



// prototyping //

<--!autonomous car-->

MIR SHARJIL HASAN

TALHA KHAN

MOHAMMAD HAMAS

Prototyping-Autonomous-CarPublic

Watch1

Fork0

Star0

main6 Branches1 Tag

Go to file

Code

About

Switch branches/tags

Find or create a branch...

BranchesTags

maindefault

V1

V2

V3

V4

V5

View all branches

f30e5d1 · last month36 Commits

Delete Diagrams/Activity Diagram.pnglast month

Create README.mdlast month

Add files via upload2 months ago

Add files via uploadlast month

Create tinkercadcode.c2 months ago

No description, website, or topics provided.

Readme

Activity

0 stars

1 watching

0 forks

Report repository

Releases

1 tags

Create a new release

Packages

No packages published

Publish your first package

Contributors3

ogetalha

sharjil247

Muhammad-Hamas-gitMuhammad ...

Prototyping-Autonomous-CarPublic

Watch1

Fork0

Star0

main6 Branches1 Tag

Go to file

Code

About

ogetalhaAdd files via uploadf30e5d1 · last month36 Commits

DiagramsDelete Diagrams/Activity Diagram.pnglast month

README.mdCreate README.mdlast month

Tinkercad Circuit .pngAdd files via upload2 months ago

To-Do List.pdfAdd files via uploadlast month

tinkercadcode.cCreate tinkercadcode.c2 months ago

No description, website, or topics provided.

Readme

Activity

0 stars

1 watching

0 forks

Report repository

Releases

1 tags

Create a new release

Packages

No packages published

Publish your first package

Contributors3

ogetalha

sharjil247

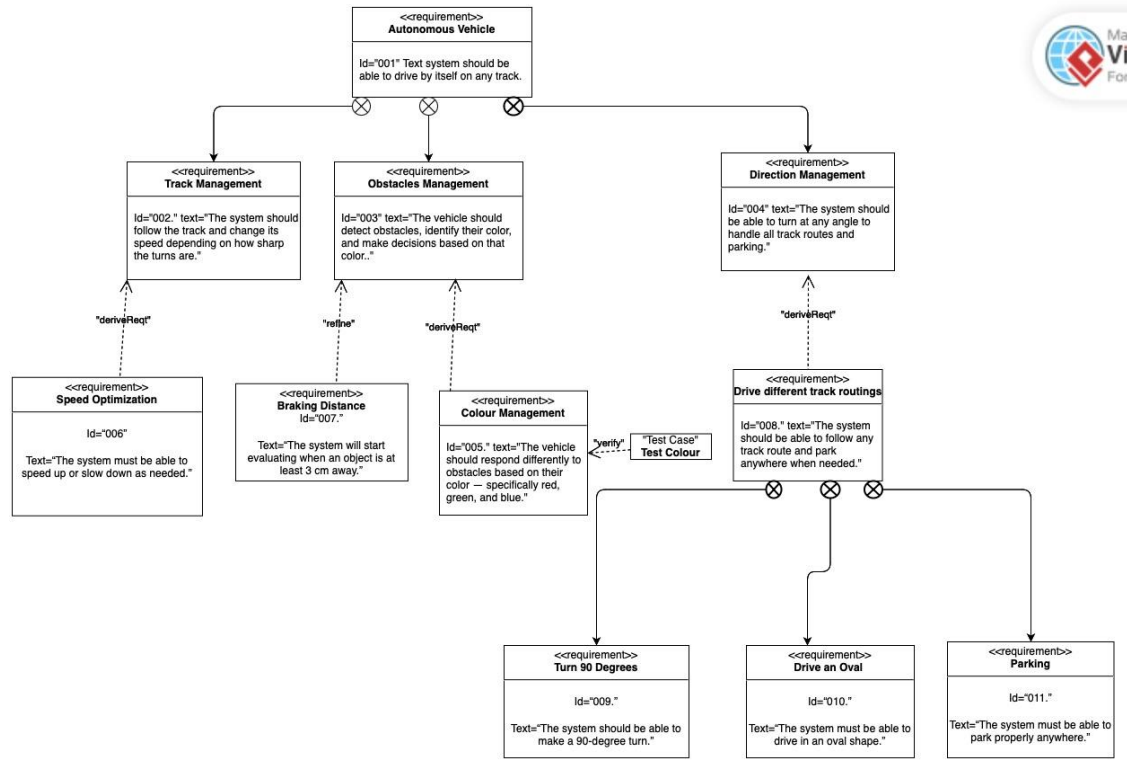
Muhammad-Hamas-gitMuhammad ...

