MATLAB EXPO 2021

MATLAB & Simulink 新特性概述

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MathWorks

MATLAB® & SIMULINK®

R2019b

R2020a

R2020b

R2021a

MATLAB® & SIMULINK®

专注　　协同　　实现

MATLAB® & SIMULINK®

专注　　协同　　实现

以思维的速度编辑

Explore data

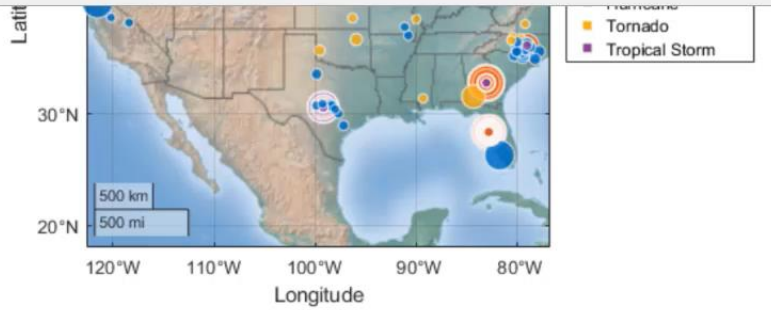
Plot some of the events on a map and use the size of the bubble as the damage cost.

```
threshold =  7640 ;
plotEventCostsMap(data,threshold);
```

Event frequency by location

Calculate damage costs by group.

```
damageByEvent = groupsummary(data,"weathercats",["mean","std"],"damage_total")
```



damageByEvent = 32×4 table

	weathercats	GroupCount	mean_damage_total	std_damage_total
1	Avalanche	39	1.2500	5.5160
2	Blizzard	961	4.8792	38.3841
3	Coastal Weather	6053	356.5849	1.1948e+04
4	Debris Flow	318	111.1654	736.8761
5	Dense Fog	1115	0.8292	9.3457
6	Dense Smoke	61	0	0
7	Drought	3584	0.1853	2.4966
8	Dust Devil	14	41.5714	132.2025
9	Dust Storm	151	8.8298	48.1969

实时编辑器任务让您“远离”代码

DATA AND VISUALIZATION

- Create Plot

DATA PREPROCESSING

- Clean Missing Data
- Clean Outlier Data
- Find Change Points
- Find Local Extrema
- Remove Trends
- Smooth Data

TABLES AND TIMETABLES

- Join Tables
- Retime Timetable
- Stack Table Variables
- Synchronize Timetables
- Unstack Table Variables

OPTIMIZATION

- Optimize

CONTROL SYSTEM DESIGN AND ANALYSIS

- Convert Model Rate
- Reduce Model Order
- Tune PID Controller

PREDICTIVE MAINTENANCE

- Estimate Approximate Entropy
- Estimate Correlation Dimension
- Estimate Lyapunov Exponent
- Extract Spectral Features
- Reconstruct Phase Space

