NXP AiM

ARTIFICIAL INTELLIGENCE in MOBILITY

Team Eagle

Sardar Vallabhbhai National Institute of Technology

Members Introduction

Prakhar Dubey

Electronics Engineering Department, Sem 4

Contribution

- ROS2 Integration
- Obstacle Avoidance

Harsh Agrawal

Electrical Engineering Department, Sem 4

Contribution

- Computer Vision
- Machine Learning

Mudit Bajaj

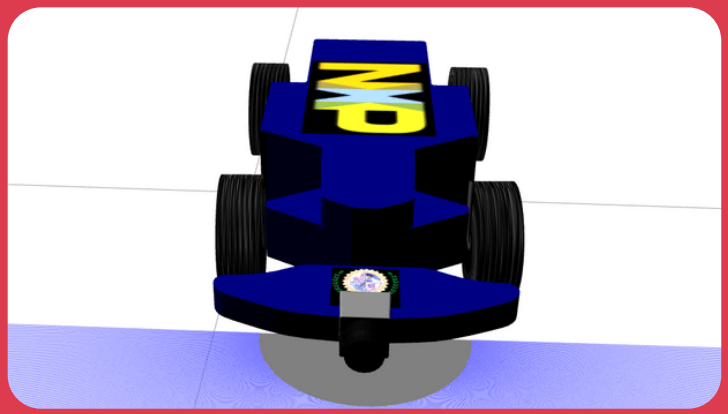
Electrical Engineering Department, Sem 4

