Mathworks Software Supported Environments

The tables below show the platforms supported by the Mathworks MATLAB/Simulink software used for programming and modeling your robot in multiple BEST Robotics challenges.

MATLAB Environment Support for BEST Robotics Challenges			
BEST Robotics Challenge	MATLAB Desktop (Windows)	MATLAB Desktop (MAC)	MATLAB Online
Autonomous Programming Challenge*	✓	✓	✓
Online Competition Time Trials*	✓	✓	✓
Robot Modeling Challenge*	✓	✓	✓
Classroom Competition	✓		
Classic Competition	✓		
Simulink Design Award	✓	✓	✓

*Uses the Robotics Playground add-on

MATLAB/Simulink Features by Environment						
MATLAB Environment	Simulate Models	Generate Simulation Videos	Control Models Interactively	Interact with Environment Visuals	Monitor & Tune Hardware	Program VEX Cortex
Desktop (Windows)	✓	✓	✓	✓	✓	✓
Desktop (MAC)	✓	✓	✓ keybrd, joystick	✓		
MATLAB Online	✓	✓**	keybrd	✓		

**Use the button provided in the template model

Simulate Models

Create and simulate your robot model in any MATLAB environment, whether preparing a model for download to the VEX Cortex hardware or programming the virtual robot in the Robotics Playground.

Generate Simulation Videos

When using a 3D visualization with the Robotics Playground, you can create and save videos of the simulation.

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Control Models Interactively

Control your Simulink model directly via the Keyboard or a USB Joystick (VEX joystick is not compatible) by using the Keyboard or Joystick blocks from the library.

Interact with Environment Visuals

Using the Robotics Playground Add-On, you can simulate your robot (or a virtual robot) and interact with various 3D virtual environments, including the 2021 BEST Robotics virtual Game Field.

Monitor & Tune (Classic/Classroom)

Use the Monitor & Tune feature to connect your simulation with the actual hardware (via USB). Then tune the parameters of your Simulink model "live" and see the results on the hardware.

Program VEX Cortex (Classic/Classroom)

Build and download your Simulink Model to your VEX Cortex hardware. Downloading to the VEX Cortex is only supported on MS Windows machines because the VEX Cortex USB driver only supports Windows.

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MATLAB Online

MATLAB Online is available to anyone with a free Mathworks account (which is also required for any installation of the software on your PC). Just create the free account and link your Mathworks account with the BEST Robotics license that you received when you requested the software.

Link your BEST Robotics License

Login at www.mathworks.com. In the upper right of the screen, click your account icon (with your initials) and select Link License. Enter the license/activation key that was received in the email when you requested the Mathworks software or get this license/activation key from your teacher.
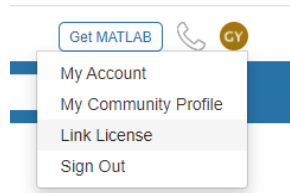
Once your mathworks account is created and linked with the BEST license, navigate to http://matlab.mathworks.com, the familiar MATLAB window will appear

You will need to install the Robotics Playground Add-On and BEST Robotics App just as if you were installing on your PC.

