



SOLUTIONS FOR VIRTUAL TEST DRIVING

FSAI LAP TIME SIMULATION RULES

2026





Table of Contents

1	Introduction	3
1	Getting Started	4
1.1	Getting Started with CarMaker	4
1.2	License Request Deadline	5
1.3	Software and Package Updates	5
1.4	System Requirements	5
2	The Task	6
2.1	Event Format	6
3	Submission Process	7
3.1	Required Submission Format	8
3.2	Proof of Simulation	9
3.3	Build Execution Requirements	9
3.4	How To Submit	10
3.5	How Submissions Will Be Assessed	10
3.6	Submission Deadlines	10
3.7	Scoring	10



1 Introduction

Developing autonomous driving systems is no small feat. The cost, time, and risk of physical testing can slow down innovation and limit how quickly teams can iterate on their designs. This is a challenge professional automotive engineers know well, which is why the industry has turned to virtual test-driving software to validate designs with confidence before anything is physically built.

The FSAI Lap Time Simulation event brings the same industry-standard approach into Formula Student, giving every team access to IPG Automotive's CarMaker software and a baseline vehicle to develop and compete virtually across 3 Formula Student events. This provides a head start on autonomous driving algorithm development, extra points on the board for your team, and hands-on experience with professional tooling used by engineers in industry.

1 Getting Started

Teams are recommended to familiarise themselves with CarMaker as early as possible and to make use of the FSAI vehicle and track models found in the Formula CarMaker file package provided.

1.1 Getting Started with CarMaker

1. Register your team on the IPG Automotive website:
<https://www.ipg-automotive.com/en/company/how-we-are-connected/investing-in-education/research-teaching/registration-formula-carmaker-program/>
2. Once registered, request your team's CarMaker licenses:
<https://ipg-automotive.com/en/support/licenses/formula-carmaker/>
3. Log-in credentials for the customer area will be emailed to you once your team is registered with the Formula CarMaker Program
4. The CarMaker software and Formula CarMaker file package can be downloaded from the Formula CarMaker customer area:
<https://ipg-automotive.com/en/support/customer-area/>
5. For the 2026 FSAI LTS event, CarMaker version 14.1.1 and Ubuntu 22.04 are required
 - a. Ubuntu install instructions:
<https://ubuntu.com/tutorials/install-ubuntu-desktop#1-overview>
 - b. CarMaker installation instructions are located inside the CarMaker installation folder: e.g. *CarMakerOffice-linux-14.1.1\InstallationGuide.pdf*
6. Follow the *FSAI_UsersGuide* found in the *doc* folder within the *FS_autonomous* package. This guide includes a quick start walkthrough covering ROS2 installation and setup, and getting started with ROS2 and CarMaker, to enable you to begin development of your FSAI autonomous driving system.

1.2 License Request Deadline

All CarMaker license requests must be submitted no later than **7th May 2026**, as defined in the Key Dates document on the FS website. IPG Automotive cannot guarantee processing of requests submitted after this date, which may prevent your team from participating in the FSAI Lap Time Simulation Event. Teams are strongly encouraged to submit requests well in advance of the deadline.

1.3 Software and Package Updates

Following the Start of the FSAI Lap Time Simulation Event, there will be a **4-week** window during which the software or package may be updated in response to bugs flagged by the teams. No further updates will be made after this period unless critical issues are identified.

1.4 System Requirements

The FSAI package has been validated against the following configuration. Some requirements are fixed and must be met exactly, while others represent a validated setup with flexibility for alternative hardware.

The following are fixed requirements that must be met:

- **OS:** Ubuntu 22.04 LTS (64-bit)
- **ROS:** ROS 2 Humble
- **RAM:** 16 GB minimum
- **CPU:** Quad-core processor or higher

The following represents the validated hardware configuration. Alternative GPUs and drivers may be compatible, but teams should refer to the CarMaker release notes for a full list of supported hardware and driver combinations:

- **GPU:** NVIDIA GeForce RTX 2070 Mobile / Max-Q (8 GB VRAM)
- **Driver:** NVIDIA 535.247.01
- **CUDA:** 12.2

32GB of RAM is recommended for the best developer experience.

2 The Task

The task is to optimise your team's autonomous vehicle stack to communicate with the provided vehicle model and achieve the highest combined score across 3 simulated FSAI virtual events; Acceleration, Skid Pad and Sprint.

2.1 Event Format

The following will be provided to each team.

1. The Formula CarMaker file package, available to download from the Formula CarMaker customer area on the IPG Automotive website:
<https://ipg-automotive.com/en/support/customer-area/>
2. A base vehicle model configured with a default setup, including a fixed sensor suite comprising of one front Lidar RSI sensor and two Camera RSI sensors (RGB and Depth). The vehicle model, sensor configuration, and all associated parameters are fixed and must not be modified in any way. The tyre model is also fixed and may not be adjusted.
3. Three virtual FSAI event scenarios; Acceleration, Skid Pad and Sprint.
4. The CarMaker ROS interface, enabling vehicle control communications between ROS and CarMaker.

