

# Department of Automotive Technologies – Vehicle Mechanics Fundamentals

**Gábor Sipos**



Optimum lap championship

## Introduction

contact: [gabor.sipos.uni@gmail.com](mailto:gabor.sipos.uni@gmail.com)

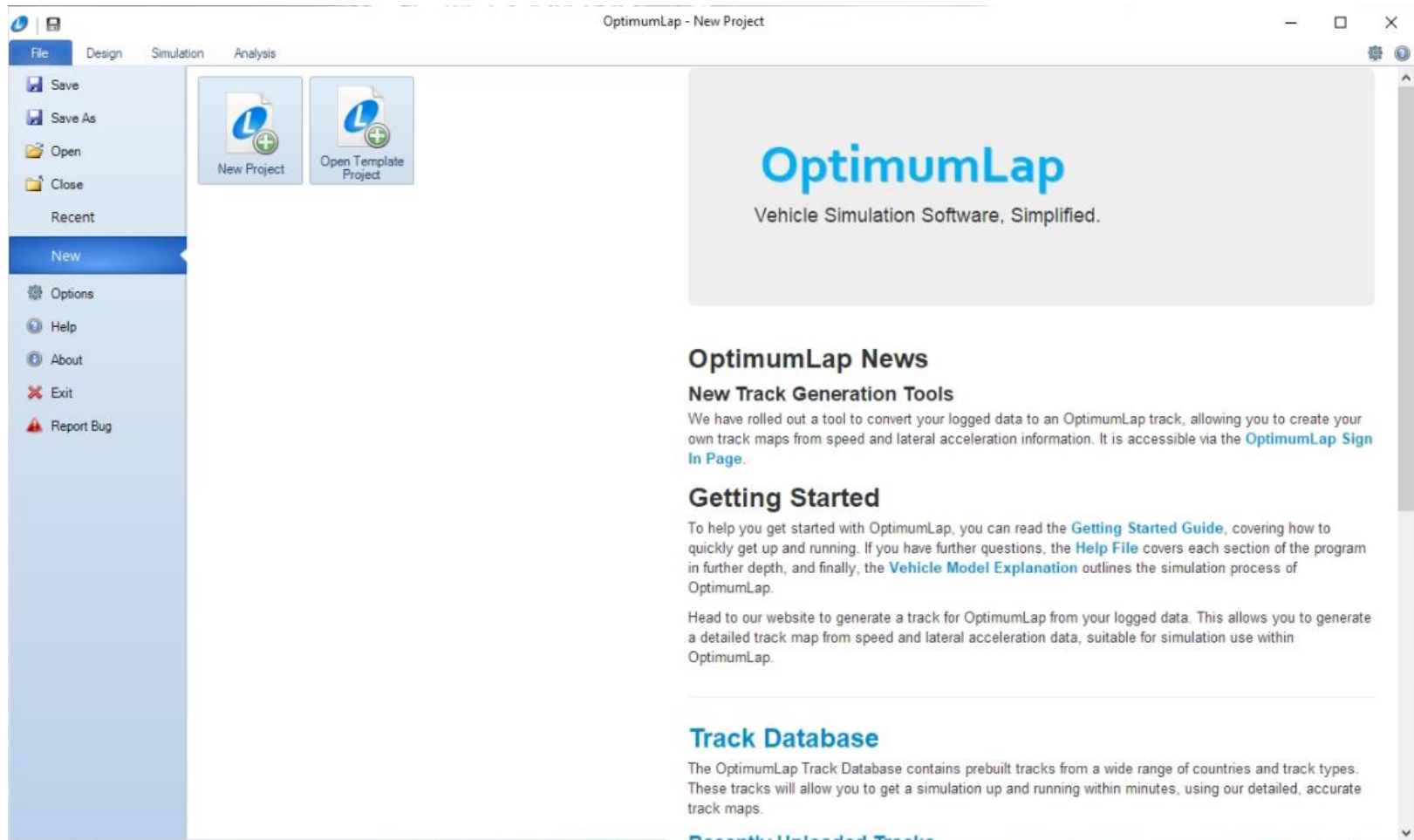
# Download and install software



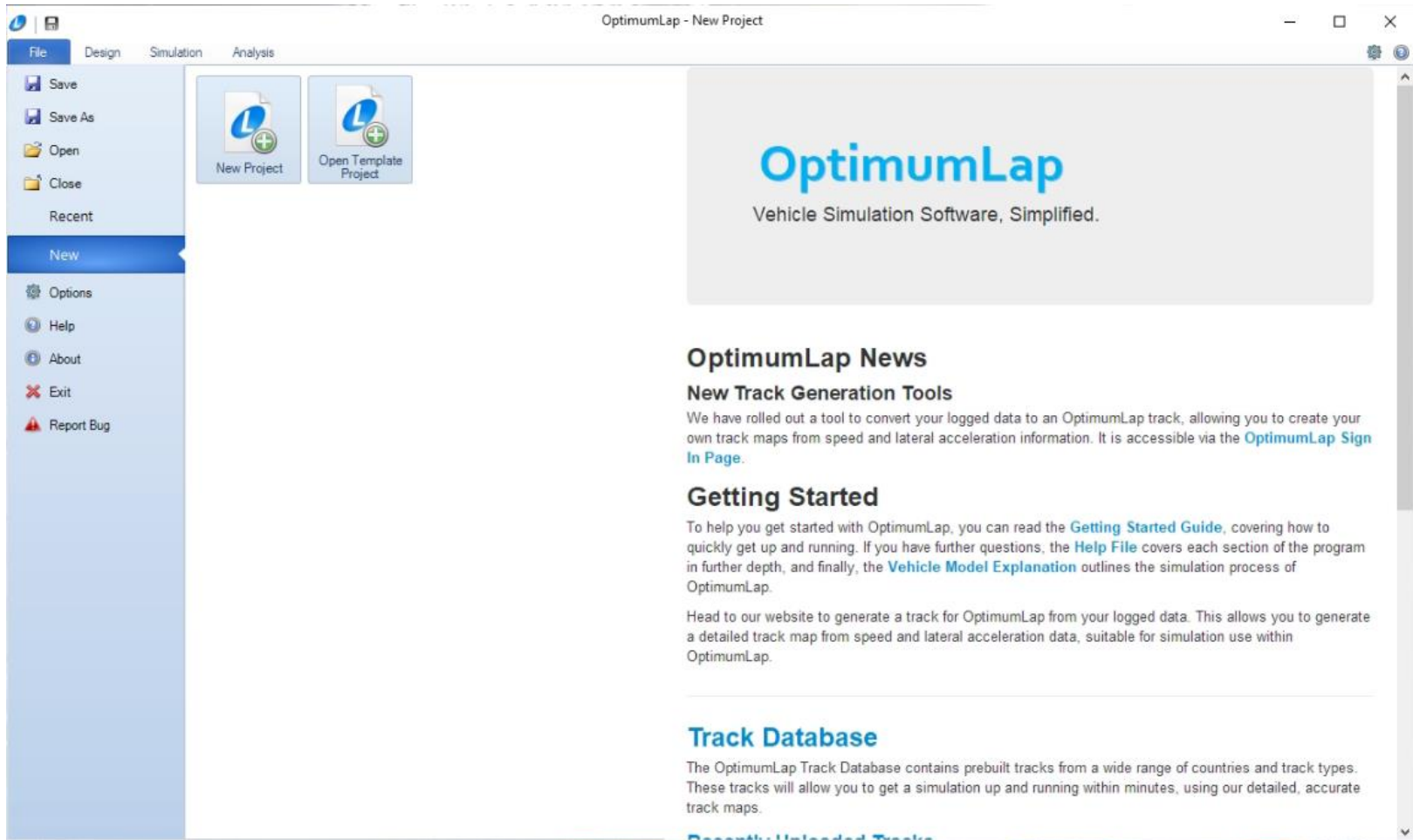
1. visit <https://optimumg.com/>
2. products-> all products -> Optimum lap
3. Get started -> Signup
  - working email address needed
4. Go to your email account
5. In one email you find downloading link and License Key for that email address
6. Download software, install it using your license key

