

DESIGN CHALLENGE

Virtual App (Beta)

Quick Start Guide 2021

IMechE DESIGN CHALLENGE

REPEATABLE DEVICE

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Please check the IMechE Design Challenge website for updates.

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List of Amendments:

Version	Page	Details	Date
2.9	-	Release for V2.9	02-03-2021

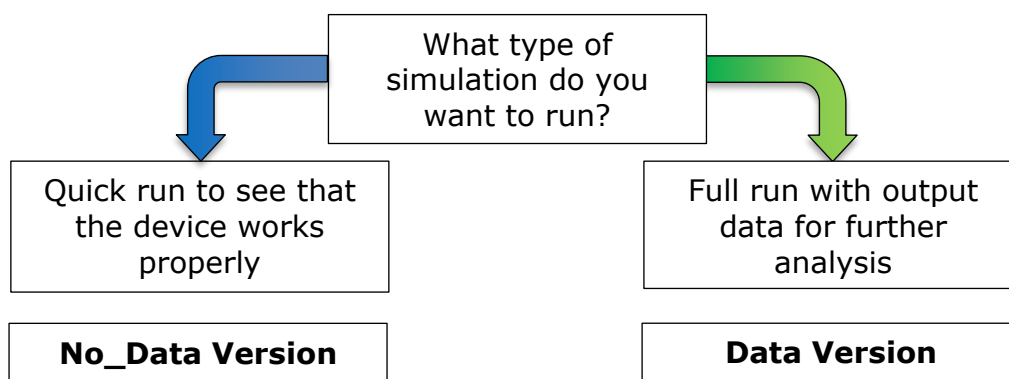
1. Introduction

This manual is for build version V2.9.

Note: This is a Beta development build, all functions are not currently implemented. For simplicity the Beta app has a fixed wall distance and horizontal lane. This also prevents teams from 'reverse-engineering' the best possible device through trial and error of all the permutations of range and lane angle before the final. The Final version will have all the functionality so that the range distance can be varied and the lane angle adjusted, according to the Project Specification and Covid-19 Amendments.

2. "Data" and "No Data" Versions

You will probably find that the programme stutters visually when you run it, unless you have a very high-powered computer. For this reason, there are two versions of the app: "Data" and "No Data". Writing data to an external file is not what *Unity* is designed for and it slows the app down. For testing your device, use the "No-Data" version, which will run smoothly and without stuttering. When you are happy with what you see, and want to view the results, run the "Data" version, which will create the ExportData file for viewing in Excel.



One important thing to note: "Data" and "No_Data" use their own separate versions of the input data file VehicleData2.csv. If you do lots of testing with "No_Data", don't forget to update the other input file, to match, for running the "Data" version.

3. Windows Run Instructions:

1. Download these two files:






IMechE_RV_V2.9_No_Data_Build_Windows.zip

IMechE_RV_V2.9_Data_Build_Windows.zip













by pasting this link into a browser:

<https://drive.google.com/drive/folders/10szbPXaC1OvASsQ6nr51ACGb77HqWBT1?usp=sharing>


2. Decompress each zip file and ensure the below file structure is visible in each folder:

Name	Date modified	Type	Size
 IMechE Simulator V2_Data	04/03/2021 07:04	File folder	
 MonoBleedingEdge	04/03/2021 07:04	File folder	
 IMechE Simulator V2.exe	04/03/2021 07:04	Application	636 KB
 UnityCrashHandler64.exe	04/03/2021 07:04	Application	1,606 KB
 UnityPlayer.dll	04/03/2021 07:04	Application exten...	23,717 KB