workload distribution

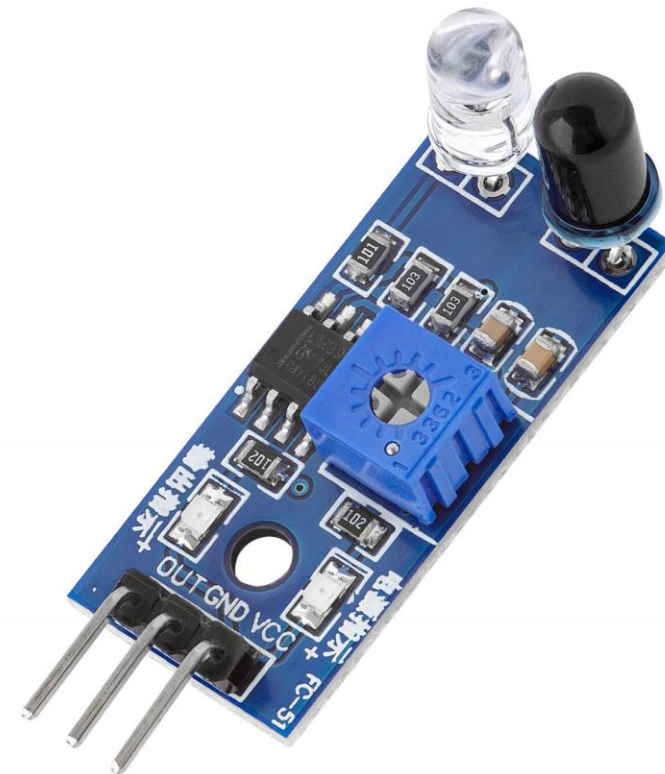


REQUIREMENTS:

- Can Follow a Line?
- Can optimize speed ?
- Can detect obstacles?
- Can take 90 degrees turn?
- Can evaluate colour of Object?
- Can take 180 degrees turn?
- Can overtake an obstacle?
- Can park?

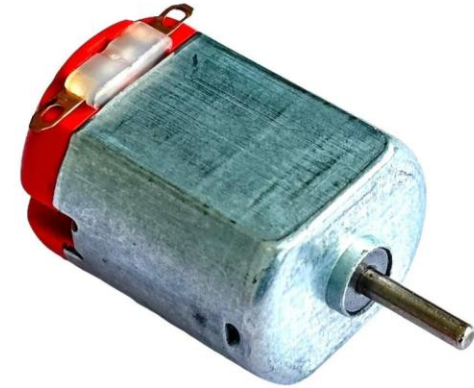


REQUIREMENT DIAGRAM



// actuators

To enable the car to move in any direction.



L298N Motor Driver

Input of 12V from
Battery.

Output of 5V to Arduino

Used to control speed and
direction of DC Motors.



// microcontroller & power



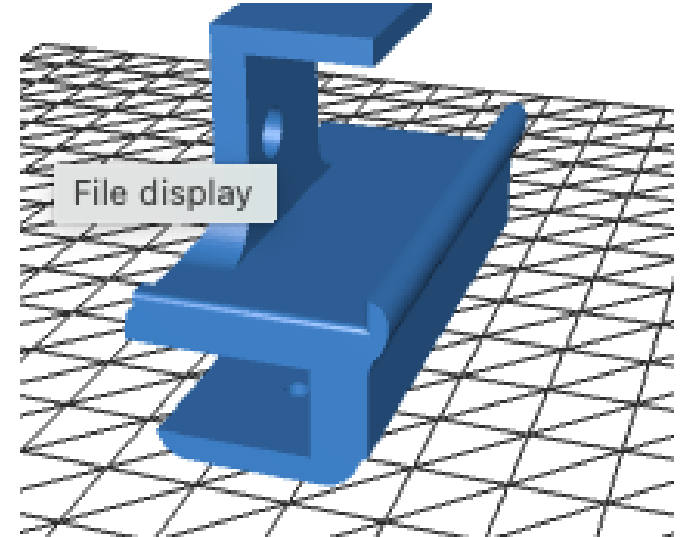
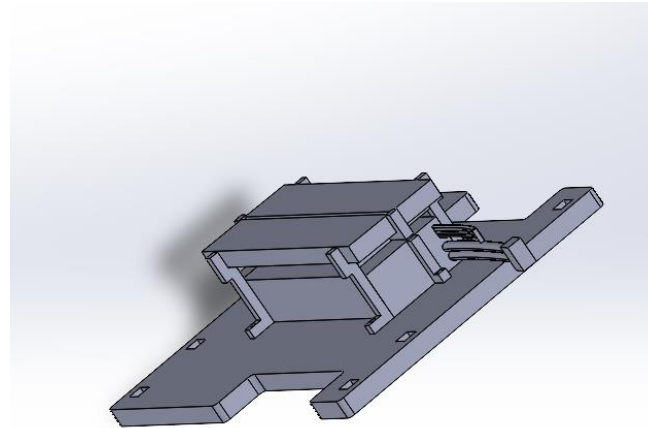
- Technology LiPo
- Cell number 2
- Tension 7.4V
- Capacity 3000mAh
- Resilience 20C
- Weight 210g