SYSTEM IDENTIFICATION

- Estimate Process Model
- Estimate State-Space Model

SIGNAL PROCESSING AND COMMUNICATIONS

- Extract Audio Features

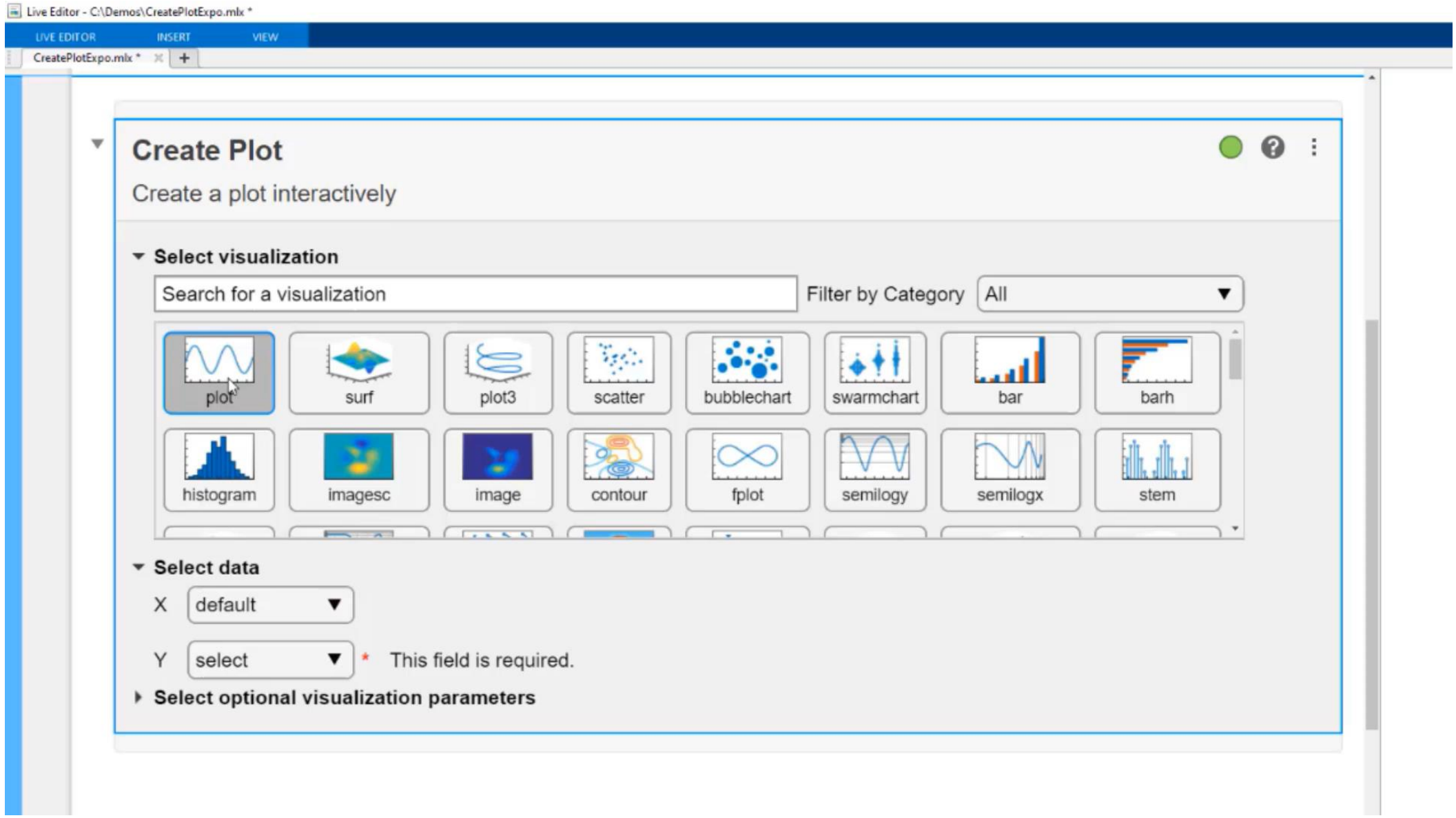
SYMBOLIC MATH

- Simplify Symbolic Expressio
- Solve Symbolic Equation

