Smart Connected Car

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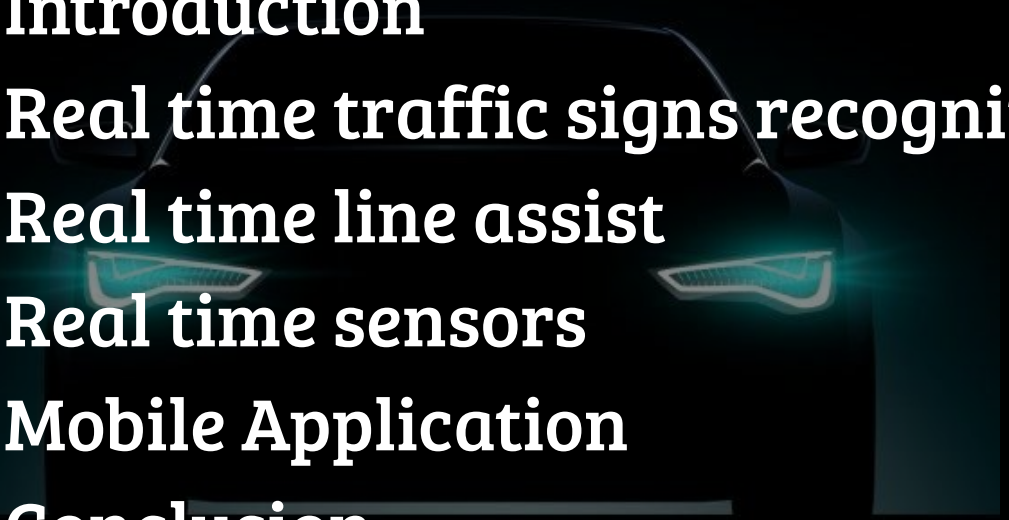
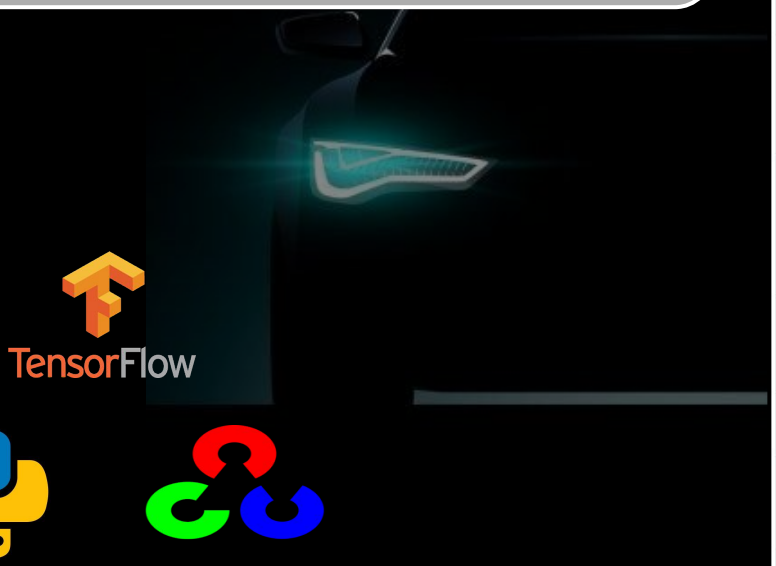
Summary



I. Introduction
II. Real time traffic signs recognition
III. Real time line assist
IV. Real time sensors
V. Mobile Application
VI. Conclusion

