Preliminary Design Report

Robotaxi 2022

Preliminary Design Report

Summary 01

Emphasis should be placed on the software design process, acquired skills, and unique aspects of the design. The task to be performed by the autonomous vehicle should be briefly explained and general information about the performance of the vehicle that will perform this task should be conveyed.

Team Organization 02

An organizational chart showing the work sharing during the Robotaxi Autonomous Vehicle design process and who is working should be shown. The work packages to be used in the vehicle design process should be shown with a "timeline graphic". Also, the main work packages should be briefly described with their requirements and objectives.

Vehicle Features 03

The vehicle must support electronic steering (steer -by-wire), electronic accelerator (pedal -by-wire) and electronic brake (brake -by-wire) functionality. In this section of the report, detailed information should be given about the vehicle to be used, focusing on autonomous driving interfaces.

Originality 04

In the works to be carried out within the scope of the competition, those with unique features in terms of design and/or software should be targeted. Whether these targets have been achieved or not will be evaluated in the detailed design report.

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Sensors — 05

In this section, information will be given about the sensors (lidar, radar, camera, etc.) to be used in the vehicle. Information should be given about the number of sensors, their location on the vehicle, how much volume the sensors can cover around the vehicle for autonomy purposes, and the sensor fusion algorithms used.

Vehicle Control Unit (VCU) — 06

Information about the control unit intended to be used in the vehicle should be conveyed. Wireless communication system should be explained. Control software features must be transferred.

Autonomous Driving Algorithms — 07

In this section, information should be given about the autonomous driving algorithms used in the vehicle, such as the recognition of traffic signs and lane tracking.

Security Precautions — 08

During the test phase and during the competition, the precautions to be taken for possible dangerous situations will be determined and information about the vehicle systems planned for this will be conveyed.

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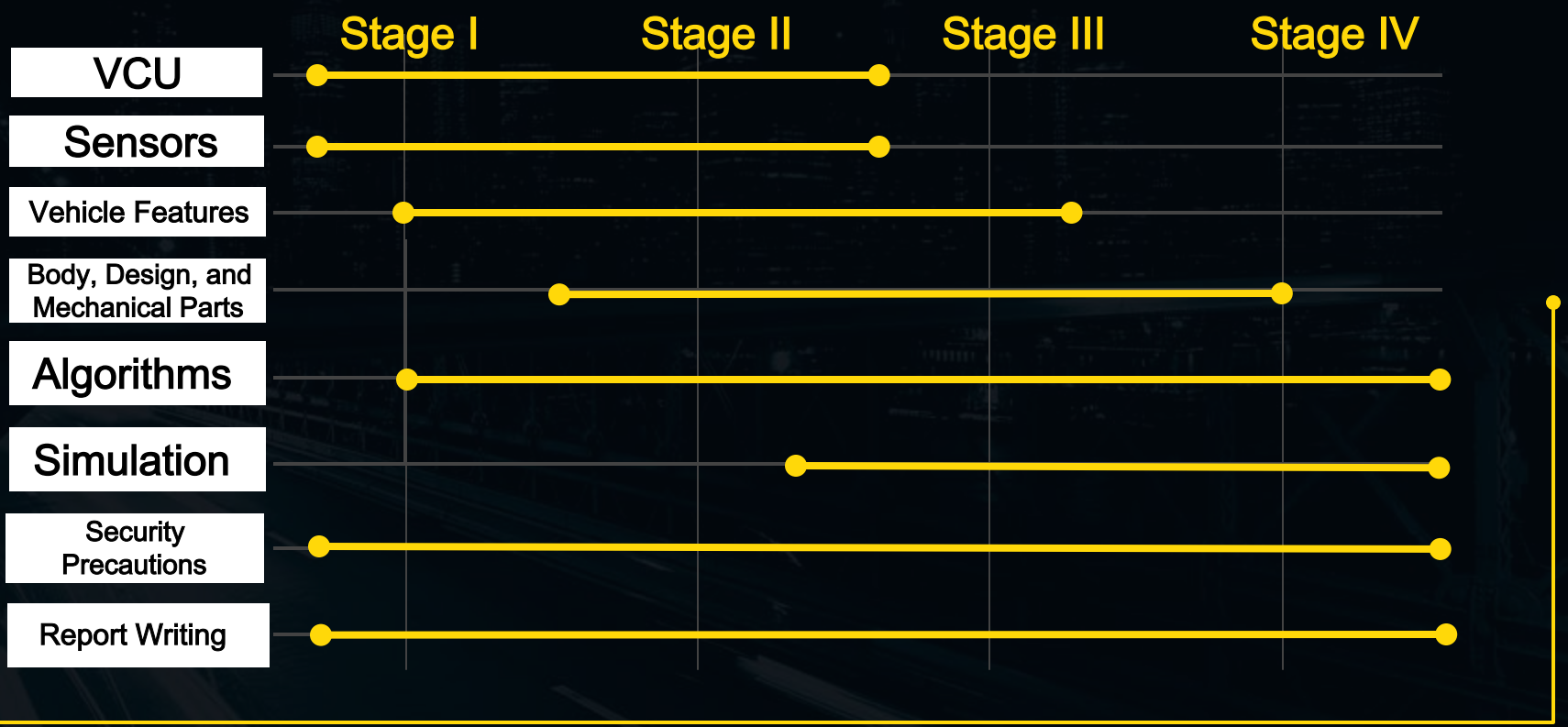
Simulation 09