Contribution

- Motion Control
- Sensor Integration

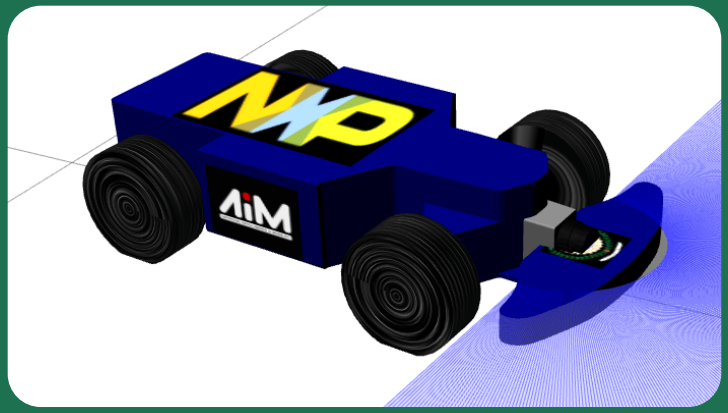
Car Model

Front

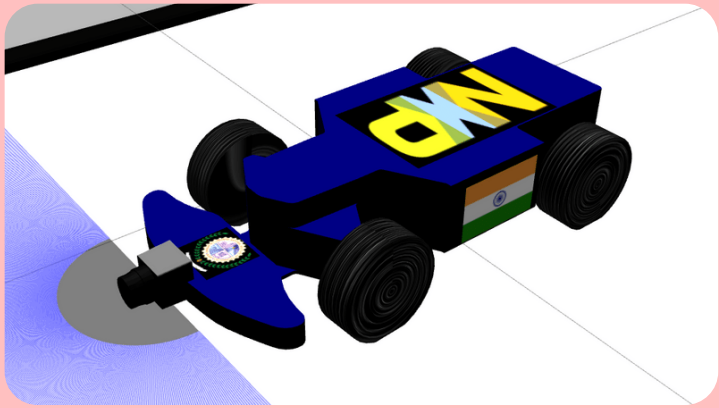


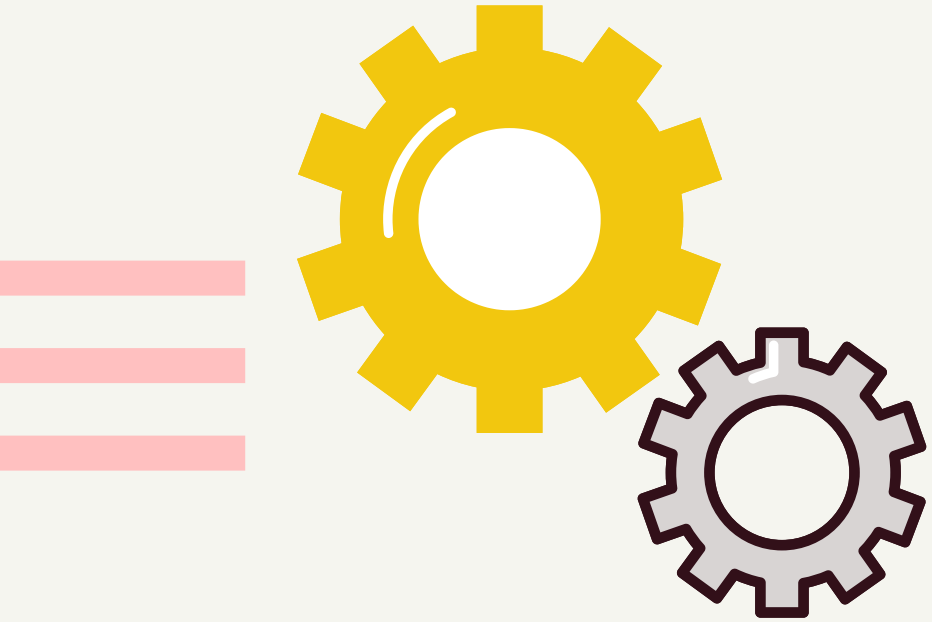
Rear

Left



Right



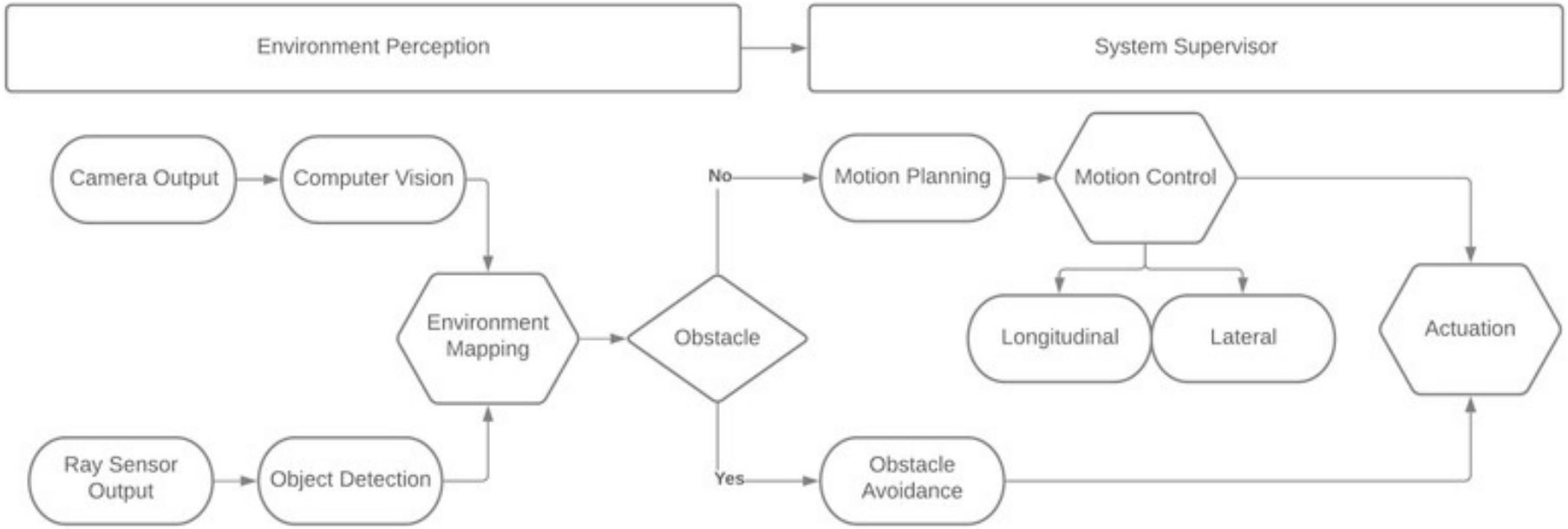


System Hardware, Interface and Sensors

- Sensor used: ROS Ray Sensor
- Interfacing : libgazebo ros block laser Plugin

- Other Sensors: Depth Camera

Software Architecture Block Diagram



AI/ML related implementation

YOLO V3

Yolo is one of the fastest object detection algorithms for real time detection without much loss of accuracy