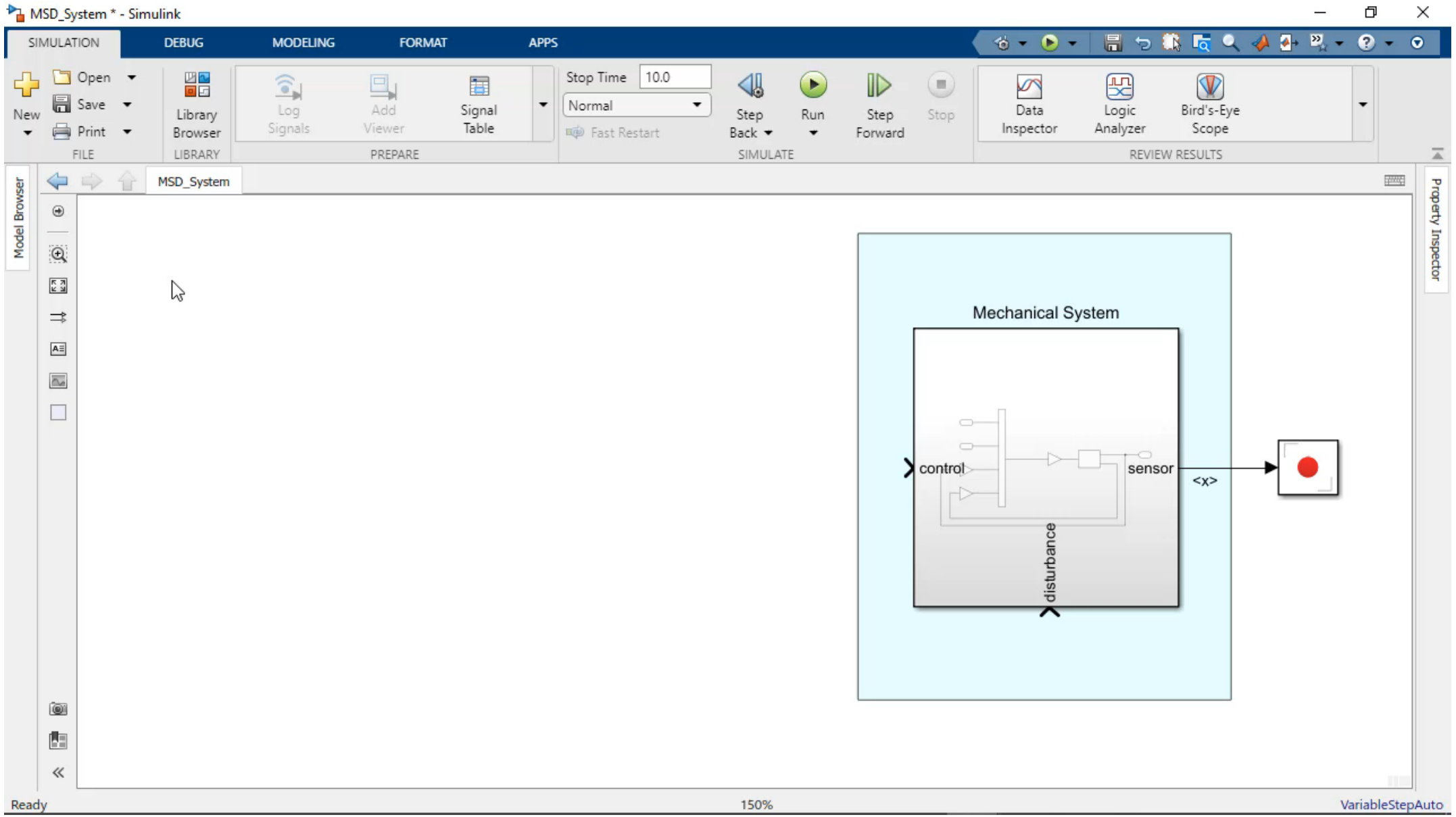
IMAGE ACQUISITION

- Acquire Webcam Image

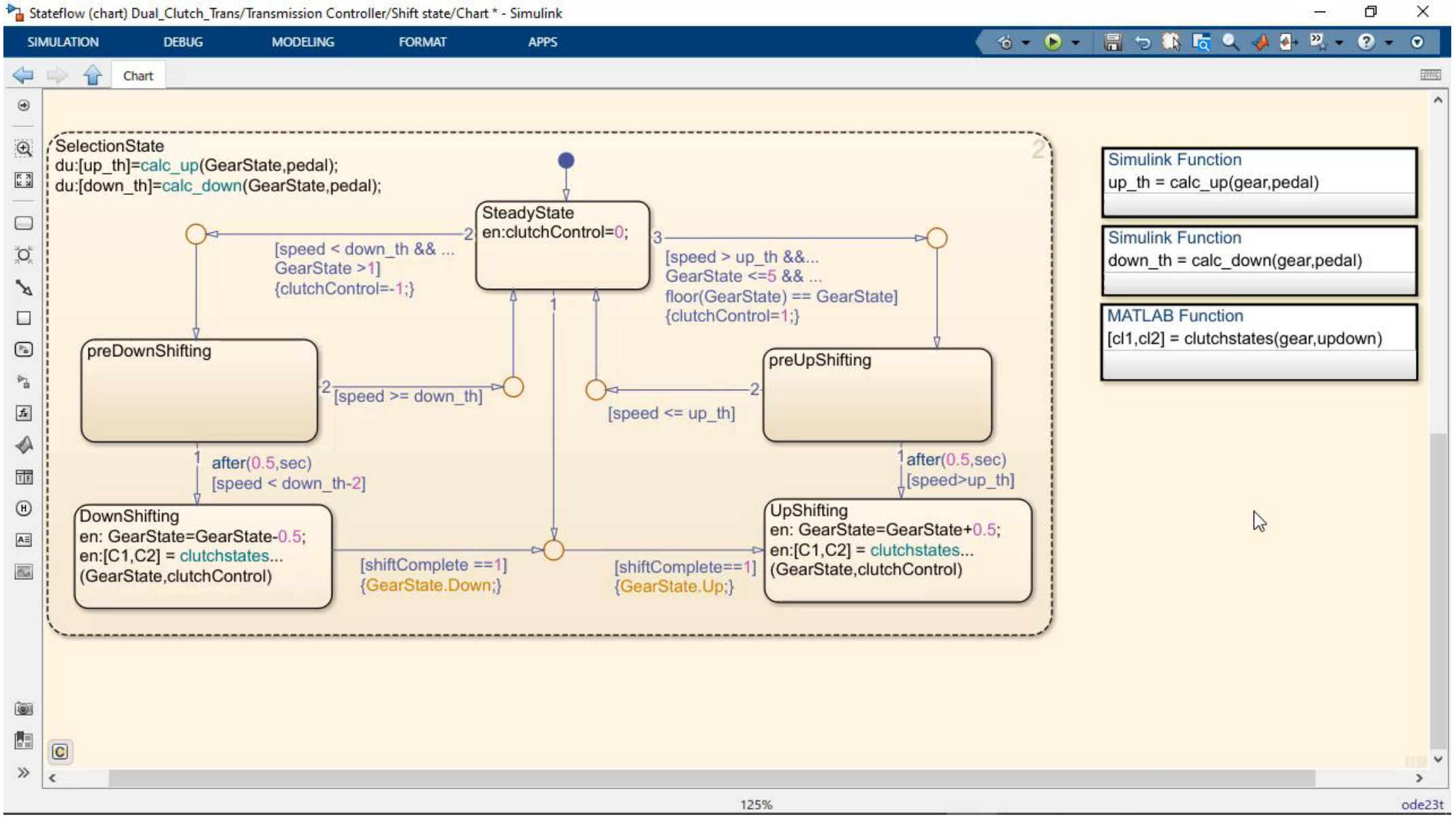
实时编辑器任务让您“远离”代码



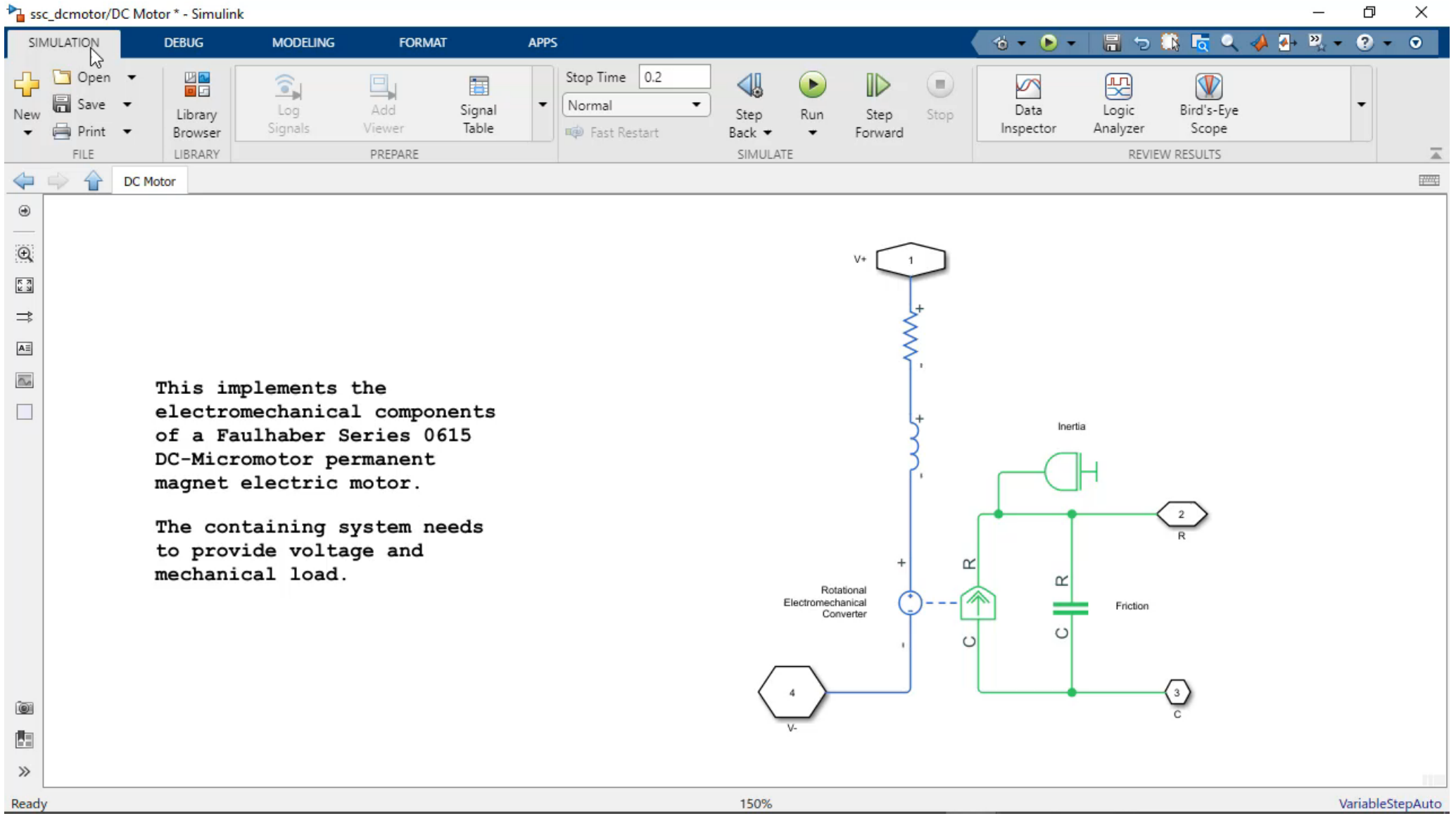
以思维的速度编辑


MSD_System * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Print
FILE
Library Browser
LIBRARY
Log Signals
Add Viewer
Signal Table
PREPARE
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Logic Analyzer
Bird's-Eye Scope
REVIEW RESULTS
Model Browser
MSD_System
Property Inspector
Mechanical System
control
sensor
<x>
disturbance
Ready
150%
VariableStepAuto