II.Real time Traffic Signs recognition

Which pre-trained model should we choose ?
→ mAP (mean Average Precision)(%)
→ total time execution (ms)



model	mAP	parameters	flops	memory_mb	total_exec_millis
Faster R-CNN Resnet 50	91.52	43337242	533575386662	5256.454615	104.0363553
Faster R-CNN Resnet 101	95.08	62381593	625779295782	6134.705805	123.2729175
Faster R-CNN Inception V2	90.62	12891249	120621363525	2175.206857	58.53338971
Faster R-CNN Inception Resnet V2	95.77	59412281	1837544257834	18250.446008	442.2206796
R-FCN Resnet 101	95.15	64594585	269898731281	3509.75153	85.45207971
SSD Mobilenet	61.64	5572809	2300721483	94.696119	15.14525
SSD Inception V2	66.10	13474849	7594247747	284.512918	23.74428378
YOLO V2	78.83	50588958	62780021160	1318.108256	21.4810122

Using the original work from Alvaro Arcos, doctor at the Seville University, Spain

II.Real time Traffic Signs recognition

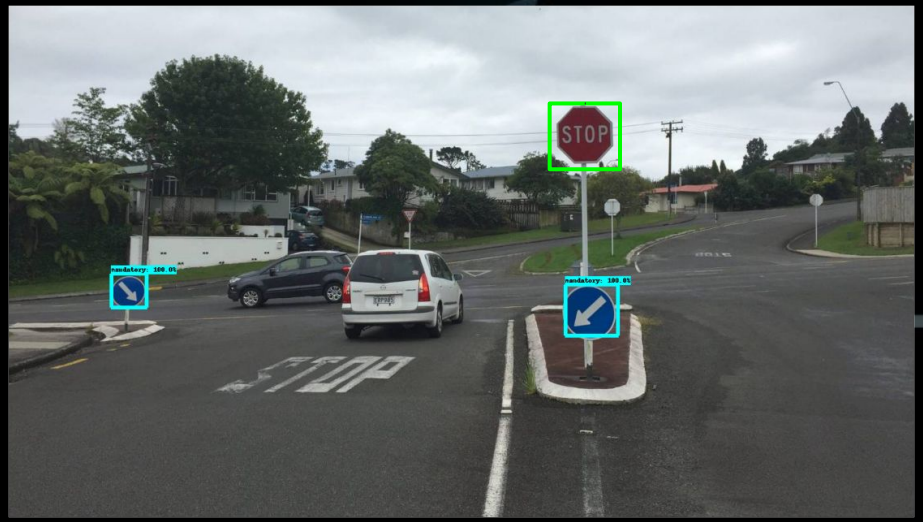
Detection box example :

First detection results using RFCN Resnet 101
reliability : 95%

The network recognizes well <u>french signs</u> even if it was trained with <u>german signs</u> !

