



Technical Presentation Brochure

Challenge Introduction

Context

1st challenge of its kind in Europe for **automated driving** in a **real-world environment**

Students & start-ups



Neither a speed race, nor a consumption race



By team

TEQMO, dedicated tests center for autonomous and connected vehicles.

With or without vehicle



Complete or partial **conception of a vehicle** or **functions** related to **autonomy & safety**



The concept

Types of categories:



Urban Track



Highway Track



Automated Parking



Open Trial



Participation:

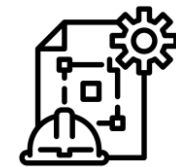
- One or more test(s) of your categorie
- With or without vehicle

Rating system

50% Technical



50% Project





CHALLENGE
UTAC CERAM
VÉHICULES AUTOMATISÉS ET CONNECTÉS

Vehicle Technical requirements

Vehicle

- Possibility to compete with and without vehicle (Open Trial)
- All types of vehicles are accepted
- The specifications must be respected
- The vehicle must validate the dedicated technical inspection on the D-day



All registered vehicles must meet the following minimum requirements:

- The vehicle **shall be designed to be safe** for its driver, any passengers and the environment.
- The vehicle must be **motorized**, have at least **three (3) wheels**, have at least one **driver trained to drive** it and able to intervene at any time.
- The vehicle shall **not be remotely controlled**, except the emergency stop function.
- The vehicle must **pass the technical control** on the day of the event. (next slide for more information)
- In case of convoy driving project (platooning function), then each vehicle must meet the above requirements.

Vehicle Technical specifications

- **Braking check** at the maximum speed of the vehicle: expectation $> 5 \text{ m/s}^2$.
- **Steering check**, expectation: be able to drive in a circle with a radius of 12m with a steering effort $< 25 \text{ daN}$ at a speed of 10km/h.
- **Exhaust system check** in case of a combustion engine.
- **Noise check** at the maximum authorised speed. Expectation $< 80 \text{ dB(A)}$.
- **Visual checks** (leaks, field of vision, condition of wiring, condition of tyres, safety aspects, absence of cracks, breaks, deformations on safety components)
- **Seat belt and helmet check**
- **Emergency stop button check** (on the vehicle)



Final application
report
-
Summary

Final application report Summary

1. Definitive team list (students and supervisors)

(Full name, Role, year, Date of birth, Email)

2. Project context

- 2.1. Name & context
- 2.2. Summary
- 2.3. Presented vehicle/system
- 2.4. Test(s) choice explanation
- 2.5. Impact of the sanitary context

3. SMART Criteria

4. Results – Functionalities to be satisfied by the vehicle / system

- 4.1. Expected results
- 4.2. Achieved results

5. Technical description

- 5.1. Initial state (of the vehicle / system)
- 5.2. Technological choices, developments achieved
- 5.3. Final state (of the vehicle / system)

6. Project organization

- 6.1. Planning

6.2. Mobilised resources and their occupation

- 6.2.1. Human resources [days/HR] and human organisation
- 6.2.2. Hardware resources
- 6.2.3. Financial resources (financing method of the project, provisional and actual budget)

7. External inputs

- 7.1. Partnerships & sponsoring
- 7.2. Technical & hardware support
- 7.3. Global estimation of external inputs