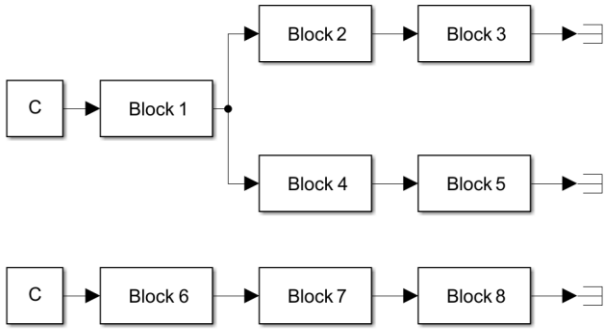
以思维的速度编辑


Stateflow (chart) Dual_Clutch_Trans/Transmission Controller/Shift state/Chart * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
Chart
SelectionState
du:[up_th]=calc_up(GearState,pedal);
du:[down_th]=calc_down(GearState,pedal);
SteadyState
en:clutchControl=0;
[speed < down_th && ...
GearState >1]
{clutchControl=-1;}
[speed > up_th &&...
GearState <=5 && ...
floor(GearState) == GearState]
{clutchControl=1;}
preDownShifting
[speed >= down_th]
[speed <= up_th]
preUpShifting
after(0.5,sec)
[speed < down_th-2]
after(0.5,sec)
[speed>up_th]
DownShifting
en: GearState=GearState-0.5;
en:[C1,C2] = clutchstates...
(GearState,clutchControl)
[shiftComplete ==1]
{GearState.Down;}
[shiftComplete==1]
{GearState.Up;}
UpShifting
en: GearState=GearState+0.5;
en:[C1,C2] = clutchstates...
(GearState,clutchControl)
Simulink Function
up_th = calc_up(gear,pedal)
Simulink Function
down_th = calc_down(gear,pedal)
MATLAB Function
[cl1,cl2] = clutchstates(gear,updown)
125%
ode23t

