

# Smart Car

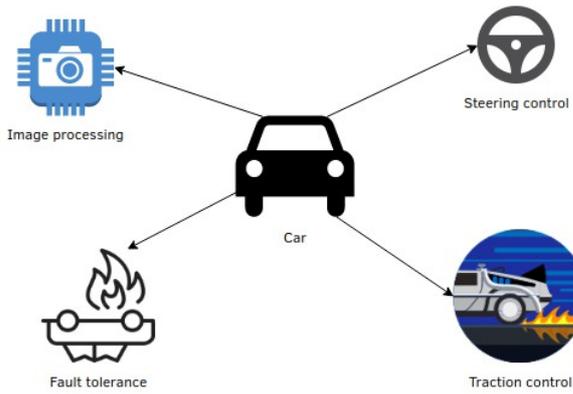


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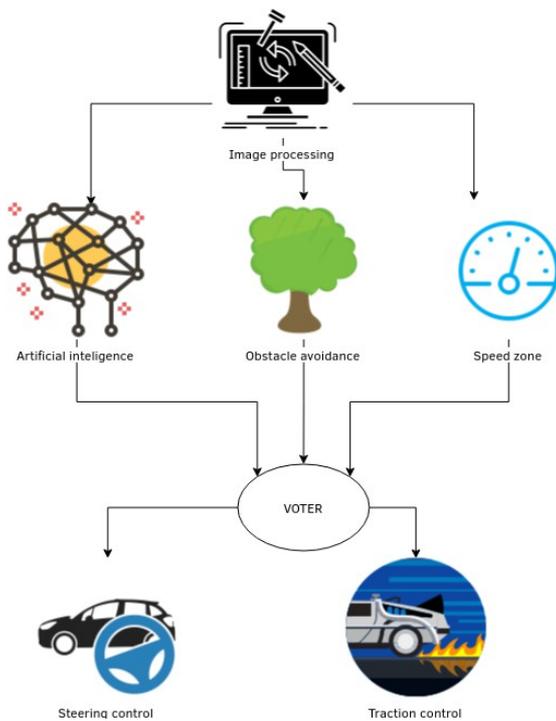
The car shall have several features separated by functionality:



1. Image processing
2. Fault tolerance
3. Steering control
4. Traction control

## Overview of the application - based on tracks

The application can be divided into different modules based on the different track the car is



running:

- Fast 2-line follower
- Obstacle avoidance
  - Break
  - Pass-by
- Speed zone detection

## **Fast 2-line follower**

This module is the primary module that controls the car. Its decisions are given by the neural network, which is trained to control the traction motors and the servo motor such that the car can finish a given trace.

The main features of this module should be accuracy in steering and speed (or, rather said, good time in finishing the race).

## **Obstacle avoidance**

This module, when is active, should give proper commands to stop or avoid an obstacle when needed. The track should be traversed by the “Fast 2-line follower”, and this (Obstacle avoidance) module should interfere only when an obstacle is detected.

## **Speed zone detection**

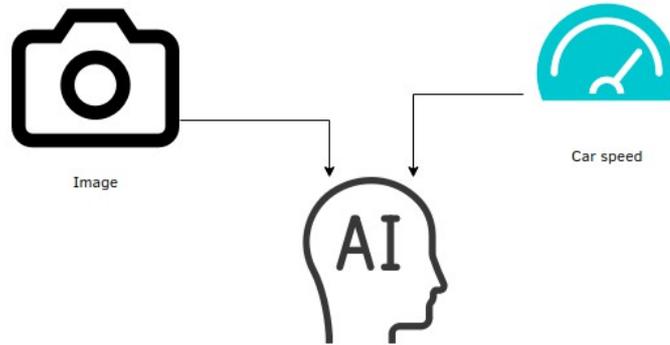
When activated, this module should control the speed of the car based on the feedback the camera returns. If the camera detects the pattern to slow down, this module should give the proper commands to slow down the car.

The different speeds of the car (slow and fast) are not explicit, the rule is that the car should have noticeable different speed.

## **Neural network**

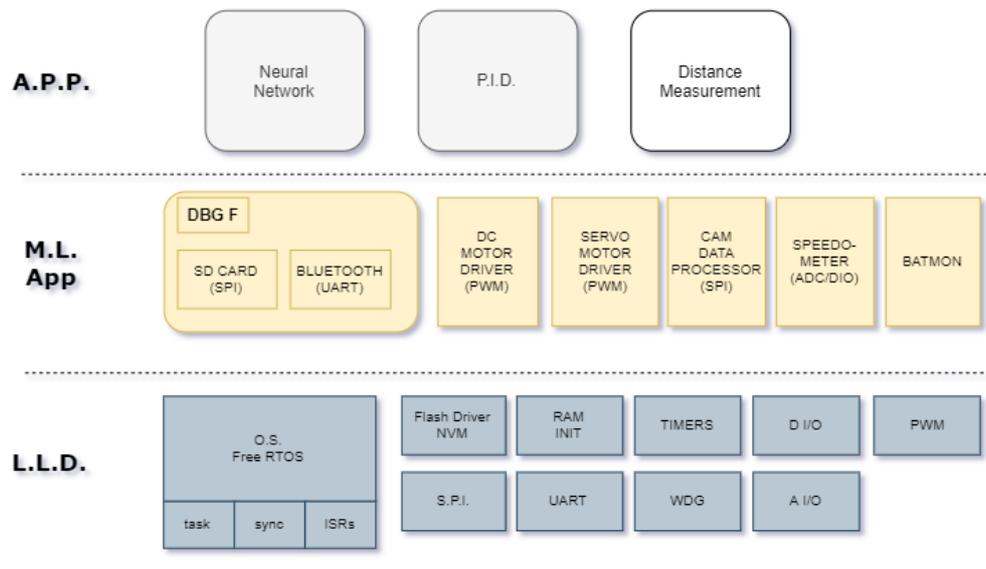
The neural network module should take as input the image from the camera and the speed of the car.

Its output should control the car speed (traction motors) and the steering of the car (the servo motor).



# Software architecture

<b>PLATFORM</b>	<ul style="list-style-type: none"> <li>- HW - microcontroller + periferics (camera)</li> <li>- Drivers</li> <li>- OS (Linux, Free Rtos, QNX)</li> </ul>
<b>Hardware Abstraction</b>	<ul style="list-style-type: none"> <li>- Image processing</li> <li>- Motor control</li> <li>- Servo (steering) control</li> <li>- Error handling</li> <li>- Measurements (speed)</li> </ul>
<b>Application</b>	<ul style="list-style-type: none"> <li>- Artificial intelligence</li> <li>- Obstacle avoidance</li> <li>- Speed zone detection</li> <li>- Voter</li> </ul>



## Modules interaction