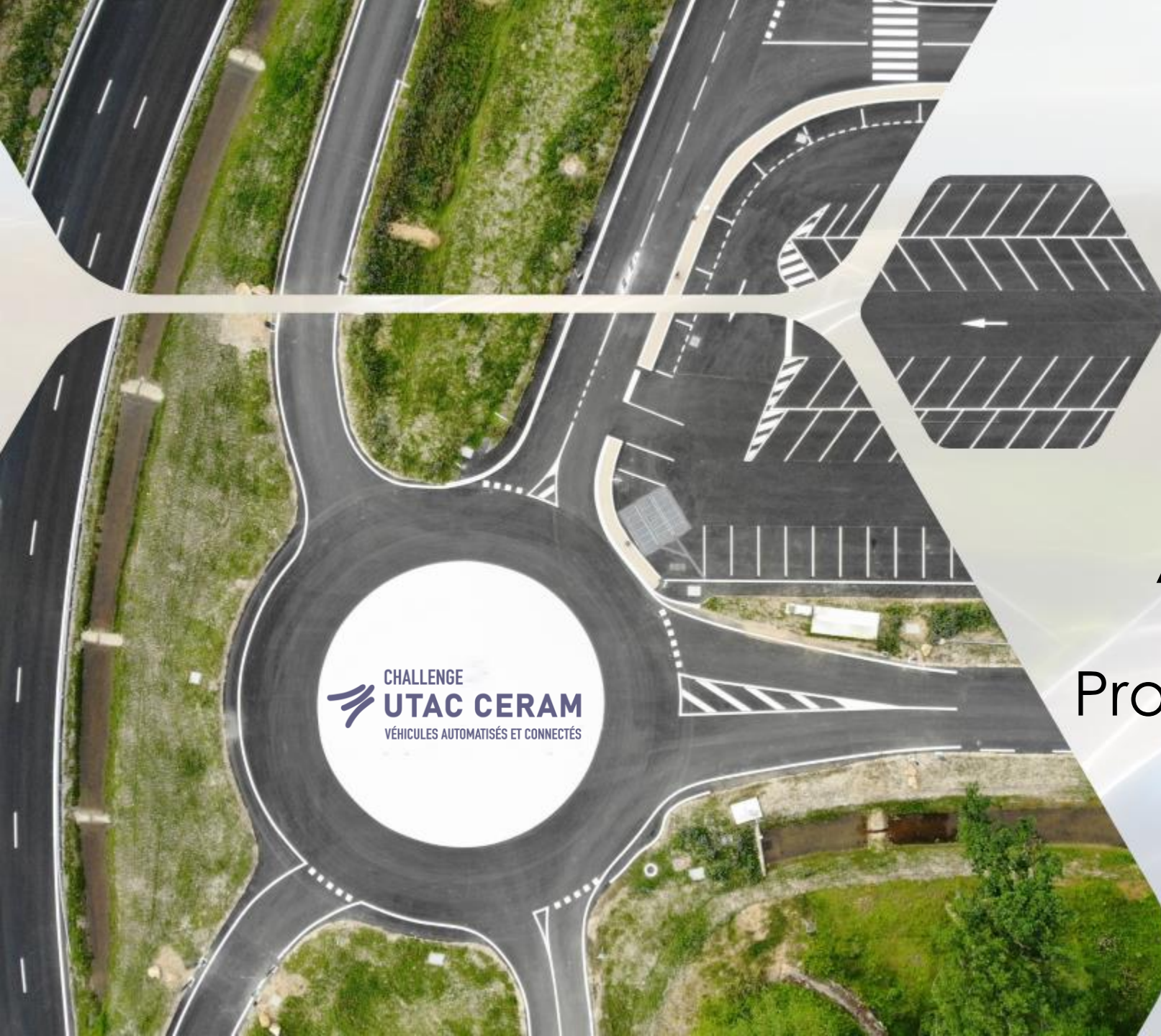
8. Future perspectives of the project

(Improvements, new developments, new targeted tests, ...)

9. Conclusion

10. Appendices

- Annex 1 : Team resume (students and supervisors)
- Annex 2 : Certificate of insurance
- Annex 3 : Certificate of compliance with the Rules of the Challenge
- Annex 4 : Certificate on image rights



Assessment system
-
Project & Technical part

50%

Project part

- technological maturity
- innovation
- project management
- Technical difficulty
- group dynamics
- communication



50%

Technical part

- efficiency
- security
- autonomy

Assessment system

Project 1/1

Technological maturity - 15 points

Development progress, number of fundamental functions (detection, fusion, navigation, control/command), ...

Innovation - 15 points

Innovative and original nature of the project (function, vehicle integration, etc.).

Project management - 20 points

Rigor and efficiency of project management, considering time, resources and possible support the project has received.

Technical difficulty - 20 points

The use of scientific and technical skills.

Group dynamics - 10 points

Team spirit, perseverance, fair play and diversity (culture, disability, gender, etc.).

Communication - 20 points

Communication, oral presentation and ability to find funding.

Assessment system

Technical – Open trial 1/1

Efficiency - 40 points

Efficiency of the solution and performance demonstrated

Security - 30 points

Interests in road safety and/or vehicle safety-validation

Autonomy - 30 points

Benefits for vehicle automation and/or Smooth Driving

Assessment system

Technical – Highway and Urban tracks

1/2

Driver intervention - 30 points

Occurrence of driver intervention
(steering wheel, accelerator or brake):

With security risk
(otherwise loss of control, impact, ...)
→ - 8 pts

Without security risk (stops, braking,...)
→ - 2 pts

Duration of the driver's intervention:

5 pts per 5% of the total time in the case of long interventions.

Example: I kept the steering wheel in my hands for 10s on a 100s run, I lose 10 pts in the driver intervention category.

Autonomous driving- 25 points

Lane keeping:

with security risk
(illegal lane change, ...)
→ - 10 pts

without security risk → - 3 pts

Dummy collision:

A dummy will be placed randomly on the test.

→ - 10 pts

Example: My vehicle does not avoid the dummy, the collision costs me 10 points.

Time - 20 points

Time to perform the test:

T_{min} = time needed to complete the route at a speed strictly equal to the speed limits.

$$T_{max} = 1,5 \times T_{min}$$

- 1 pt per 5% of T_{min} , after exceeding T_{max} .

A vehicle with a time $2 \times T_{min}$ would have 10 pts out of 20.

Example: Exceeding 10% of the T_{max} of the test, loss of 2 points.