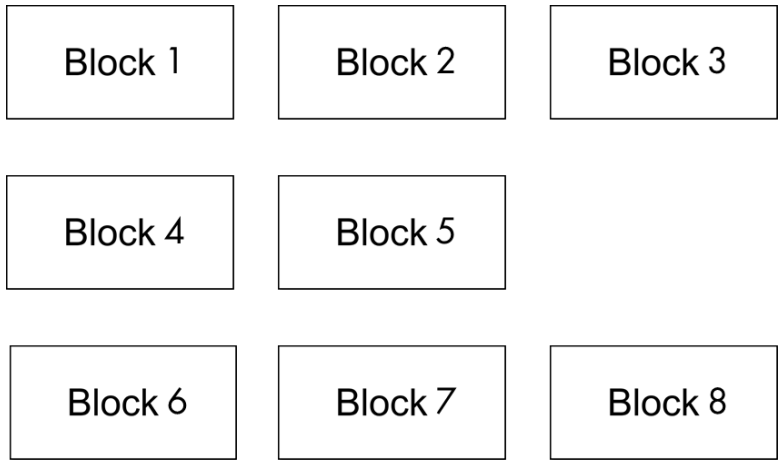
易用的Simulink工具栏



让Simulink运行更快



Parallel Execution



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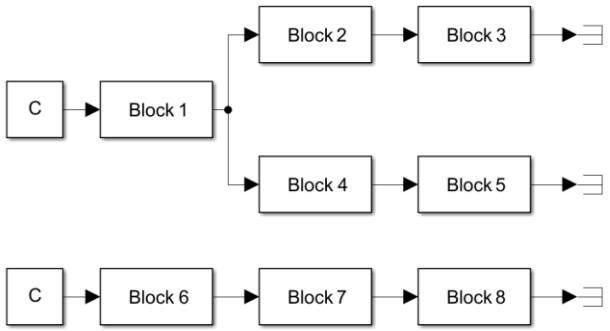
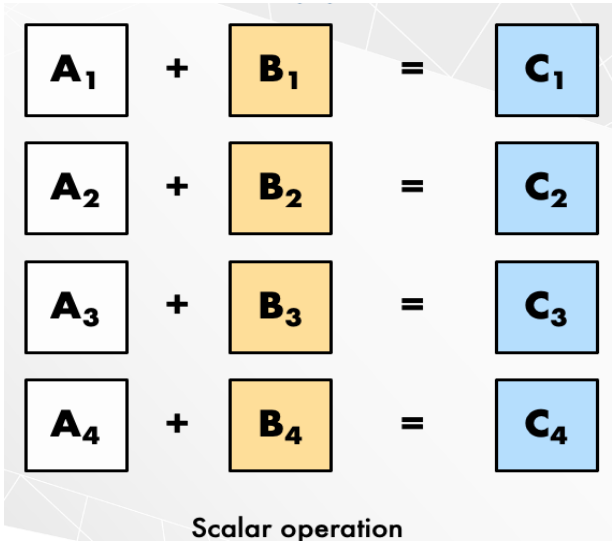
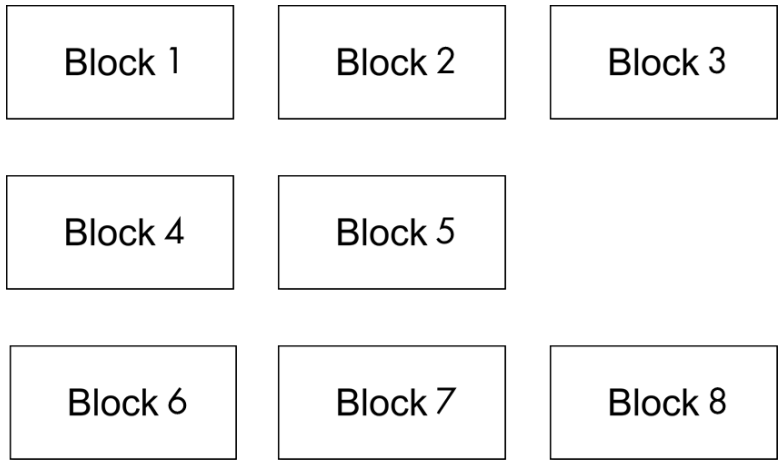
