



Formula Student Germany Driverless Rules Draft 2017

Version 1.0
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2.2 Cockpit

- 2.2.1 FSD vehicles must still have a fully operational cockpit according to 2016 FSAE rules.
- 2.2.2 In derogation from 2016 FSAE rule T3.10.4 c., the bottom 200 mm circle of the 95th percentile male template will be placed on the seat bottom such that the distance between the center of this circle and the rearmost face of the pedals is no less than 865mm (34 inches).
- 2.2.3 In derogation from 2016 FSAE rule T4.2 the cockpit internal cross section template may be replaced by the template shown in Fig. 1 in a section of max. 200 mm length in the area of the steering actuation. Except for the 200 mm section, the original template must be used. The template must be used as depicted in Fig. 1 or upside down.

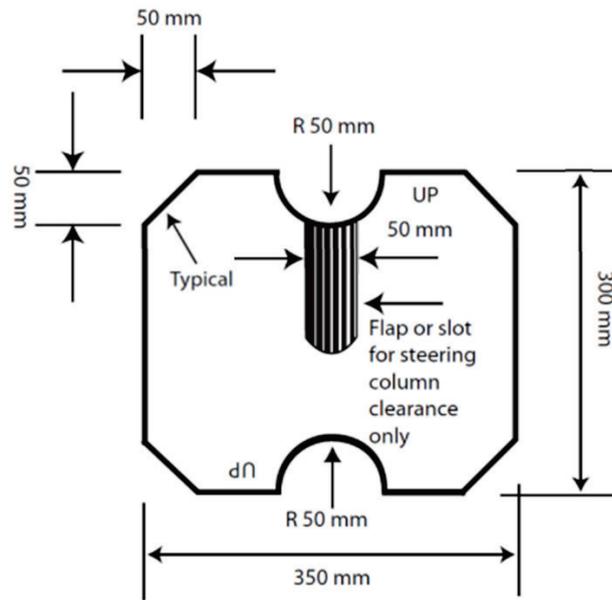


Figure 1

- 2.2.4 The additional space according to rule 2.2.2 and 2.2.3 must only be used for steering and braking actuators. When steering actuators and braking actuators are removed, the templates as specified in 2016 FSAE rules T3.10.4 and T4.2, must to fit in the cockpit.

2.3 Wireless Communication

During dynamic events, the wireless communication is limited to ensure that the car is driving autonomously. It is prohibited to change parameters, send commands or make any software changes by wireless communication. An exception is the remote emergency system described in 3.4. Receiving information from the car via one-way-telemetry is allowed.

2.4 Data logger

FSG will provide a standardised data logger that must to be installed in any FSD vehicle during the competition. Further specifications for the data logger and required hardware and software interfaces will be included in the final 2017 FSD rules.



The intention of the data logger is to understand and reproduce the perception as well as the motion planning of the vehicle by the algorithm based on the information and data collected by the sensors implemented in the car.

Note: A vehicle software or algorithm that bases purely on upfront loaded track data does not comply with intention or rules of FSD.



3.2.12 The autonomous system must not start the combustion engine or activate the HV system.

3.3 Autonomous System Status Indicator

3.3.1 The vehicles must include a single Autonomous Systems Status Indicator (ASSI) that must indicate the status of the autonomous system. The ASSI must not perform any other functions.

3.3.2 Autonomous System Status definitions will be included in the final FSG 2017 rules.

3.3.3 The ASSI mounting location must:

- a) Be near the main roll hoop at the highest point of the vehicle.
- b) Be mounted lower than the highest point of the main roll hoop.
- c) Be no lower than 150 mm from the highest point of the roll hoop.
- d) Not allow contact with the driver's helmet in any circumstances.
- e) Not be in proximity to other lights, except the TSAL

3.3.4 The ASSI must be visible:

- a) From every horizontal direction, except small angles which are blocked by the main roll hoop.
- b) From a point 1.6 m vertically from ground level, within a 3m horizontal radius from the ASSI.
- c) In direct sunlight.

3.4 Remote emergency system

3.4.1 Every vehicle must be equipped with a standard remote emergency system (RES) specified by FSG. The system consists of two parts, the remote control and the vehicle module.

3.4.2 The RES must be purchased by the teams.

3.4.3 The RES has two functions:

- a) When the remote emergency stop button is pressed:
 - i. the vehicles safety circuit must be opened in a direct way.
 - ii. the emergency brake system must be triggered. The emergency brake system must apply to rule 3.7.
 - iii. The autonomous steering system may remain active when the remote emergency stop button is activated.
- b) Race-control-to-vehicle communication:
 - i. The race control can send a "Go" signal to the vehicle
 - ii. The "Go" signal replaces green flags



- 3.8.3 Sensors are not allowed to come into contact the driver's helmet in any circumstances.
- 3.8.4 Additionally, sensors may be mounted with a maximum distance of 500 mm above the ground and not further forward than 700 mm forward of the front of the front tires. They must not exceed the width of the front axle (measured at the height of the hubs).