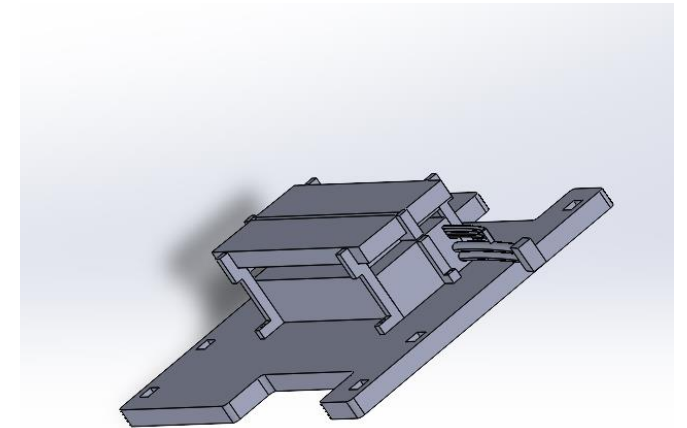
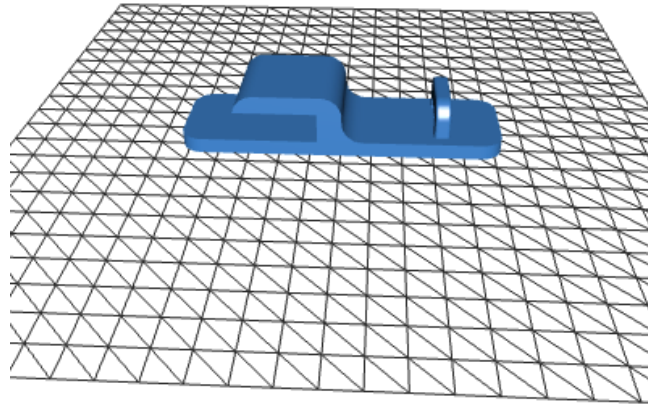
- 5V Input
- 14 Digital Pins
- 6 Analog Pins
- Used with
Arduino IDE

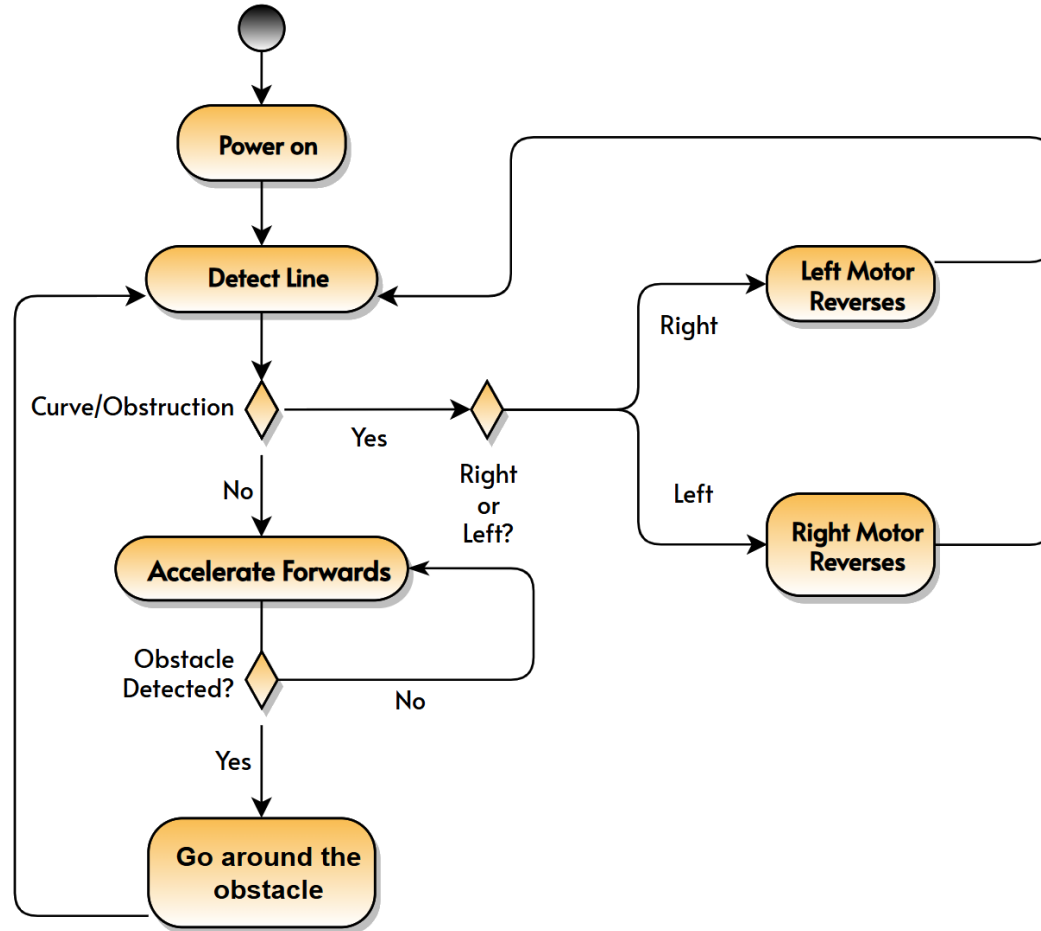
[4]