Using MATLAB Online

MATLAB Online cannot be used to Build & Deploy models to your VEX hardware. It can only be used for developing/simulating models for the Autonomous Programming Challenge:
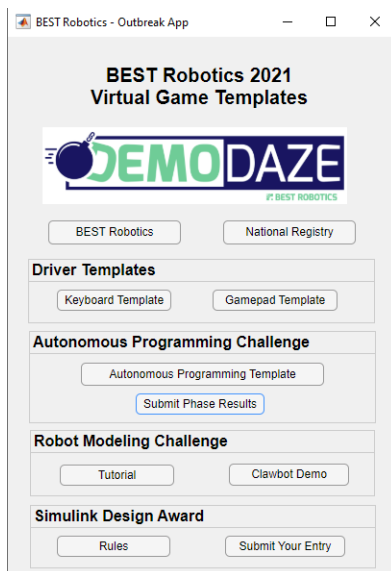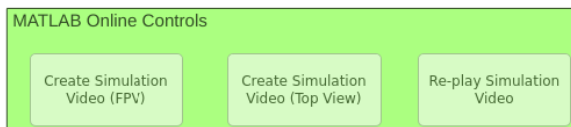
From the BEST Robotics App, open the Autonomous Programming Template and create your new Simulink model (autonomous program).
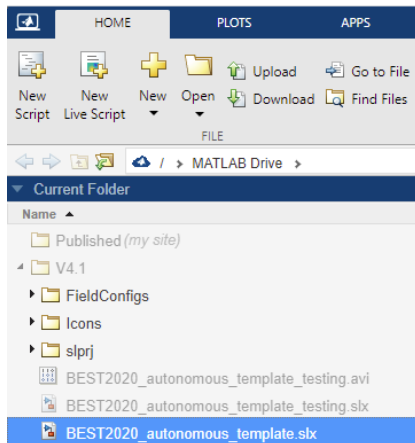
All files that you create will be stored on your MATLAB drive, a cloud-based drive. You can transfer files between MATLAB drive and your local PC.

BEST Robotics 2021 Competition Autonomous Template

For more information on how to use charts to program robot behavior, watch this video on Stateflow or follow the BEST Getting Started Guide

MATLAB Online Controls

Create Simulation Video (FPV)   Create Simulation Video (Top View)   Re-play Simulation Video

To create a video in MATLAB Online, you will need to use the button that comes with the Autonomous template model. Follow these steps carefully,

1. Single Click on "Create Simulation Video (*camview*)" to select it
   - *camview* = Camera point of view; FPV = First Person View, Top View)
2. Single Click on "Create Simulation Video (*camview*)" a second time to start the video
   - NOTE: fast double-click on the button will not start the simulation but instead opens the underlying script.
   - This button click will invoke the compile, simulate and playback of the video. You will see a progress bar during the compile/simulate but no 3D view.
   - The video window closes automatically after it plays.
3. After the simulation completes, the video is played showing exactly what happened during the run. Now you can
   - Single Click on "Re-play Simulation Video" to select it.
   - Single Click on "Re-play Simulation Video" to replay the video again.

When you click on "Create Simulation Video (*camview*)" again, the previous simulation will be lost.

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Mathworks Robotics Playground Add-On

For the Outbreak Online Competition, after you have requested and installed the Mathworks MATLAB/Simulink software, you will need to install the Robotics Playground Add-On to get access to the virtual game field components.

Un-installing an Earlier Version

If you have already installed the Robotics Playground before Sep 11th, 2020, you will need to uninstall it and re-install a newer version.