# Using the software

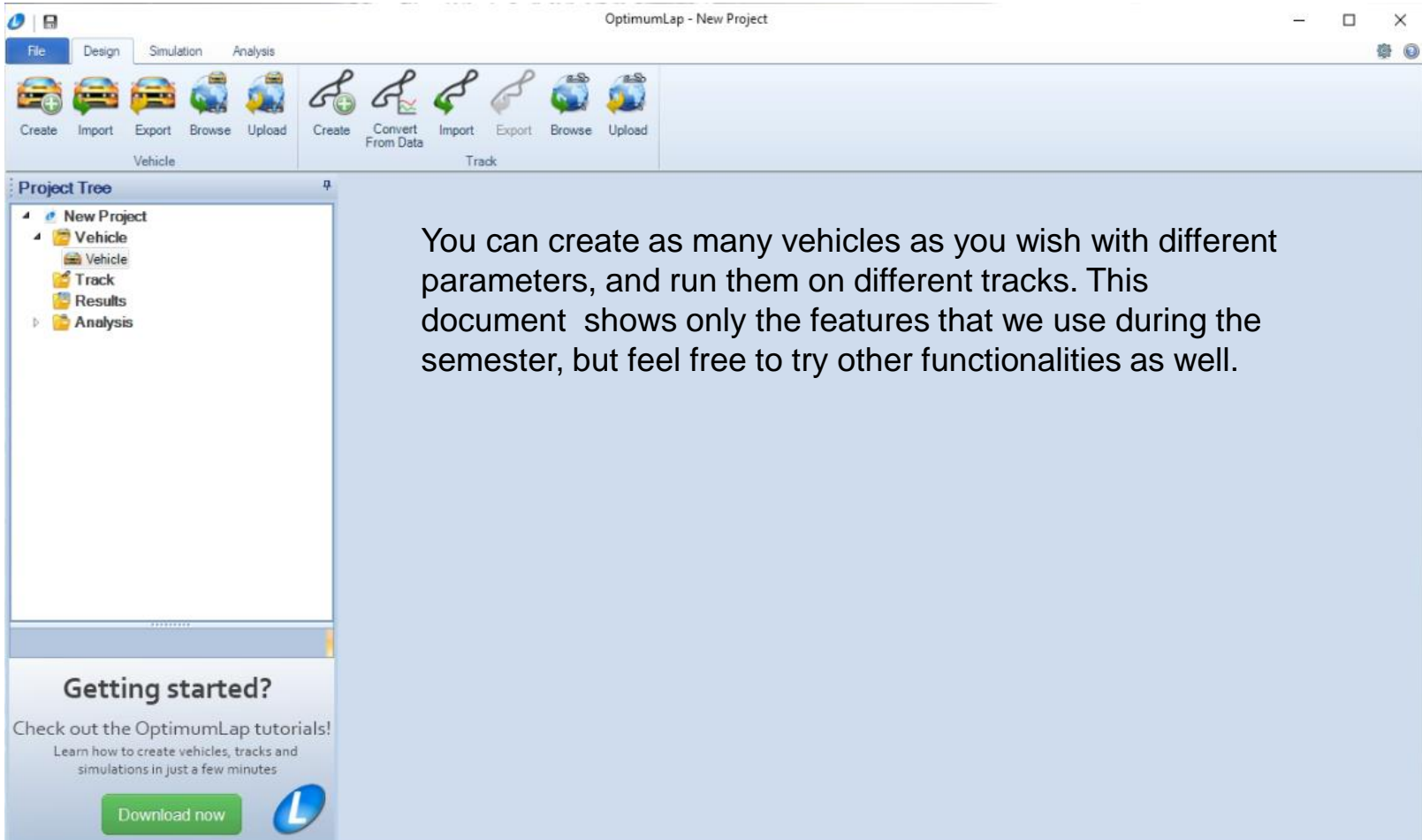
## 1. Open Optimum Lap from your computer