II.Real time Traffic Signs recognition

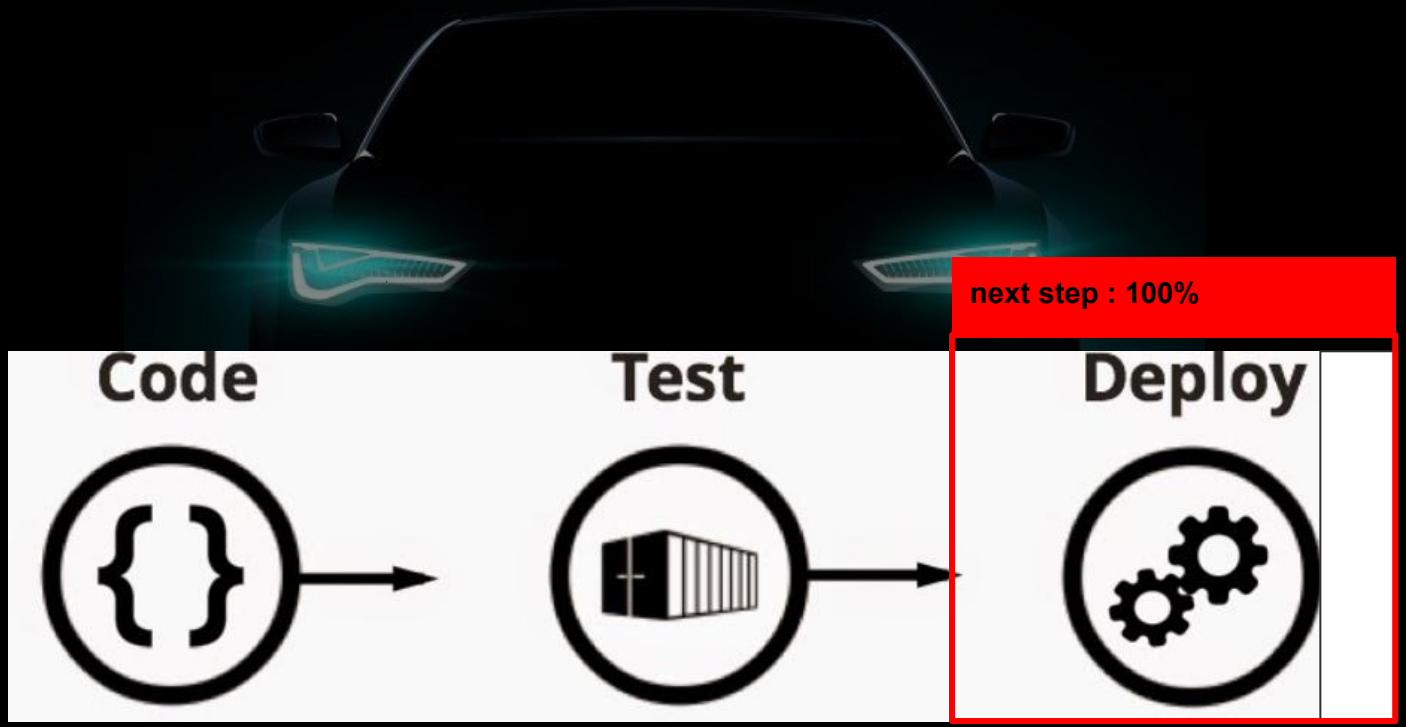
How to transmit the information if there are various detected signs ?
→ We need to estimate the distance between the car and the sign



Return to the user :
→ Recognized sign classes
(Danger - Mandatory - Prohibitory)
→ Order of the detected signs