// component
design

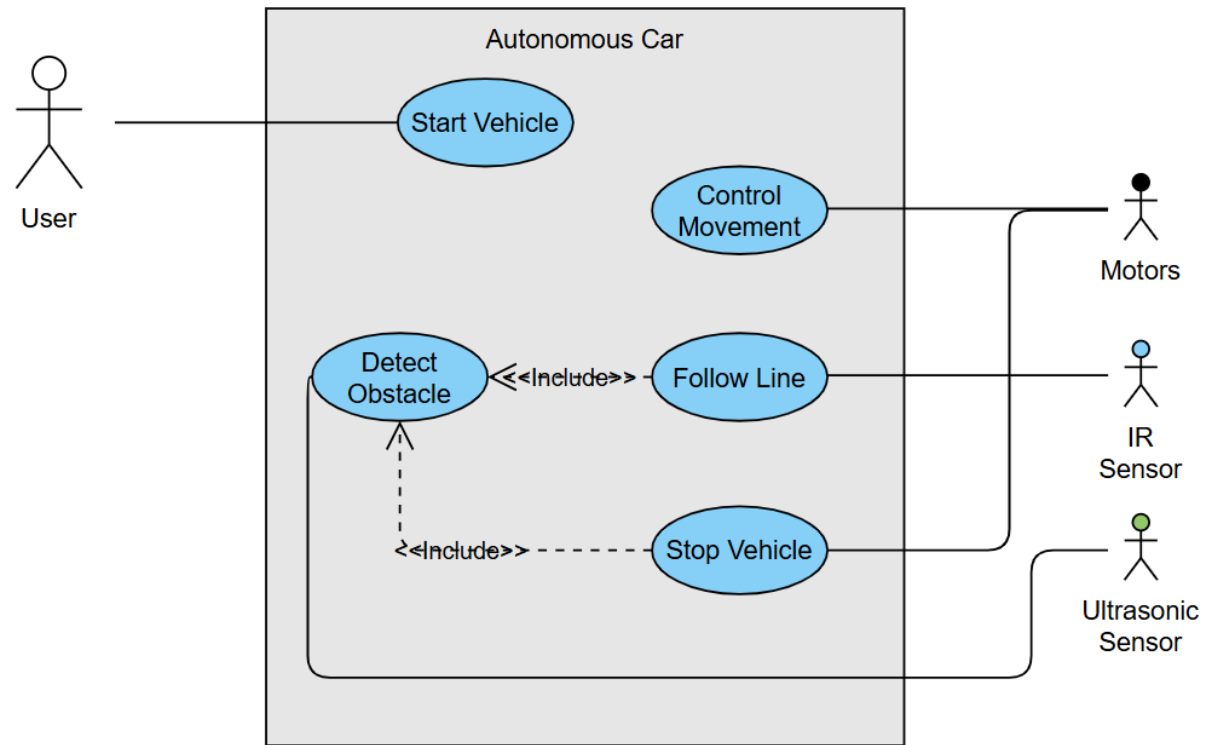


File display





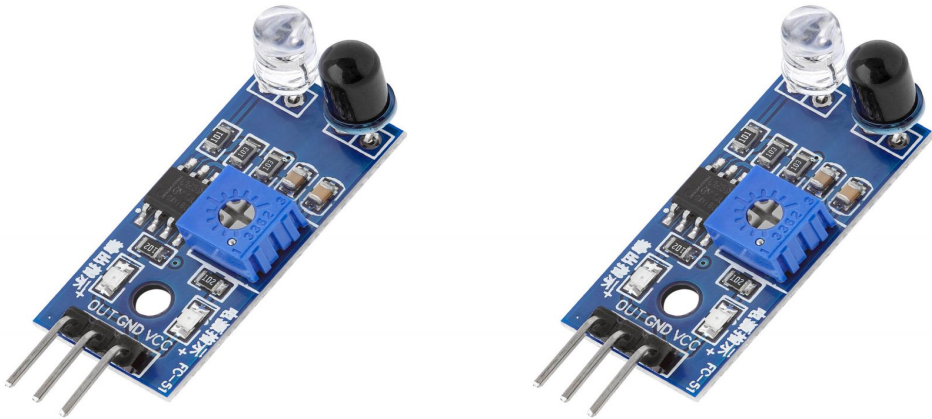
activity
diagram.



use case
diagram.