2. click New Project, then select a working directory and name the project



## 3. This is your project view



The screenshot displays the OptimumLap software interface for a new project. The window title is "OptimumLap - New Project". The interface includes a menu bar with "File", "Design", "Simulation", and "Analysis". Below the menu bar is a toolbar with two groups of icons: "Vehicle" (Create, Import, Export, Browse, Upload) and "Track" (Create, Convert From Data, Import, Export, Browse, Upload). On the left, a "Project Tree" panel shows a hierarchical structure: "New Project" (expanded), "Vehicle" (expanded), "Track", "Results", and "Analysis". At the bottom left, a "Getting started?" section encourages users to check out tutorials, with a "Download now" button and a logo.

You can create as many vehicles as you wish with different parameters, and run them on different tracks. This document shows only the features that we use during the semester, but feel free to try other functionalities as well.

# Using the software

## 4. Create new Vehicle

The screenshot displays the OptimumLap software interface for a 'New Project'. The main window is titled 'OptimumLap - New Project' and features a ribbon menu with tabs for 'File', 'Design', 'Simulation', and 'Analysis'. The 'Design' tab is active, showing icons for 'Create', 'Import', 'Export', 'Browse', and 'Upload' for both 'Vehicle' and 'Track'.

The 'Project Tree' on the left shows a hierarchy: 'New Project' > 'Vehicle' > 'Vehicle' > 'Track' > 'Results' > 'Analysis'. The 'Vehicle' folder is selected, and the 'VEHICLE SETUP' panel is open. This panel is divided into several sections:

- General Data:** Includes 'Vehicle Type' (dropdown), 'Mass' (input field, unit 'kg'), and 'Driven Type' (radio buttons for '2WD' and 'AWD').
- Aero Data:** Includes 'Drag-Lift' (radio button), 'Efficiency-Lift' (radio button), 'Drag Coefficient' (input field, unit '-'), 'Downforce Coefficient' (input field, unit '-'), 'Front Area' (input field, unit 'm^2'), and 'Air Density' (input field, unit 'kg/m^3').
- Tire Data:** Includes 'Tire Radius' (input field, unit 'm'), 'Rolling Resistance' (input field, unit '-'), 'Longitudinal Friction' (input field, unit '-'), and 'Lateral Friction' (input field, unit '-').
- ENGINE DATA:** Includes 'Add / Remove Torque Data' with three icons.

The main workspace on the right displays the 'OPTIMUMLAP' logo and the text 'vehicle dynamics solutions' and 'Inputs not valid'. At the bottom, there is a 'Getting started?' section with a 'Download now' button and a 'Learn how to create vehicles, tracks and simulations in just a few minutes' message. The bottom status bar shows 'Engine Model', 'Driveline Model', 'Gearing', 'Traction Model', and 'Vehicle Report'.

# Using the software

## 4. Create new Vehicle

**VEHICLE SETUP**

**General Data**

Vehicle Type  
Open Wheeler Car

Mass: 743,000 kg

Driven Type:  2WD  AWD

**Aero Data**

Drag-Lift  Efficiency-Lift

Drag Coefficient: 1.000

Downforce Coefficient: 2.000

Front Area: 2.200 m<sup>2</sup>

Air Density: 1.200 kg/m<sup>3</sup>

**Tire Data**

Tire Radius: 0.330 m

Rolling Resistance: 0.025

Longitudinal Friction: 2.100

Lateral Friction: 1.950

**ENGINE DATA**

Add / Remove Torque Data

Engine Speed (rpm)	Engine Torque (N.m)
3500	450.00
4500	500.00
5500	550.00
6500	580.00
7500	610.00
8500	630.00
9500	650.00
10500	660.00
11500	670.00
12500	660.00
13500	640.00
14500	610.00

Thermal Efficiency (optional): 100.000 %

Fuel Energy Density (optional): E85 25650000 J/kg

**TRANSMISSION DATA**

Transmission Type: Sequential Gearbox

Add / Remove Gears

	Gear Ratios
▶ Gear 1	2.8750
Gear 2	1.8490
Gear 3	1.6707
Gear 4	1.2886
Gear 5	1.1462
Gear 6	0.9919
Gear 7	0.8778
Gear 8	0.7686