From the MATLAB window, follow these steps to Un-install the previous version.
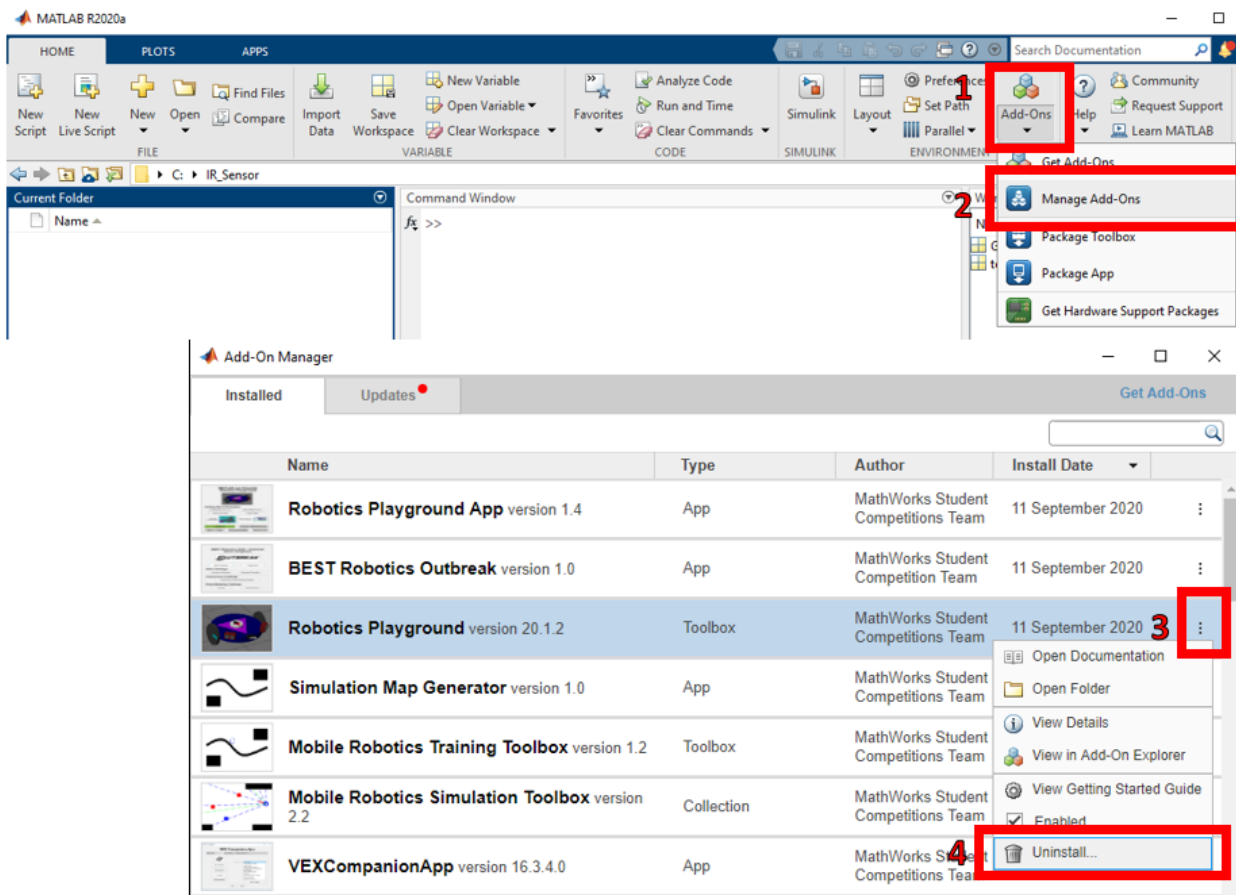
Install the Robotics Playground Add-On

From the MATLAB window, follow these steps to install the latest version of the Robotics Playground Add-On. Click Add-On, enter "Robotics Playground" in the search window and click the magnifying glass. Click on the APP name. When the APP information comes up, there will be a "Add From GitHub" button on the far right to initiate the installation. After installation, the information will be updated to indicate that the APP has been installed (as shown in the picture).

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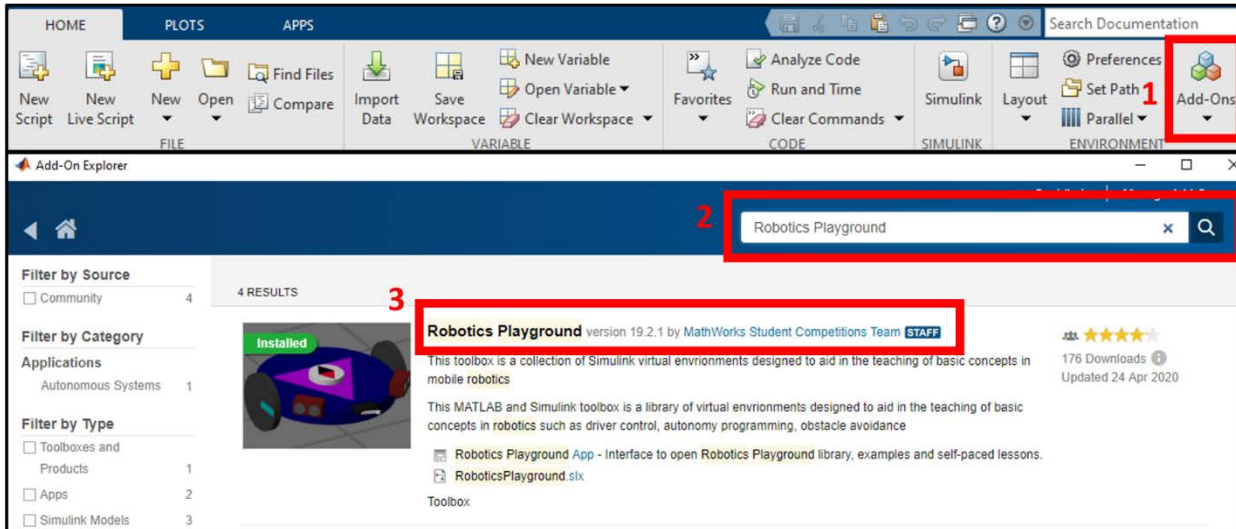
MATLAB APPS