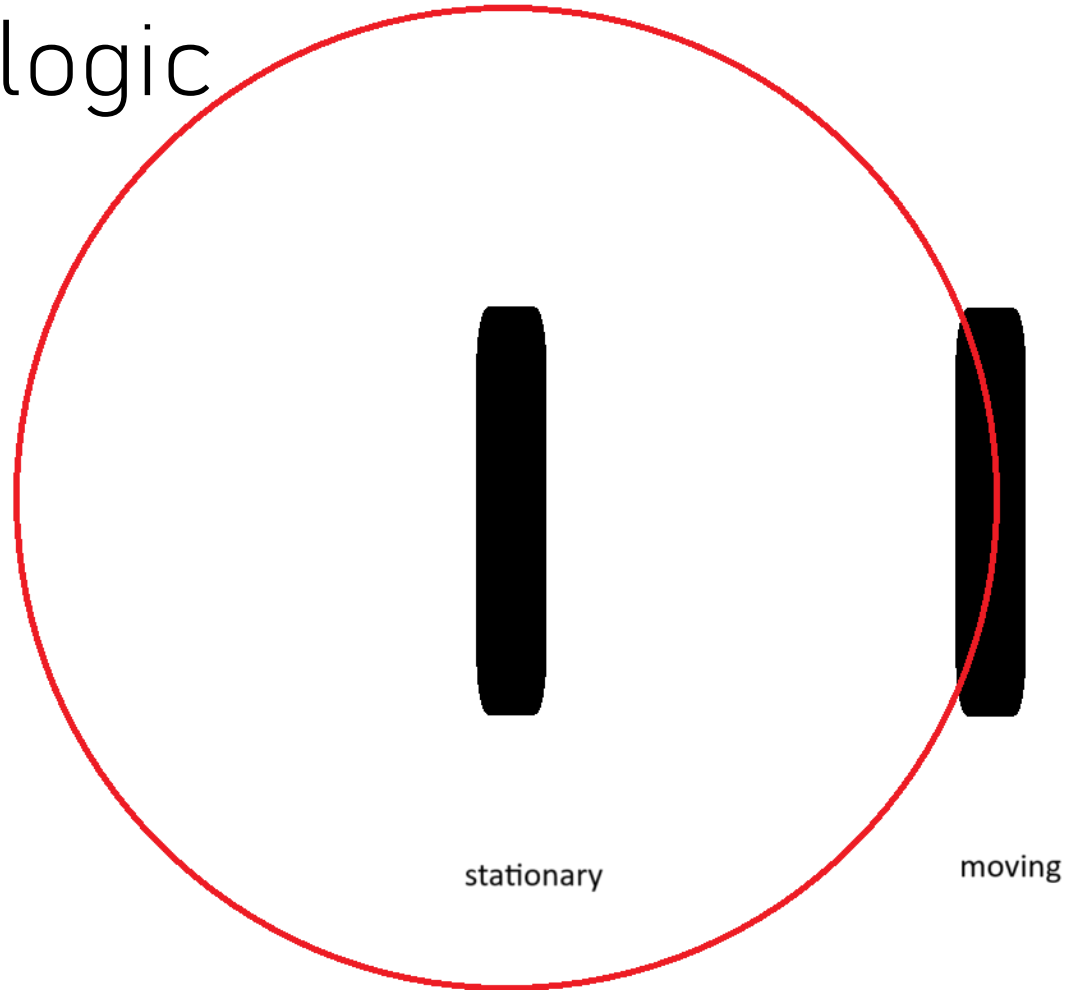
// general movement logic

- Dual motor based turning.



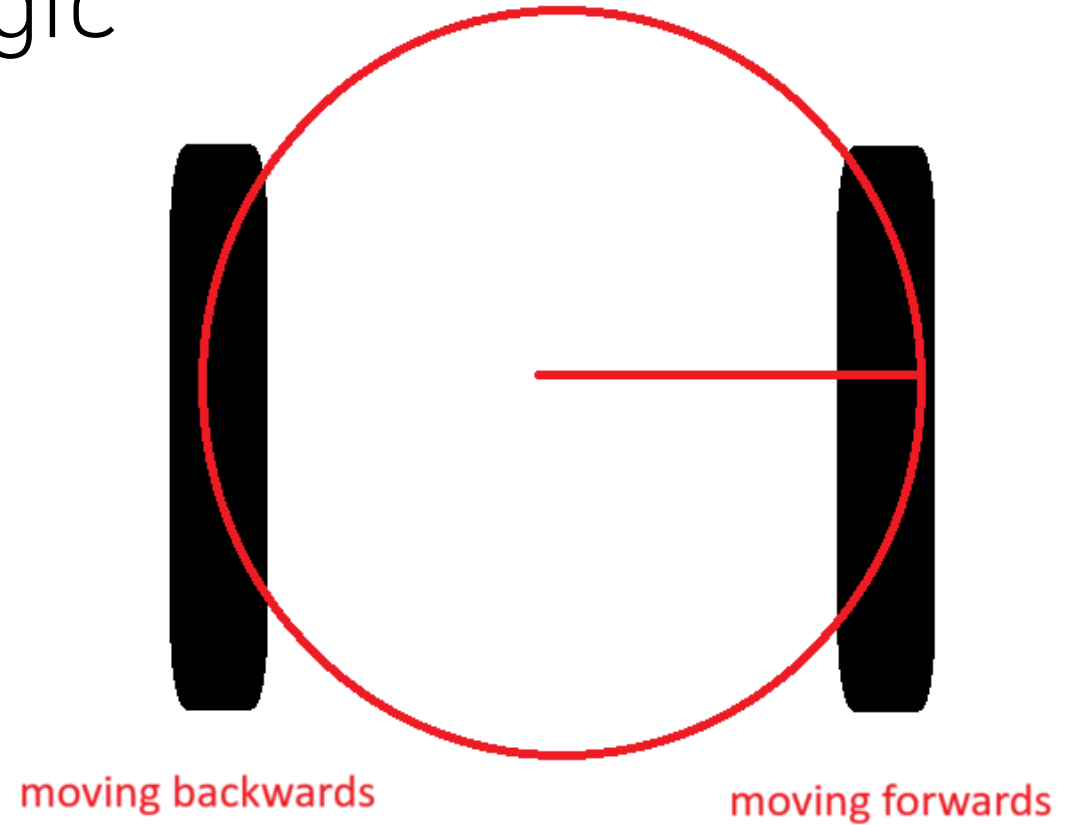
// general movement logic

- single motor based turning.