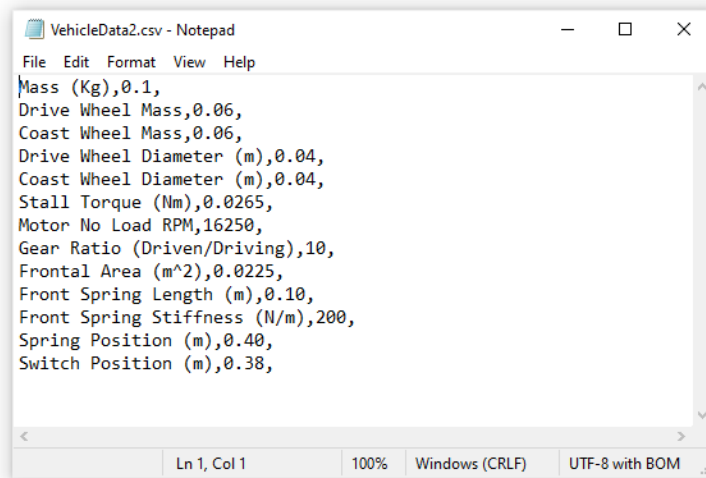
3. Click into the IMechE Simulator V2_Data Folder and ensure the following file structure is visible in each (ie "Data" and "No_Data"):

Name	Date modified	Type	Size
 Managed	04/03/2021 07:04	File folder	
 Resources	04/03/2021 07:04	File folder	
 StreamingAssets	04/03/2021 07:04	File folder	
 app.info	04/03/2021 07:04	INFO File	1 KB
 boot.config	04/03/2021 07:04	CONFIG File	1 KB
 globalgamemangers	04/03/2021 07:04	File	41 KB
 globalgamemangers.assets	04/03/2021 07:04	ASSETS File	54 KB
 globalgamemangers.assets.resS	04/03/2021 07:04	RESS File	118 KB
 level0	04/03/2021 07:04	File	106 KB
 level0.resS	04/03/2021 07:04	RESS File	129 KB
 sharedassets0.assets	04/03/2021 07:04	ASSETS File	7,941 KB
 sharedassets0.assets.resS	04/03/2021 07:04	RESS File	29,372 KB

4. Let's start with "No_Data". Click into StreamingAssets and then right click VehicleData2.csv.

Name	Date modified	Type	Size
 VehicleData2.csv	04/03/2021 07:11	Microsoft Excel C...	1 KB

5. Use the option "Open with" and select Notepad. The below file data should be visible:

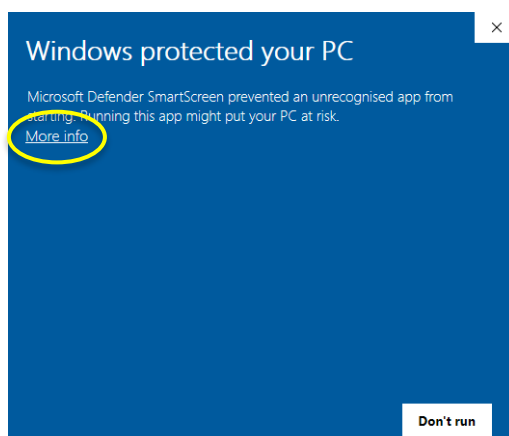


```

VehicleData2.csv - Notepad
File Edit Format View Help
Mass (Kg),0.1,
Drive Wheel Mass,0.06,
Coast Wheel Mass,0.06,
Drive Wheel Diameter (m),0.04,
Coast Wheel Diameter (m),0.04,
Stall Torque (Nm),0.0265,
Motor No Load RPM,16250,
Gear Ratio (Driven/Driving),10,
Frontal Area (m^2),0.0225,
Front Spring Length (m),0.10,
Front Spring Stiffness (N/m),200,
Spring Position (m),0.40,
Switch Position (m),0.38,
Ln 1, Col 1 100% Windows (CRLF) UTF-8 with BOM

```

6. The above file can be modified with the required vehicle parameters to be simulated. Ensure the value entered has a comma before and after it and is specified in the units stated. Once the changes have been made, the file can be saved. First, let's check that *Unity* runs okay on your machine with the default data set.
7. To begin with, try running the simulation with the default input data. To run the simulation return to the root directory in step 2 for "No_Data" and run IMechE Simulator V2.exe .
If this window appears when you try to run the exe file, click "More info" and select "Run anyway".