The FSAI LTS event is a standalone competition. Submissions are not required to match the team's FSAI DDT or ADS Class software submission at the Silverstone event.



3 Submission Process

Teams must develop their autonomous driving software using the official FSAI CarMaker packaged provided by IPG Automotive. The Autonomous Vehicle (AV) software must be integrated as an external ROS2 nodes within the supplied ROS2 workspace. **The supplied FSAI CarMaker interface must not be modified.**

Section 4 of the FSAI_UsersGuide explains how the CarMaker ROS interface can be extended for general use, however for the purpose of this event the interface must remain unmodified.

3.1 Required Submission Format

Teams must upload a compressed archive (.zip or tar.gz) containing the official FSAI package structure. The AV stack must be implemented as ROS2 packages located inside:

```
ros/ros2_ws/src
```

Each package must be clearly identifiable by the team's official IMechE team number, for example:

```
ros/ros2_ws/src/<team_number> or  
ros/ros2_ws/src/<team_number>_<package_name>
```

The AV stack must consist of the team's own ROS2 nodes responsible for processing sensor data, implementing perception, planning and control logic, and publish vehicle control commands.

Only the following files and locations may contain team additions:

- `ros/ros2_ws/src/`, should have additional team ROS2 packages only.
 - The following existing folders must not be modified, as they will be replaced with the default versions during assessment.
 - `camera_msgs`
 - `carmaker_rlds_client`
 - `cmrosutils`
 - `hellocm`
 - `hellocm_cmnode`
 - `hellocm_msgs`
 - `vehiclecontrol_msgs`
- Launch files required to start the AV software.
- Configuration or parameter files required by the team's packages.
- `README.md`
- A proof of simulation video (see below).

All other files and folders must remain identical to the originally supplied FSAI package. Teams must guarantee that their submission runs without any modification to the supplied FSAI package.

3.2 Proof of Simulation

Teams must include a proof of simulation video as part of their submission, compressed with the CarMaker project archive. The video must be provided in an .mp4 format and should capture CarMaker, MovieNX and Rviz running simultaneously. Submissions will not be assessed until a valid proof of simulation video has been received.

3.3 Build Execution Requirements

The submission must:

- Build successfully using standard *rosdep* and *colcon* build commands.
- Provide a single launch file that starts the complete AV stack.
- Subscribe to the provide FSAI sensor topics.
- Publish vehicle commands using the provide VehicleControl interface.

The *README.md* file must be included and must contain:

- Build instructions
- Launch command
- List of required ROS topic subscriptions
- Confirmation that vehicle control commands are published via the provided interface.
- Any external dependencies required.

3.4 How To Submit

Submissions will be tested by IPG Automotive and scored in accordance with IMechE event rules. **For the FS2026 season, there is a pre-requisite step before submission:**

1. Fill in the 'FS-AI Lap Time Simulation Entry Form' found on the IMechE's website under 'Forms & Documents' > 'FS-AI Lap Time Simulation': [Fill | IPG LTS FSAI Submission Details 2026](#)
2. A shared folder link will be sent to the email address provided in the entry form. Once received, upload the required files listed in 'Forms & Documents' > '[FS-AI Lap Time Simulation](#)' > Chapter 3 to complete your submission.

3.5 How Submissions Will Be Assessed

The assessment process is as follows:

1. The submission is downloaded from the shared folder.
2. The proof of simulation video is reviewed to verify the team has successfully run the simulation.
3. Permitted files are copied to a clean FSAI CarMaker project, to ensure only permitted modifications have been made.
4. The project is rebuilt using standard build commands (*rosdep* and *colcon*).
5. The scenarios are run across the three events.
6. Each submission is scored in accordance with the IMechE event rules.

3.6 Submission Deadlines

Teams may begin submitting from **1st May 2026**. Submission deadlines and associated lateness penalties are detailed in the Key Dates document on the Formula Student website.

Any submission received after **18th June 2026** will be subject to lateness penalties. Submissions received after **23rd June 2026** will not be accepted. If multiple submissions are received from the same team, only the latest valid submission received before the final deadline will be evaluated.

Any suspicion of collaboration between teams will be reported to the Chief Judge and may result in both teams being disqualified.

3.7 Scoring

Scoring for the FSAI LTS event follows the official Formula Student AI rules. Teams should refer directly to sections D4, D5 and D6 of the FS-AI 2026 Rules for the full scoring methodology:



<https://www.imeche.org/docs/default-source/1-oscar/formula-student/2026/rules/fs-ai-2026-rules-v1.pdf?sfvrsn=2>