After installing the Robotics Playground Add-On, two new apps are now available for BEST Robotics users. These are the BEST Robotics 2021 App and the Robotics Playground App. You can find and open these Apps by following the steps shown from the MATLAB window. Click on the STAR next to the app to make it a favorite for quick access in the future from the APPS menu.
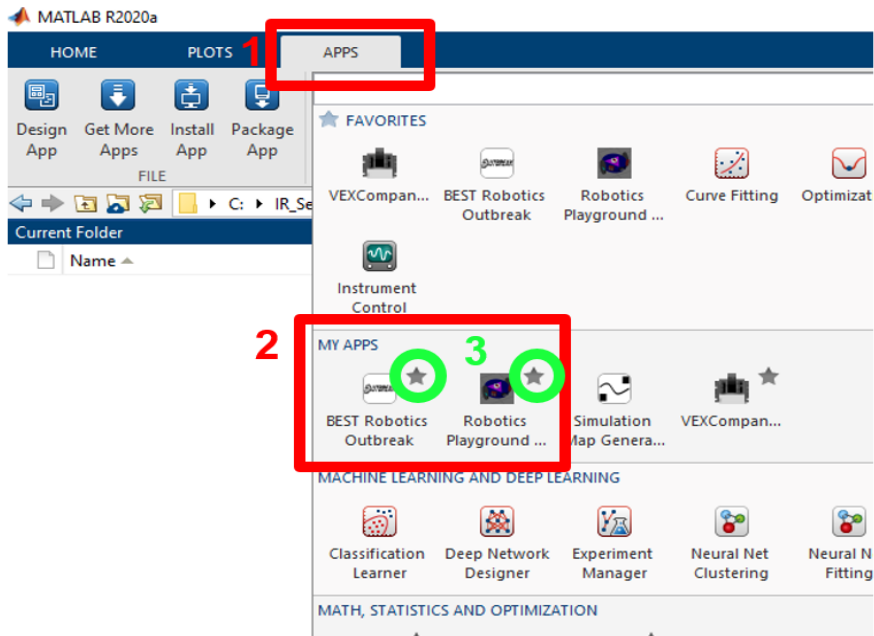
The Robotics Playground App contains links to general playground environments, examples, documentation and lessons (a portion of which were taught in the Simulink Summer Workshop).
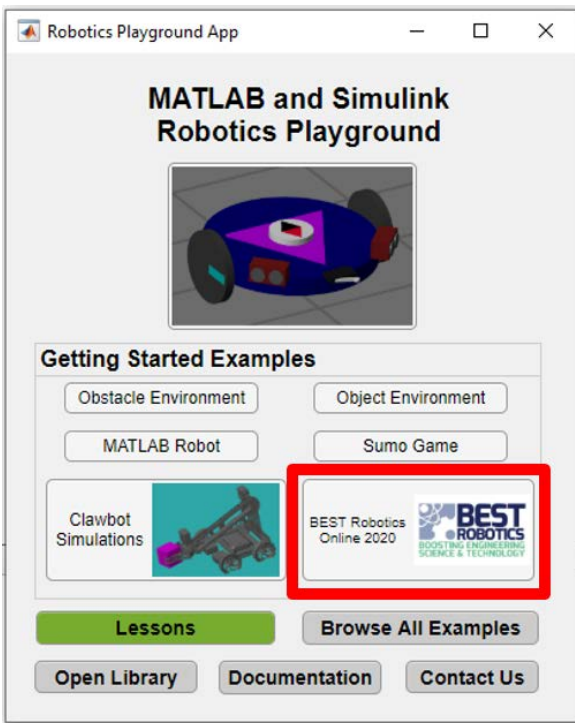
The BEST Robotics 2021 App contains quick links to templates for both Driver Controlled (gamepad or keyboard) and Autonomous programming. It also provides quick links to tutorials and examples for the Robot modeling challenge and the quick access to the Simulink Design Award rules and submission form.
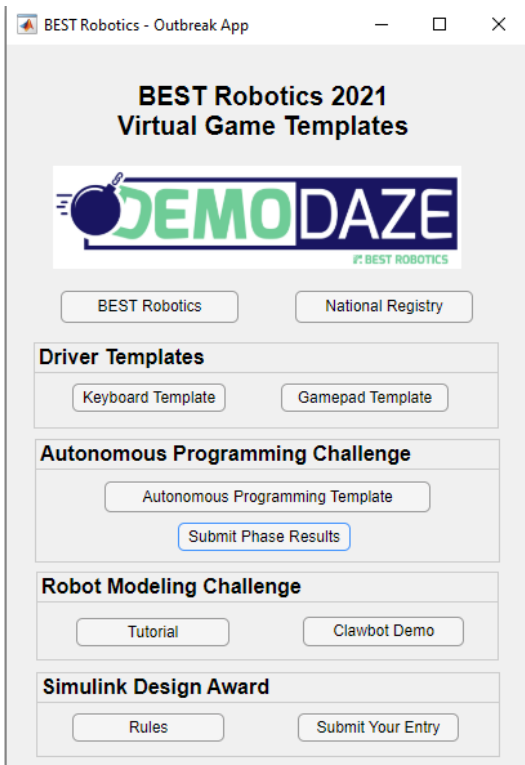
Robotics Playground Files