Assessment system

Technical – Highway and Urban tracks

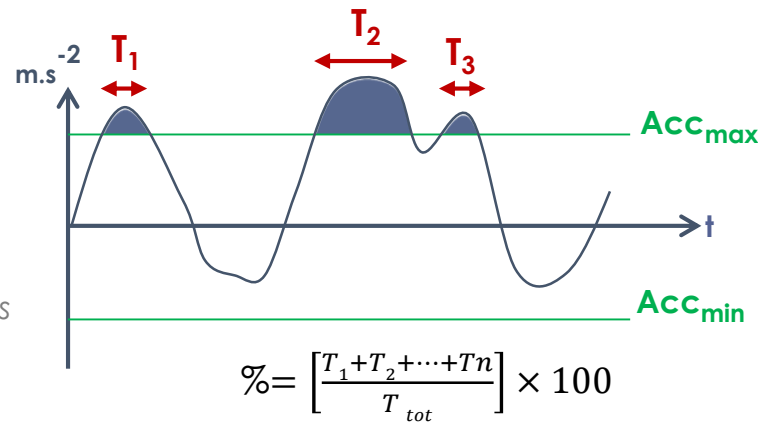
2/2

Smooth Driving - 15 points

Lateral acceleration:

Percentage of time out of threshold on test time. - 3 pts for every additional 5% with the threshold values: **urban 2 m.s⁻²** and motorway **1.5 m.s⁻²**.

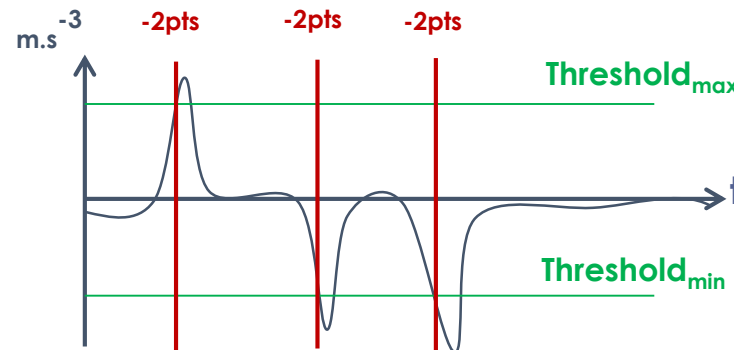
Example: Over 100s, the lateral acceleration was above the limit value for 5s. I lose 3 pts.



Longitudinal jerk :

-2 pts per occurrence of exceeding the threshold value, **urban 3 m.s⁻³** et **highway 1,5 m.s⁻³**.

Example: During the course I exceed the jerk threshold value 3 times, thus - 6 pts.



Compliance with traffic regulations - 10 points

In the case of the Urban route:

Respect of the signs:

- 2 pts for each infraction: traffic lights, give way, stop sign, ...

In the case of the Highway route :

Speed limits:

Percentage of time in overspeed on the test, - 2 pts per 5% step.

Assessment system

Technical – Automated parking 1/2

Driver intervention - 30 points

Occurrence of driver intervention
(steering wheel, accelerator or brake):

With security risk
(otherwise loss of control, impact, ...)
→ - 8 pts

Without security risk
(the vehicle stalls, brakes,...)
→ - 2 pts

Efficiency - 30 points

Ratio of length and width of the vehicle to the parking space.

Variety of feasible parking scenarios

Number of manoeuvres

Automatic parking space search

Compliance with traffic regulations -15 points

Dummy collision:

A dummy will be placed randomly on the test.

→ - 10 pts

Example: My vehicle does not avoid the dummy, the collision costs me 10 points.

Non-use of turn signals

→ - 5 pts

Assessment system

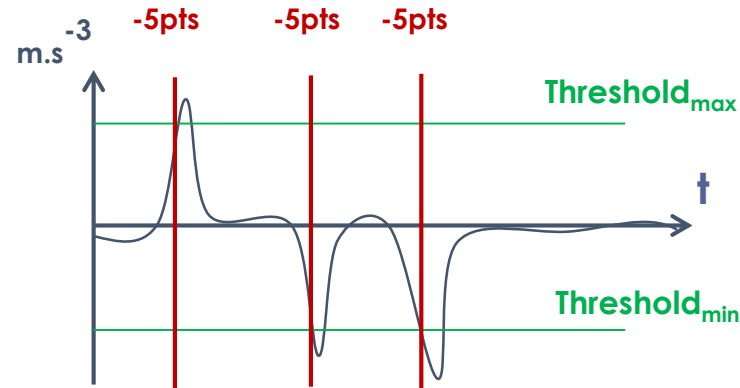
Technical – Automated parking 2/2

Smooth Driving - 15 points

Longitudinal and lateral jerk:

-5 pts per occurrence of exceeding the threshold value of $X \text{ m.s}^{-3}$.

Example: During the test I exceed the jerk threshold value 3 times, thus -15 pts



Impact and major line crossing: - 8 pts

Time - 10 points

Time to perform the test:

T_{\min} = time needed to complete the route at a speed strictly equal to the speed limits.

$$T_{\max} = 1,5 \times T_{\min}$$

- 1 pt per 5% of T_{\min} , after exceeding T_{\max} .

A vehicle with a time $2 \times T_{\min}$ would have 10 pts out of 20.

Example: Exceeding 10% of the T_{\max} of the test, loss of 2 points.



Théo CHARBONNEAU
Project activity manager
ADAS & AD

Challenge-VA@utacceram.com

<https://www.utacceram.com/fr/accueil-challenge>

New automated and connected mobility