8. Once a simulation has run successfully, try the “Data” version so that you can see the export file. Close the *Unity* window, if it is still open, and navigate again to the root directory in step 2 for the “Data” version. Run IMechE Simulator V2.exe. A new ExportData file should now be visible:

Name	Date modified	Type	Size
IMechE Simulator V2_Data	04/03/2021 09:27	File folder	
MonoBleedingEdge	05/03/2021 10:40	File folder	
ExportData	04/03/2021 15:14	File	41 KB
IMechE Simulator V2.exe	04/03/2021 09:27	Application	636 KB
UnityCrashHandler64.exe	04/03/2021 09:27	Application	1,606 KB
UnityPlayer.dll	04/03/2021 09:27	Application exten...	23,717 KB

9. Using Excel, navigate to this file and select to open it using the “All Files (*.*)” option. The following import Wizard should appear:

Text Import Wizard - Step 1 of 3

The Text Wizard has determined that your data is Delimited.
If this is correct, choose Next, or choose the data type that best describes your data.

Original data type

Choose the file type that best describes your data:

Delimited - Characters such as commas or tabs separate each field.

Fixed width - Fields are aligned in columns with spaces between each field.

Start import at row: 1 File origin: MS-DOS (PC-8)

My data has headers.

Preview of file C:\Users\VR_PC2\Documents\Ismail\Projects\IMechE Design Challen...\ExportData.

```

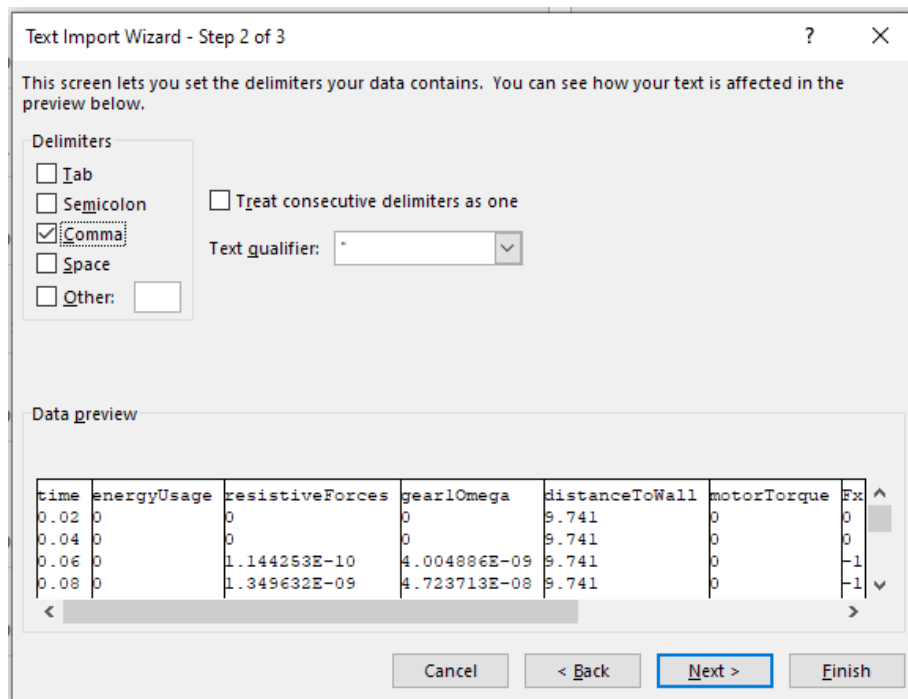
1 time, energyUsage, resistiveForces, gear1Omega, distanceToWall, motorTorque, Fr
2 0.02, 0, 0, 0, 9.741, 0, 0, -31.69999, 0
3 0.04, 0, 0, 0, 9.741, 0, 0, 38.1, 5.067824E-19
4 0.06, 0, 1.144253E-10, 4.004886E-09, 9.741, 0, -1.144253E-10, 30, -5.52301E-08
5 0.08, 0, 1.349632E-09, 4.723713E-08, 9.741, 0, -1.349632E-09, 30, -3.701561E-08

```

Cancel < Back Next > Finish

Click the “My data has headers” option and click next.