Upon installation of the Robotics Playground Add-On, the files will get stored here:

C:\Users\JohnDoe\Documents\MATLAB\Add-Ons\Toolboxes\Robotics Playground\examples\BESTRoboticsDemoDaze

This is the default location when opening the models from the BEST APP. The template models and practice field configurations will always be pulled from this folder.

There are 3 Template Simulink models available to be used as starter models. For driver-controlled, there is a Keyboard template and a Gamepad template. For autonomous, there is only one template. Click the appropriate button on the BEST Robotics 2021 App to open the template file. On the first opening, be patient as the model may load a bit slower the first time.

After opening and modifying a template (as you start your own programming), always use SAVE AS for your modified model and save it to a folder of your choice so that you do not overwrite the original templates in the above folder. If you DO overwrite the above template models, you will need to retrieve them from GitHub by uninstalling/re-installing the Robotics Playground Add-On.

Game configuration files provided by BEST Robotics should always be stored in the "local" directory with your simulink model. The tool will always search for these files in the current folder first.

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Robot Modeling Challenge

The BEST Robotics 2021 App also has quick links to some supporting instructions and examples for the Robot Modeling Challenge. The Tutorial is a two-part Robot Modeling blog written by Mathworks that walks you through how to use the Simscape Multibody tool to model the physical aspects of your robot. It covers how to import your own CAD models as well. The Clawbot Demo is a model of the VEX Robotics Clawbot design. You can open this model and see an example of how the modeling was done. This example is what is covered in the tutorial mentioned.

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