and the output of the IR sensors decides the trajectory of the path following robot

=>the further problem is with the obstacles present in the path which can be resolved by ultra sonic sensor which rotates when detects the best path for the robot to move

- The direction of the robot based on the outputs of the IR sensor and ultra sonic sensor will be controlled by the motor driver
- The motor driver is used to rotate the wheels in the forward or backward direction based on our requirement

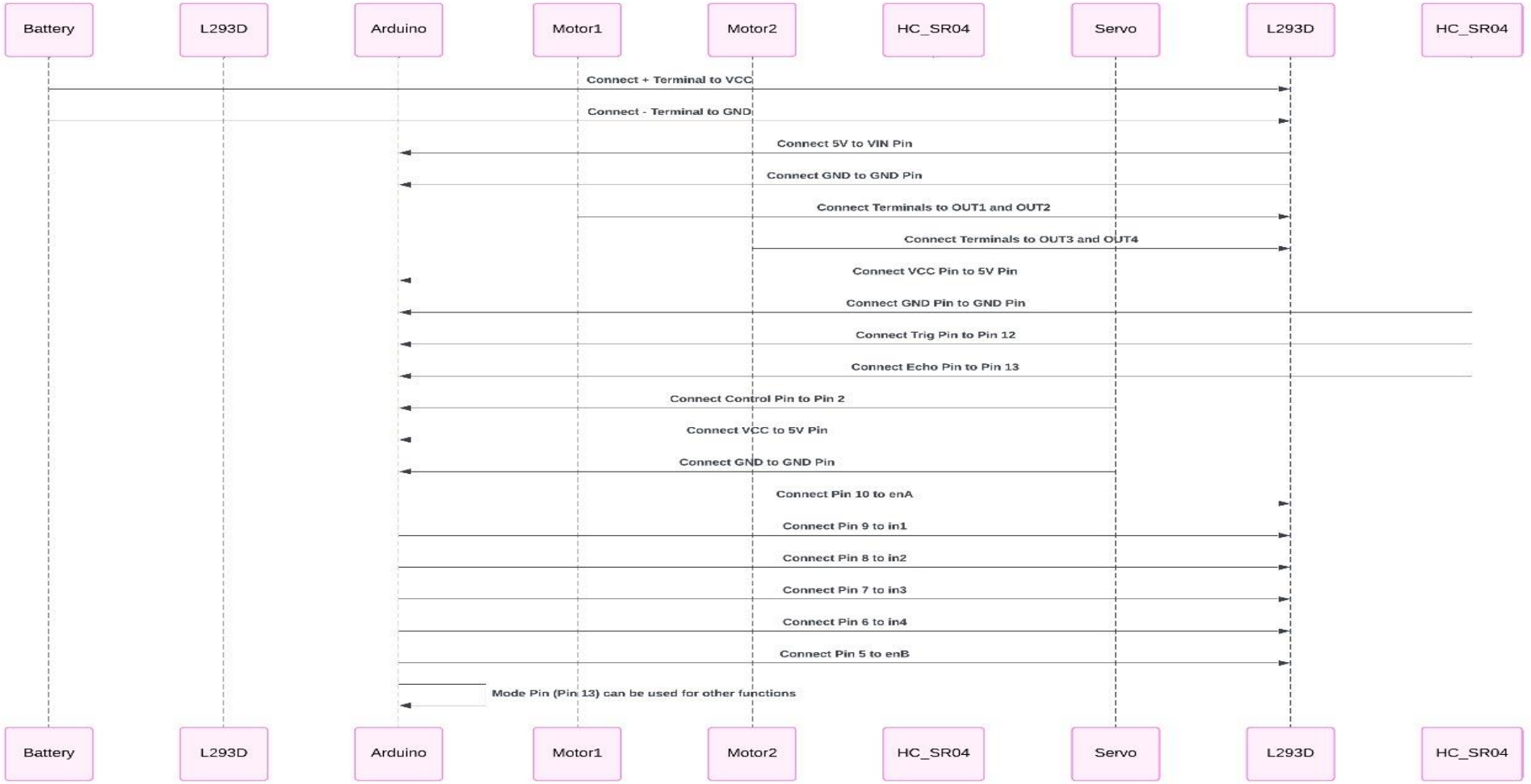
- **Block diagram**



Design explanation

- The IR sensors detects the path of the robo t and checks the surface in which the robot is going and gives the output according to it
- The outpin pins from arduino are given to the motor driver as input pins we will give the input to the motor driver based on our requirements
- The output pins of this motor driver is given to the motors which decides the direction of the robot

CIRCUIT DIAGRAM



DEMO VIDEO

- https://drive.google.com/file/d/1DFGaNHDDuN59o46vxlJ-JiGGBEK6L6xz/view?usp=drive_link

Key Performance Indicator

- The solution to this path following robot is more affective based on hardware complexity because the components used in this project consists of only two IR sensors which will be very easy to perform and understand
- The circuit consists of some basic elements like arduino motor driver and IR sensors which minimises the hardware complexity
- The circuit elements are very much efficient according to the cost efficiency

Cost of the Solution

- 1)Arduino UNO:-around 400
- 2)IR sensors(2) :-around 170
- 3)motor driver:-around 150
- 4)N20 motors:-around 150 each
- 5)Wheels:-around 30 each
- 6)acrylic chassis:-around 150

Contributions from team members

- Contribution from Santhosh:-
- 1)checking the workings of all the sensors like IR and Ultra sonic
- 2)designing the circuit for the path following robot
- 3)constructing the circuit
- Contributions from Akshay:-
- 1)writing the code required
- 2)soldering the pcb

Remark

- 1)we faced several challenges while using the PCB by the loose connections in them
- 2)we have also faced several challenges while giving the output pins of motor driver to the N20 motors

Feasibility of the giving problem statement :-

1)the problem statement is highly feasible due to low circuit complexity and low cost usage in the experiment

Learnings from the project

- 1)we have learned several things by performing this experiment like usage and applications of IR and Ultra sonic sensors
- 2)we have gained confidence in performing the complex circuits using the sensors

References

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