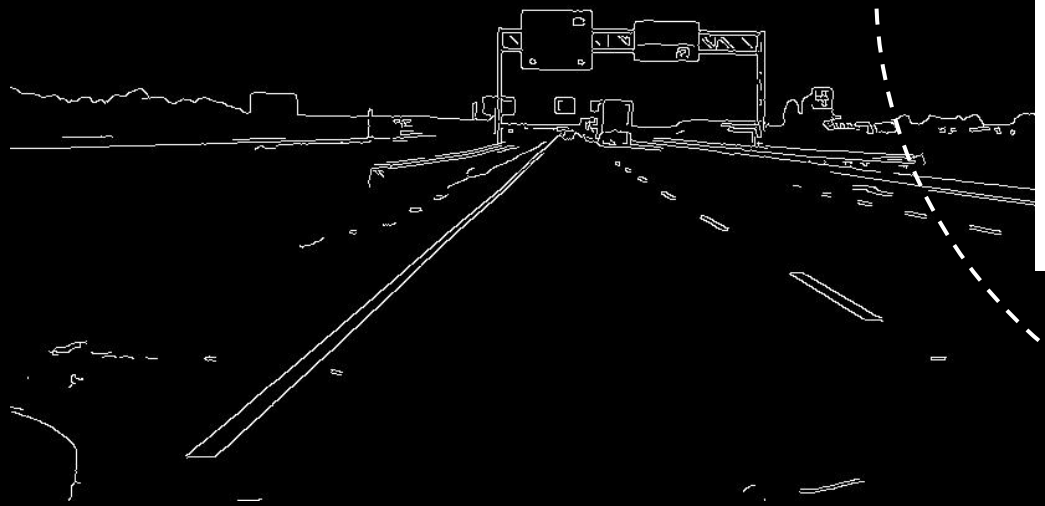
1. Danger
2. Mandatory
3. Mandatory

II.Real time Traffic Signs recognition



III.Real time Line Assist

Image Processing for Line Assist
TOOL BOX



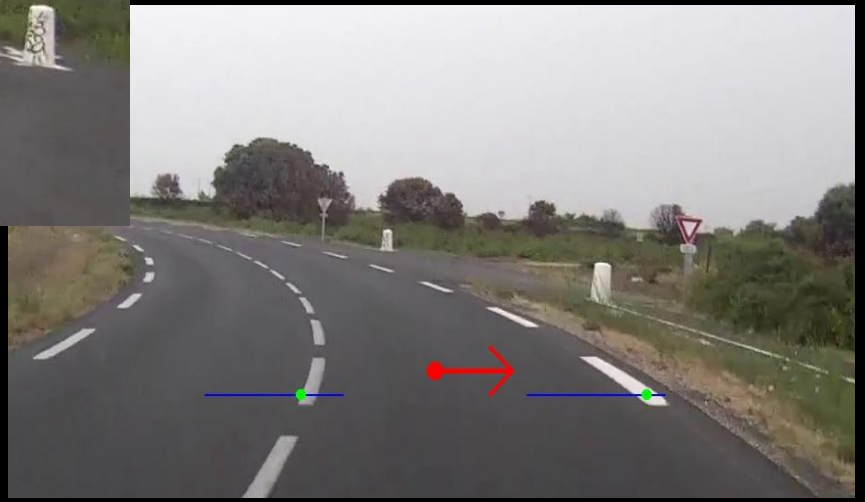
spyder

```
capteur1=cv2.Canny(gray1, th1, th2)
```

OpenCV

python™

III.Real time Line Assist



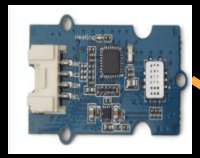
III.Real time Line Assist

Bad Weather

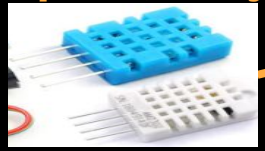
Night

IV.Real time Sensors

Sensor mutichanel gas

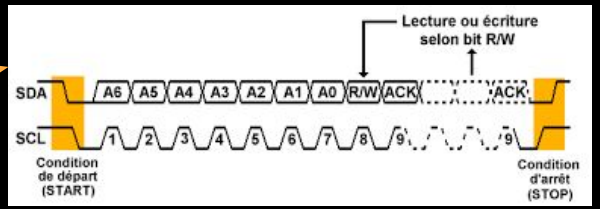


Sensor temperature,humidity



NVIDIA • Jetson Nano

protocole I2C



Plan actions :

1- Achieve the code of sensors in IDE. 100% done.

2- Develop code in our card board jetson. not yet.

3- Plan B ,achieve final code with arduino board and send data to file text . 60% done.

V.Mobile Application

Application organization:

- Home Page
  - Air Quality
  - Driving Style
  - Fuel Consumption
  - Easy parking localisation
  - Traffic signs
  - Line assist
  - Alert list
  - Settings

Main characteristics :

- Easy to use interface, with large buttons and font size
- Dynamic display buttons

V.Mobile Application

Air quality page

- Informations available :
  - Temperature, inside the car
  - Humidity rate, inside the car
  - CO2 rate, inside the car
  - General Air Quality index, inside the car
  - General Air Quality index, outside the car (current location).