// general movement logic

- dual motor based turning.



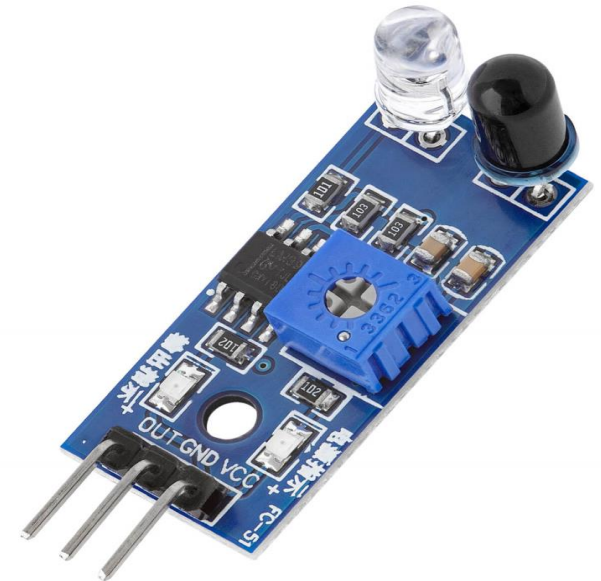
Position orienting

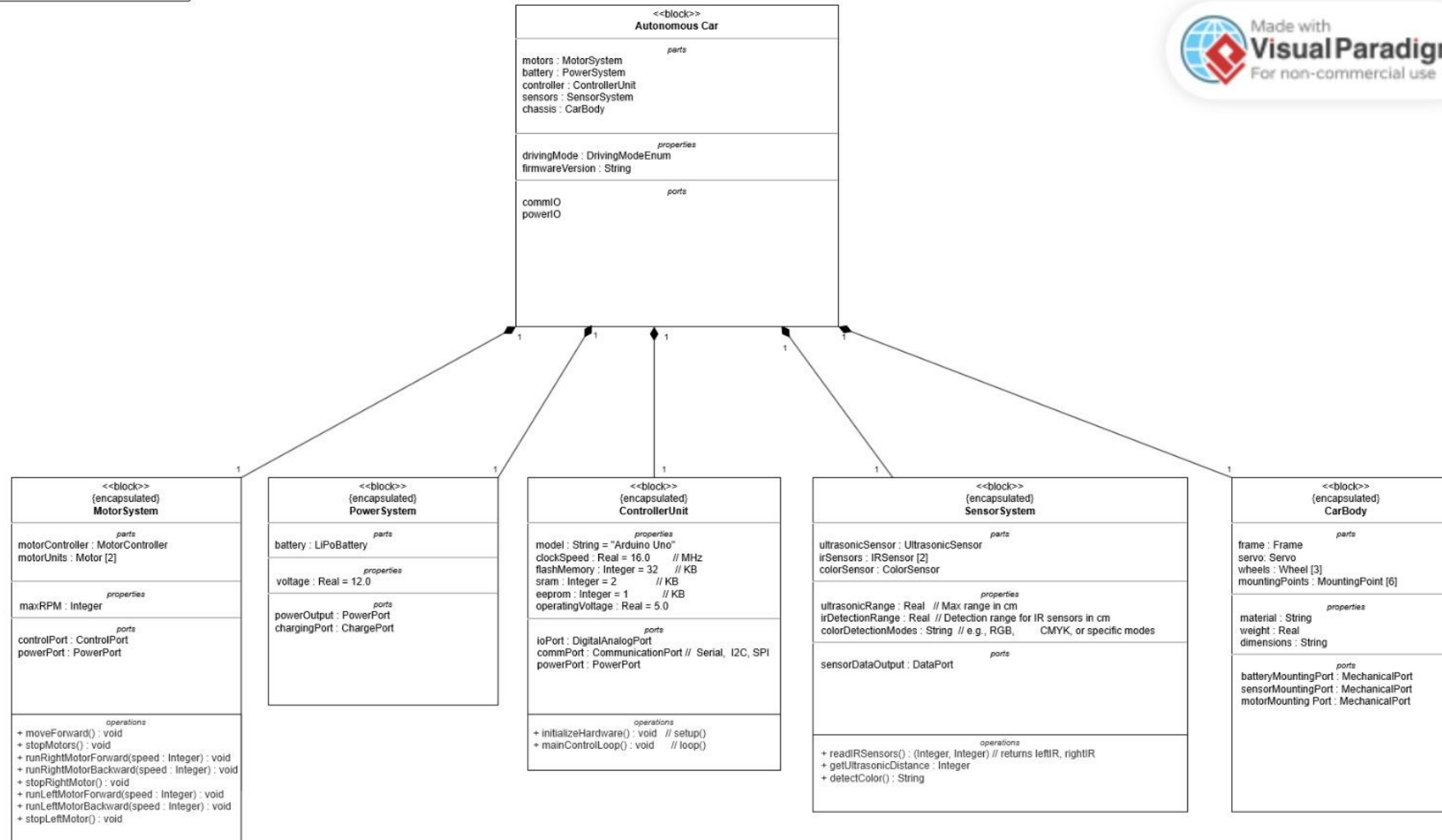
- The car loses position after avoiding obstacle.
Hence the ultrasonic sensor was utilized to relocate the position relative to the line.