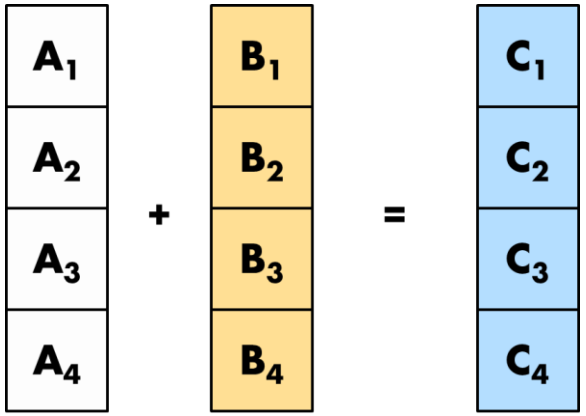




Parallel Execution



Hardware Acceleration



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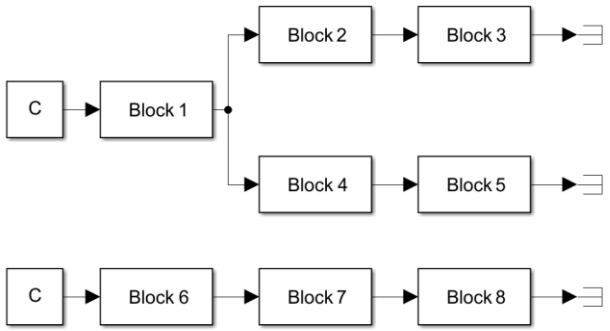
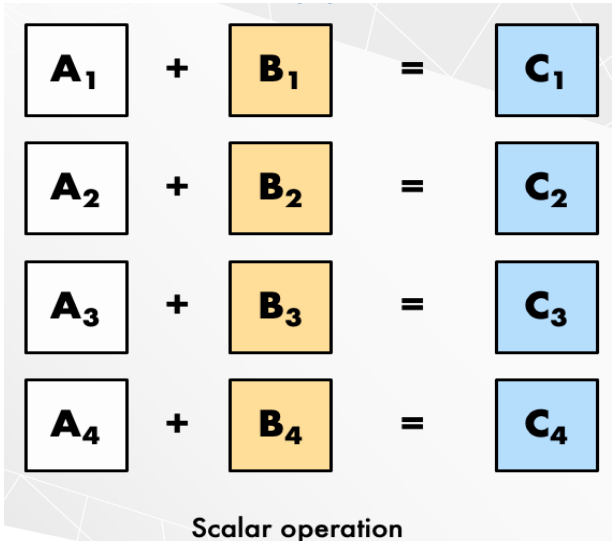
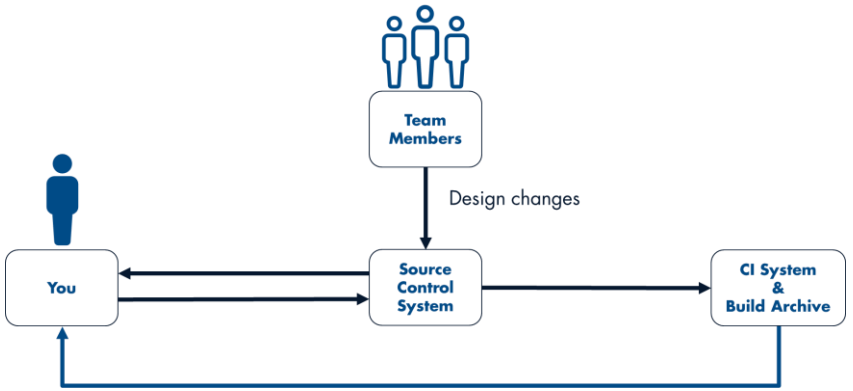
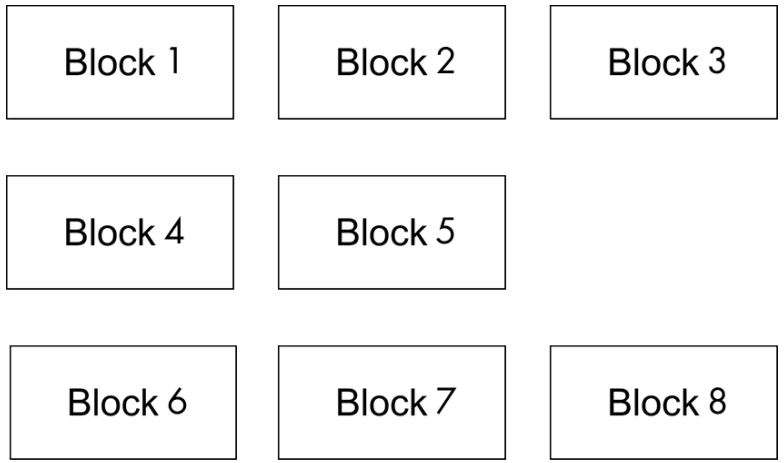