10. On the next page unclick the "Tab" option and select the "Comma" option as shown below:



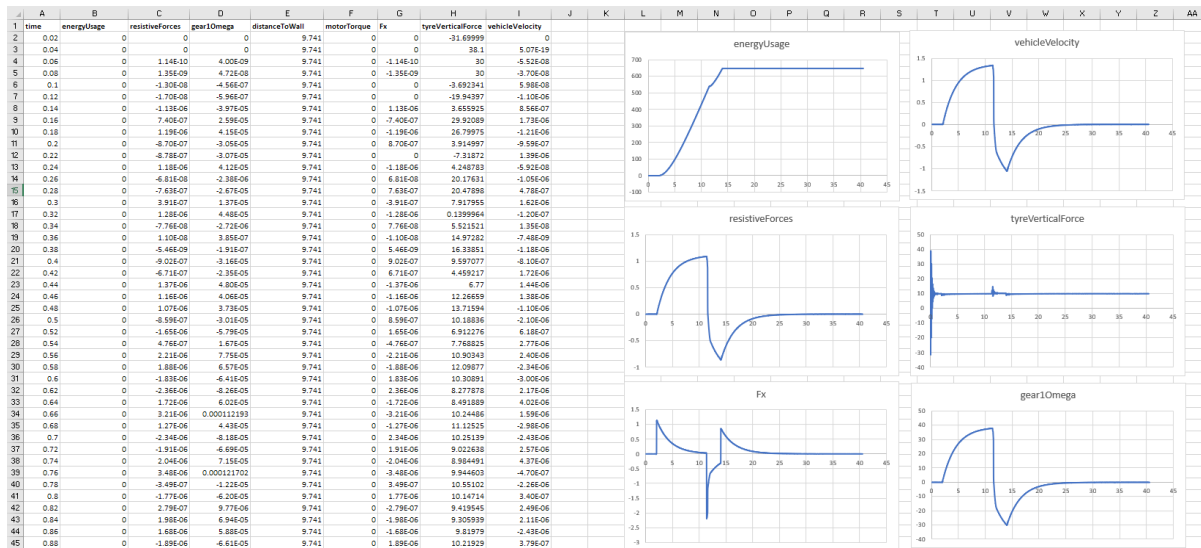
11. The data collected through the simulation will now be available in a normal excel format. This will allow teams to be easily able to graph what is happening during a simulation run and also determine the final energy usage and time taken.

NOTE: To rerun the simulation and produce a second ExportData file the original should be renamed, or copied to another folder, and deleted from the root directory. If it is left, any new data from the next run will be added below the original.

You will need to swap between "No_Data" and "Data" versions of the app as you develop your device, depending on whether you want a quick visualisation, or data for analysis.

Don't forget that each version has its own VehicleData2.csv file!

This final figure shows a typical set of results. We recommend that you create your own template with graphs and then copy and paste new data sets into your template.



4. FAQs and Assistance

Help Webinars

The IMechE will announce the times of online webinars where the Beta app will be introduced, and competitors can ask the app developers any questions they have.

Mac Users

Because of time and resource limitations, it has only been possible to develop the app for use with Windows.

My Computer is Slow After Running the App

Close the *Unity* window and this will solve the issue.

How to get More Help

If you continue to have problems, please send emails to designchallenge@imeche.org along with your VehicleData2.csv file.