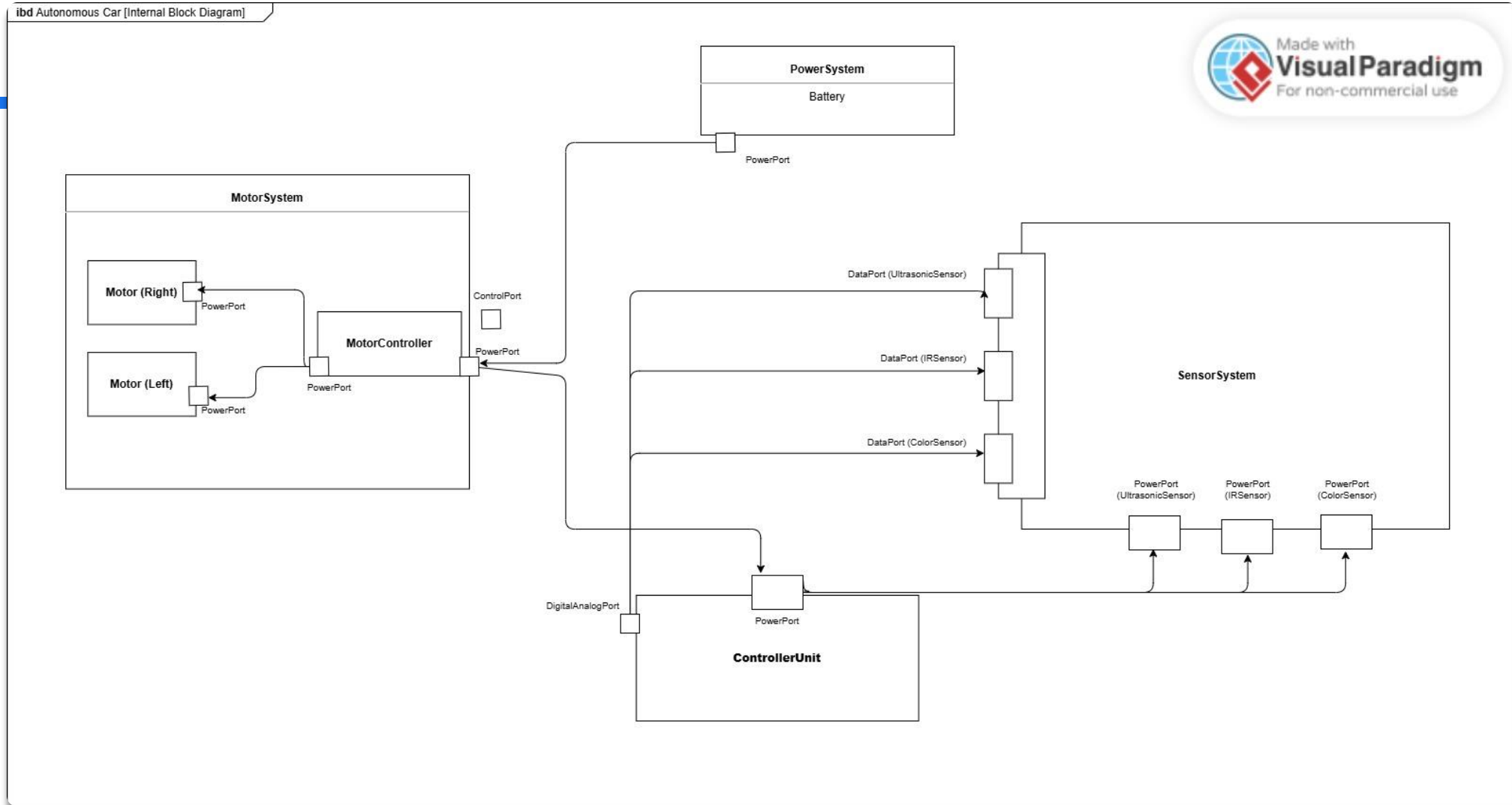
Experimentation with single IR

- Crab dance procedure; the car would wiggle left and right with different amplitudes to find the line.