Final Drive Ratio: 7

Drive Efficiency: 100.000 %

**SCALING FACTORS**

Power Factor: 100.000 %

Aero Factor: 100.000 %

Grip Factor: 100.000 %



## 5. Load track



## 5. Load track

Nem biztonságos | [share.optimumg.com/tracks/](https://share.optimumg.com/tracks/)



[HOME](#) [COMPANY](#) [SERVICES](#) [SEMINARS](#) [PRODUCTS](#) [MARKETS](#) [NEWS](#) [CAREERS](#) [CONTACT](#)

### OptimumLap Track Database

The following tracks are designed for use with OptimumLap. If you would like to generate your own track from logged data, please see our [online track conversion tool](#). Make sure to also check out the [Vehicle Database](#).

- 

1.3 km  
0.8 mi

2010 SCCA Solo Nationals West

Lincoln - NE, United States
- 

3.2 km  
2.0 mi

Adelaide Street Circuit

Adelaide, Australia
- 

5.3 km  
3.3 mi

Albert Park

Melbourne, Australia
- 

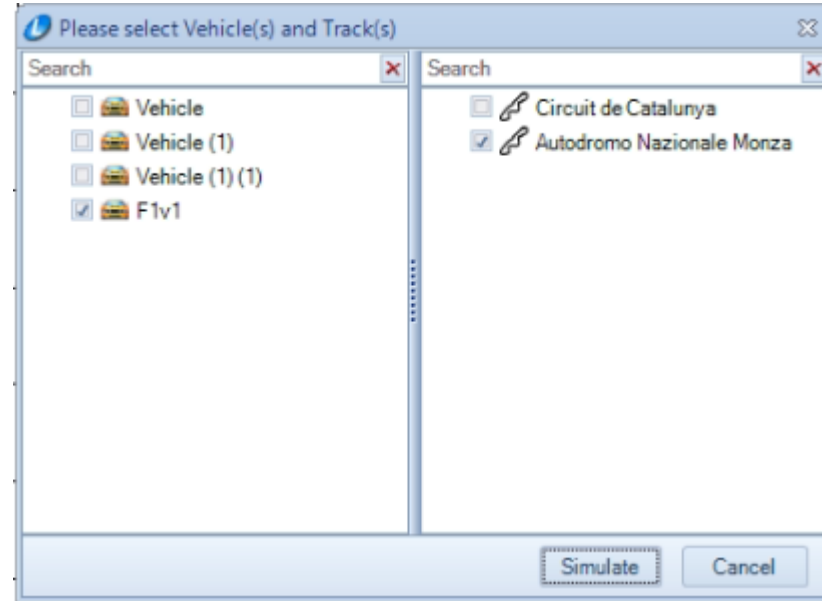
4.0 km  
2.5 mi

Anderstorp Raceway

## 5. Load track

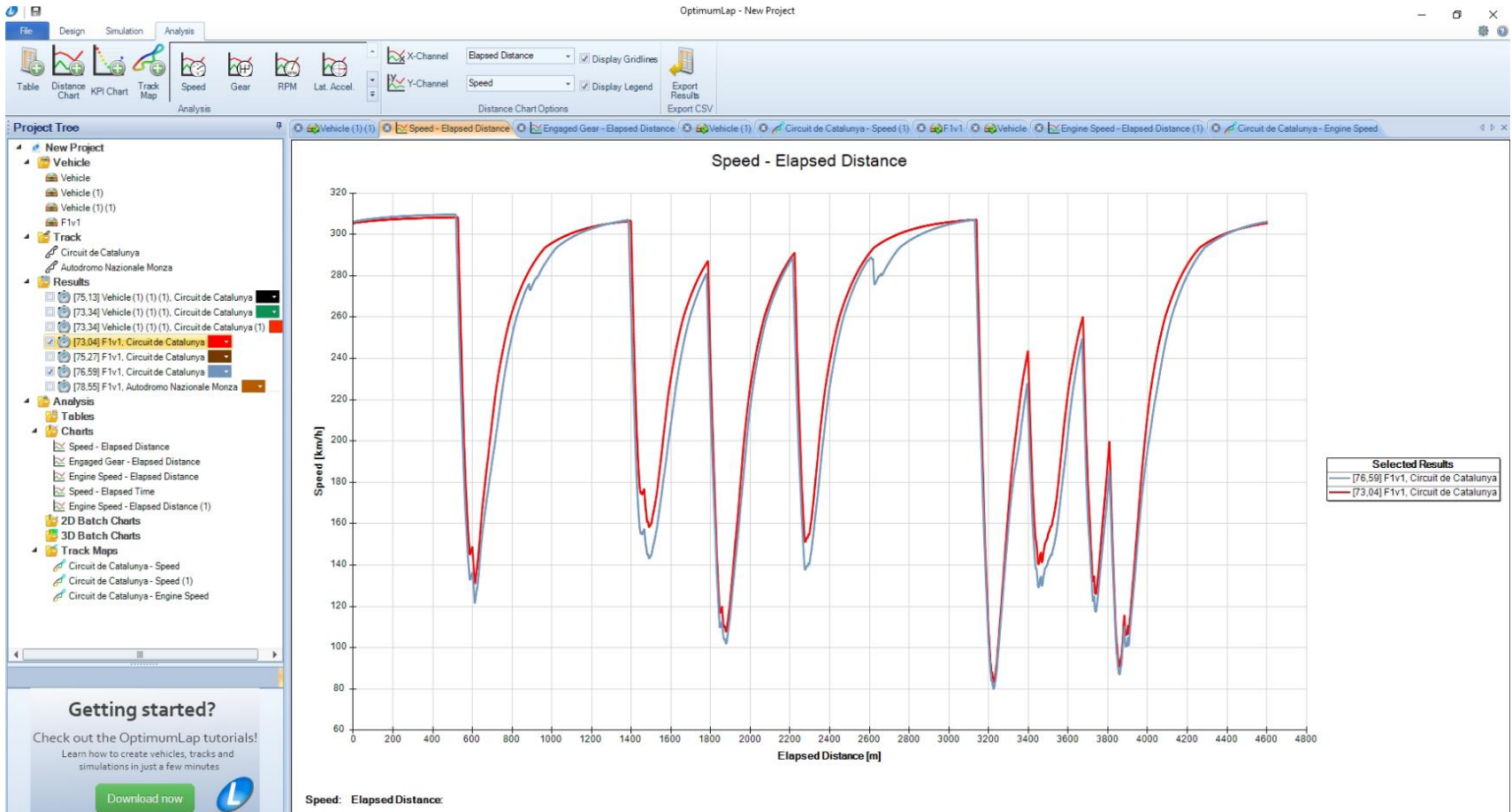


## 6. Simulate



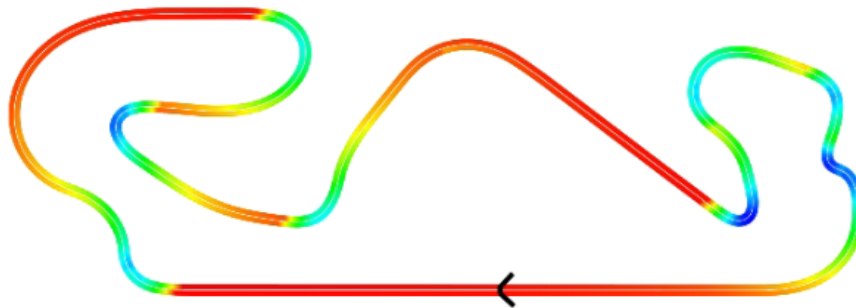
# Using the software

## 6. Simulate



## 6. Simulate

Circuit de Catalunya - Speed (2)



Speed [km/h]	
■	79,884
■	102,865
■	125,846
■	148,828
■	171,809
■	194,790
■	217,771
■	240,752
■	263,734
■	286,715
■	309,696