Informations sources:

- Added sensors :
  - Temperature/humidity sensor
  - Gaz sensor (CO, smoke, etc)
- Official information websites
  - Air Quality index

V.Mobile Application

Driving Style page
- Informations available :
  - Driving style index
  - Number of abrupt acceleration in the last hour
  - Advices the driver

Informations sources:
- Built-in sensors :
  - Accelerometer
  - Gyroscope

V.Mobile Application

Fuel Consumption page
- Informations available :
  - Average fuel consumption
  - Total spent on fuel (by month)
  - Total spent with car maintenance, etc
  -

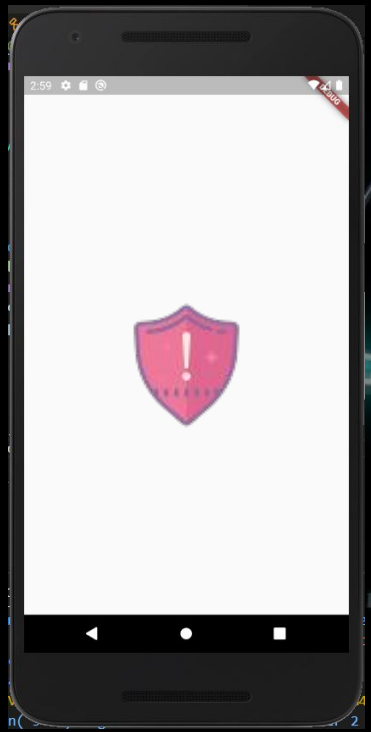
Informations sources:
- User input data

V.Mobile Application

Easy parking page
- Informations available :
  - current GPS position
  - Parking marker
  - Personal markers

Informations sources:
- Built-in GPS sensor

V.Mobile Application



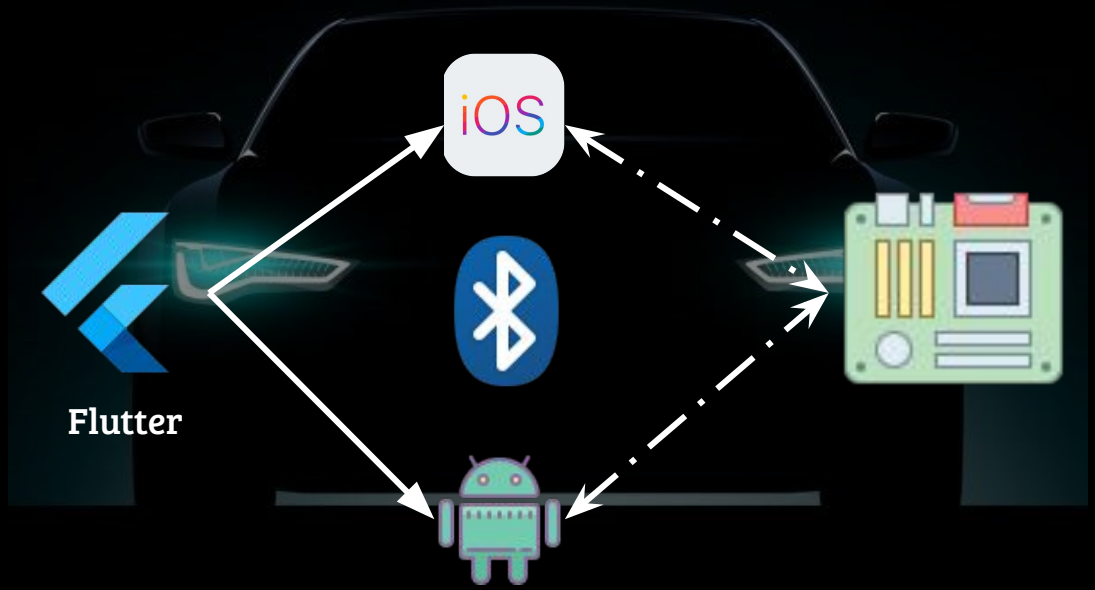
Vocal and visual alerts

- Type
  - Smoke detected inside the car
  - Bad air quality
  - Temperature alert
  - Multiple abrupt accélérations detected
- Form
  - Visual Images displayed on the smartphone screen
  - Vocal messages produced by the phone

Informations sources:

- Built-in sensors
- Alert codes sent by the motherboard

V.Mobile Application



VI.Conclusion

Progress on each feature

Technical problems

Respected schedule

Integration problems

Additional features

Thank you for your attention.

Do you have any questions?