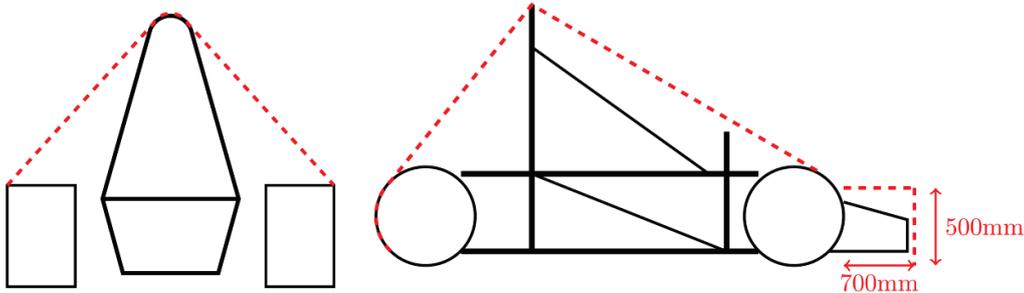


Figure 2

- 3.8.5 All sensors must fulfil German legislative specifications (i.e. eye-protection classification for laser sensors, power limitation for radar sensors, etc.)
- 3.8.6 This is to be demonstrated through the submission of the documentation of the implemented sensors prior to the competition.

3.9 Autonomous Mission Indicator (AMI)

- 3.9.1 For safety reasons, the car must be able to display it's planned mission in some form before starting a dynamic discipline. This device is called Autonomous Mission Indicator (AMI).
- 3.9.2 The AMI can be part of the dashboard. It is also possible to use some adequate LED's which are clearly marked.
- 3.9.3 The AMI must be able to display at minimum the following tasks: Acceleration, Skidpad, Trackdrive and Braketest.
- 3.9.4 The AMI will be checked before every dynamic discipline.



4 Dynamic Events

4.1 Track Appearance and Environment

- 4.1.1 The track is marked by cones. The cones will be specified in detail in the 2017 FSG rules.
- 4.1.2 The maximum distance between two cones in driving direction is 5m. In curves, the distance between the cones is smaller for a better indication. The spacing will be similar to current FSG tracks.
- 4.1.3 The start/finish line is defined by cones with a bigger size and different colour.
- 4.1.4 In addition to the cones, the edge of the track and the start/finish line will be marked with spray paint, as is currently used at FSG.
- 4.1.5 No special artificial landmarks are provided by FSG. Teams may not place additional landmarks on the track.
- 4.1.6 No map data will be provided by FSG.
- 4.1.7 It cannot be guaranteed that further track markings, to those mentioned above, (e.g. markings from other events) will be on the track.

4.2 Starting procedure for all dynamic events

- 4.2.1 The car must be pushed by hand to the queue according to 2016 FSAE rule D12.1.
- 4.2.2 Lining up in the queue means that the car is in 'ready-to-drive' condition.
- 4.2.3 The car's task must be programmed before pushing the car to the waiting queue.
- 4.2.4 The track marshal must be able to check the car's planned task on the AMI.
- 4.2.5 If the AMI shows the wrong task, the car must leave the queue.
- 4.2.6 Once at a certain location in the queue, the driver must remove himself from the car. He may also be requested to do this by an official.
- 4.2.7 The vehicle will be pushed to the starting line without the driver.
- 4.2.8 After approval by an official the Primary Master Switch / GLVMS and the ASMS may be switched on.
- 4.2.9 After approval by an official, the engine can be started with the outside start button / TSMS can be switched on.
- 4.2.10 After receiving the "Go"- signal via the RES, a gear can be engaged / ready-to-drive-mode can be engaged by the autonomous system.
- 4.2.11 If the car does not start within 30 sec., the race control may switch off the car via the RES.

4.3 Stopping procedure for all dynamic events

- 4.3.1 After crossing the finish line, the car must come to a full stop in the marked area.
- 4.3.2 The car will be switched off via the RES.



- 4.3.3 After approval by an official, the team may switch off TSMS (electric cars)/ switch to neutral (combustion cars) and switch of ASMS.
- 4.3.4 Primary master switch / GLVMS is switched off and the brake is released manually (if necessary, depending on brake system).

4.4 Acceleration

- 4.4.1 The acceleration for FSD will be in accordance to 2016 FSAE rule D5.
- 4.4.2 In derogation to 2016 FSAE rule D5.3 there will be only one heat per car.
- 4.4.3 After the finish line, the car must come to a full stop within 75m, otherwise the run counts as DNF.
- 4.4.4 The scoring will be published in the 2017 FSG rules and may differ from 2016 FSAE rule D5.8.

4.5 Skidpad

- 4.5.1 The skidpad for FSD will be in accordance to 2016 FSAE rule D6.
- 4.5.2 In derogation to 2016 FSAE rule D6.2 there will be only one heat per car.
- 4.5.3 In derogation to 2016 FSAE rule D6.4 there will be no removable cone at the exit.
- 4.5.4 The scoring will be published in the 2017 FSG rules and may differ from 2016 FSAE rule D6.8.

4.6 Trackdrive

- 4.6.1 The event will be run as a single heat consisting of 10 laps.
- 4.6.2 One lap will be approximately 250m to 500m long.
- 4.6.3 The track layout will be based on 2016 FSAE rule D8.6.
- 4.6.4 There will be no slaloms.
- 4.6.5 There will be a course walk prior to the trackdrive to allow teams to collect track data. Trolleys, handcarts, scooters, drones etc. are not allowed for the course walk.
- 4.6.6 There will be no "last-lap-sign" i.e. the car needs to count laps.
- 4.6.7 Scoring and penalty specification will be included in the 2017 FSG rules.

4.7 Efficiency

- 4.7.1 Energy efficiency will be evaluated based on the Trackdrive.
- 4.7.2 Further information on the efficiency event will be included in the 2017 FSG rules.

5 Static Events

Static events for FSD will be specified in the 2017 FSG rules. As a part of a static event, the safety concept and safety assessment of the team's autonomous system will be judged.