The video of the realized simulation will be uploaded to YouTube before the date specified in the specification and its name/link will be included in this section of the report. Team information should be included in the video to be uploaded. No changes will be made on the video after the date specified in the specification. This video is considered as proof of concept of the simulation.

References 10

You should specify the resources, websites, trainings, books, articles, etc. you have used in this section.

TASK DEPENDENCIES



TASK PARTITIONING

Team Member	VCU	Sensors	Vehicle Features	Body, Design & Mechanical Parts	Algorithms	Simulation	Security Precautions	Report Writing
Afef Salhi		✓	✓		✓			✓
Ameni Jellali		✓			✓		✓	
Amin Guesmi				✓				
Fadhel Essid						✓		
Fatma Zahra Trabelsi					✓			
Hadil Sridi	✓		✓ ✓				✓	
Hamza Jmii		✓						
Nesrin Abidi	✓		✓				✓	
Oussama Jouni	✓	✓			✓			
Racem Ghorbel						✓		
Mohamed Yassine Bouaziz				✓				
Wael Aissaoui				✓				
Elyes Khechine	✓	✓	✓	✓	✓	✓	✓	✓

Preliminary Design Report Scoring

Section		Scoring
1	Summary	5
2	Team Organization	5
3	Vehicle Features	10
4	Originality	15
5	Sensors	5
6	Autonomous Driving Algorithms	15
7	Vehicle Control Unit	15
8	Security Precautions	5
9	Simulation	$(P - 1500) \cdot 0.02$ *
10	References	5

* P, represents the scores from the simulation according to Table 3 in the competition specification.

Overall Competition Scoring

Task Type	Point
Starting To Move The Vehicle	200
Picking-Up Passengers According To The Rules	500
Droping-Off Passengers According To The Rules	500
Reaching To The Parking Point	500
Parking According To The Rules	500
Following The Right Path (Not Acting in Violation of Reverse Direction)	500
Preliminary Design Report Score (Evaluated Out of 100)	100 (max)
Critical Design Report Score (Evaluated Out of 100)	100 (max)
Competition Evaluation Presentation Score	100 (max)
First Traffic Rule Violation	-50
Second Traffic Rule Violation	-100

Table 3 – Task and Penalty Points

Simulation Video Evaluation

- Creating a racing track in any simulation environment
- Creation of the vehicle and sensors in accordance with the specified technical requirements
- in the simulation environment
- Performance of tasks (will be shown through the selected simulation program during the presentation)
- The results of the study should be sufficient and meaningful, supported by graphics and figures
- As a result of the student's preliminary design work, the plan and program for the future stages
- Modern engineering software and hardware selection/use
- Required background work and analysis
- Including the necessary technical data (all technical data must be included in the preliminary design report)
- Professional presentation skills
- Presentation video durations will be a maximum of 10. It should be noted that video durations will not be flexible. Teams have to explain the simulations they include in their reports during the presentation video.
- Preliminary design report and presentation video will be evaluated according to the template to announced on the website. The teams to be supported will be determined according to the score ranking that will be formed by the evaluation of the preliminary design report and presentation as stated in the appendix.