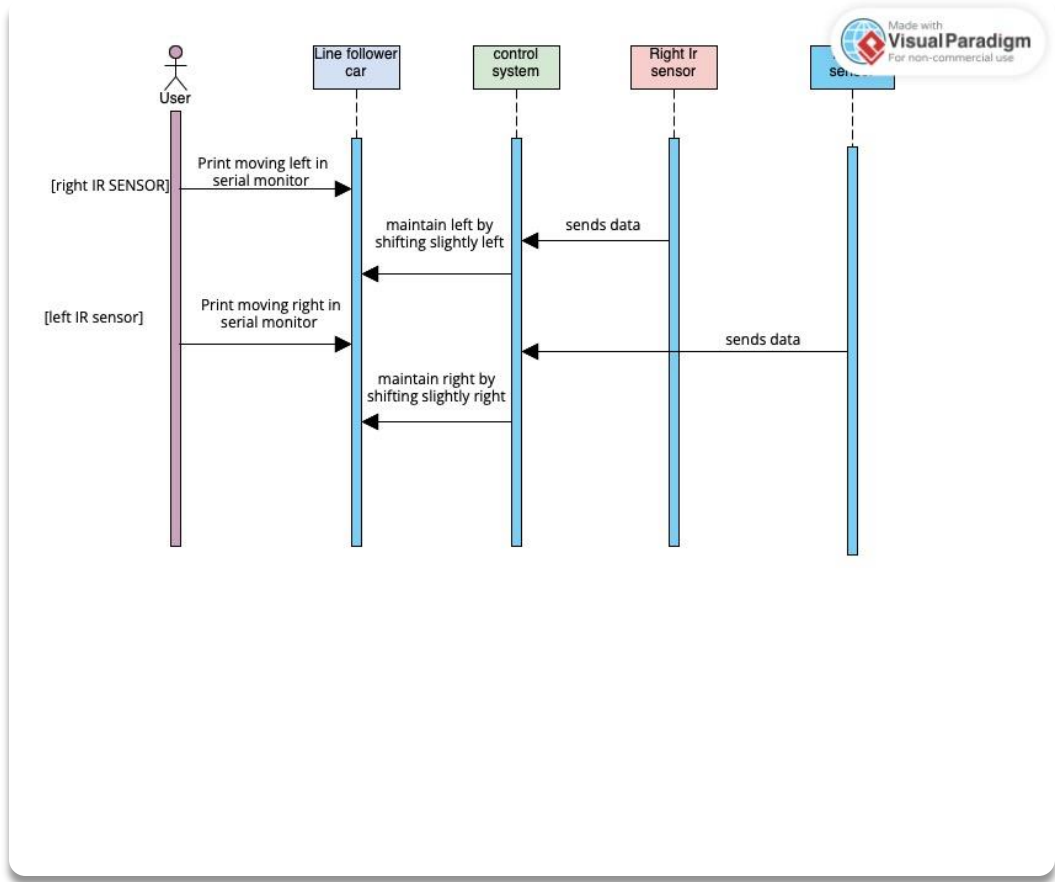




Block Definition Diagram (BDD)



Internal Block Diagram



INTERACTION STRUCTURE FOR FOLLOWING LINE



Outcomes and Achievements

- Can Follow a Line? ✓
- Can Take Turns at any angle (i.e 90 degree turn)? ✓
- Can optimize speed ? ✓
- Can detect obstacles? ✓
- Can evaluate colour of Object? ✓
- Can take 180 degrees turn? ✓
- Can overtake an obstacle? ✓
- Can park? ✓

FUTURE WORK:



Four-wheeled autonomous vehicle prototype



Servo motors mounted at the front and back to rotate ultrasonic sensors for environmental scanning



Current use of Arduino may be limiting due to insufficient digital pins



Considering switching to a different microcontroller with more I/O capabilities



Possible integration of a Real-Time Operating System (RTOS) for improved responsiveness and control



REFERENCES:

- [1] Joy-IT, "Color sensor module TCS3200," *Joy-IT.net*, [Online]. Available: <https://joy-it.net/de/products/SEN-Color>. [Accessed: 21-Jun-2025].
- [2] R. Santos, "Complete Guide for Ultrasonic Sensor HC-SR04 with Arduino," *Random Nerd Tutorials*, [Online]. Available: <https://randomnerdtutorials.com/complete-guide-for-ultrasonic-sensor-hc-sr04/>. [Accessed: 21-Jun-2025].
- [3] Lextronic, "Capteur de ligne Arduino OpenST1140," *Lextronic.fr*, [Online]. Available: <https://www.lextronic.fr/capteur-ligne-arduino-openst1140-51718.html>. [Accessed: 21-Jun-2025].
- [4] Components101, "L293D Motor Driver Module," *Components101.com*, [Online]. Available: <https://components101.com/modules/l293n-motor-driver-module>. [Accessed: 21-Jun-2025].
- [5] Arduino, "Arduino UNO Rev3 with long pins (Retired)," *Arduino Documentation*, [Online]. Available: <https://docs.arduino.cc/retired/boards/arduino-uno-rev3-with-long-pins/>. [Accessed: 21-Jun-2025].
- [6] Autodesk, "Tinkercad Circuits: Online Simulator for Arduino and Electronics," *Tinkercad.com*, [Online]. Available: <https://www.tinkercad.com>. [Accessed: 21-Jun-2025].