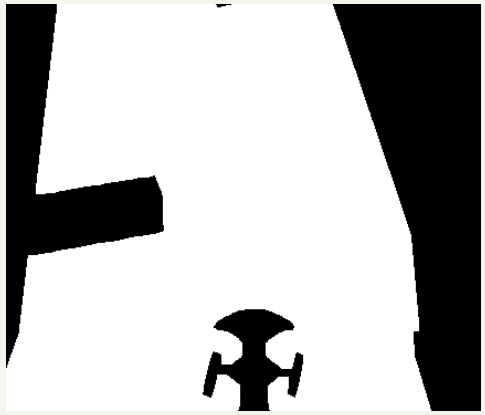
Obstacle Avoidance

The range data from ray sensor is converted into regions and for each respective region the lateral and longitudinal control is applied

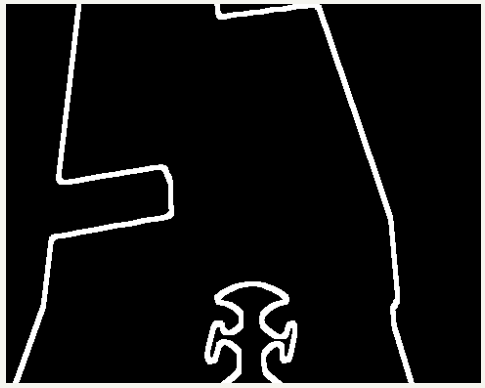
Coding

- HSV white was used for lane detection.
- Traffic Lights were detected using HSV image and filtering the red and green colors.

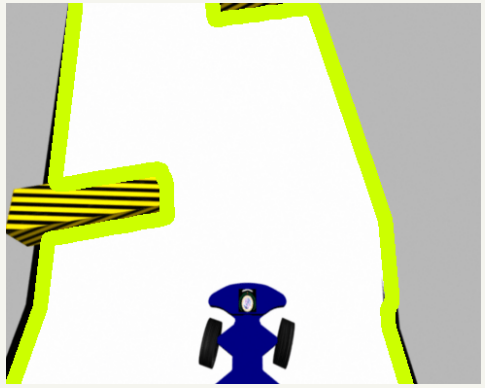
HSV



Canny



Final



Different things we tried

Haar Cascade

CLassification using Computer Vision for Sign Detection

Feature Detection

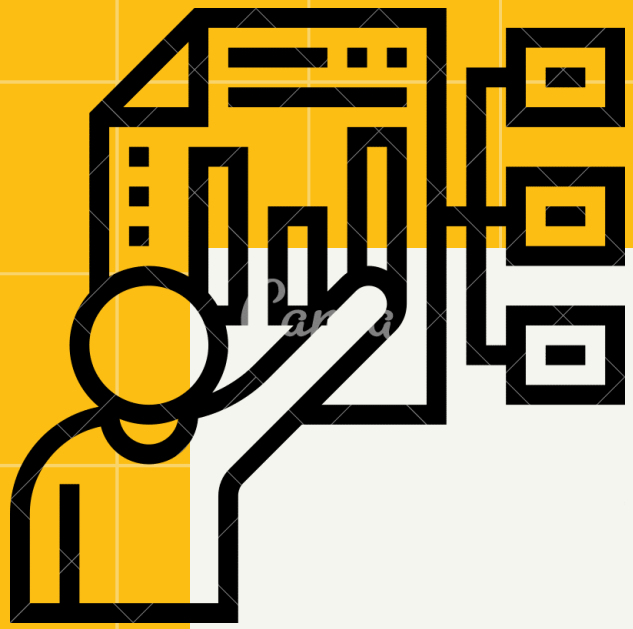
Examine pixels by Brute Force for feature matching

Image Classification

Image classification using Convolution Neural Network for Sign Detection

YOLO V5 and V4

Sign detection using custom data set trained with darknet neural network



Conclusion

This competition helped us in many ways by teaching us teamwork and continuous dedication. Working with the NXP team, we learned many skills like computer vision, ROS, Machine learning, and integration of various sensors. We are very grateful to our mentors for their constant support and helping hand, and we look forward to working with NXP in the future.