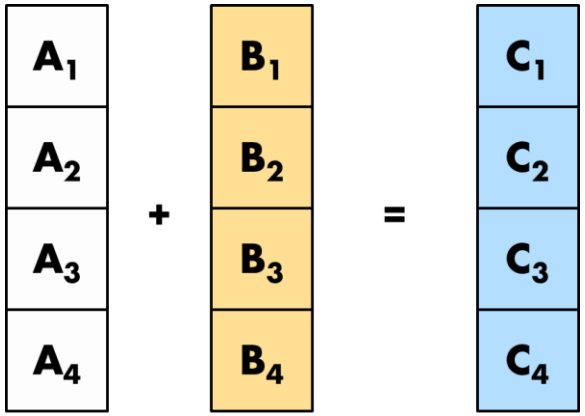




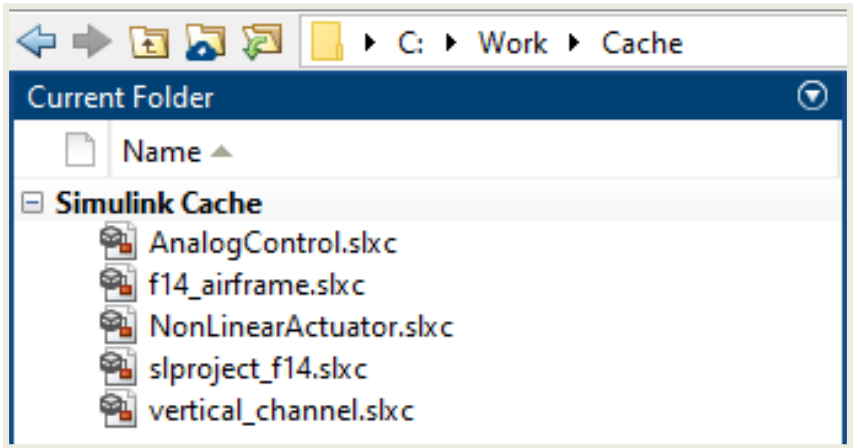
Parallel Execution



Hardware Acceleration

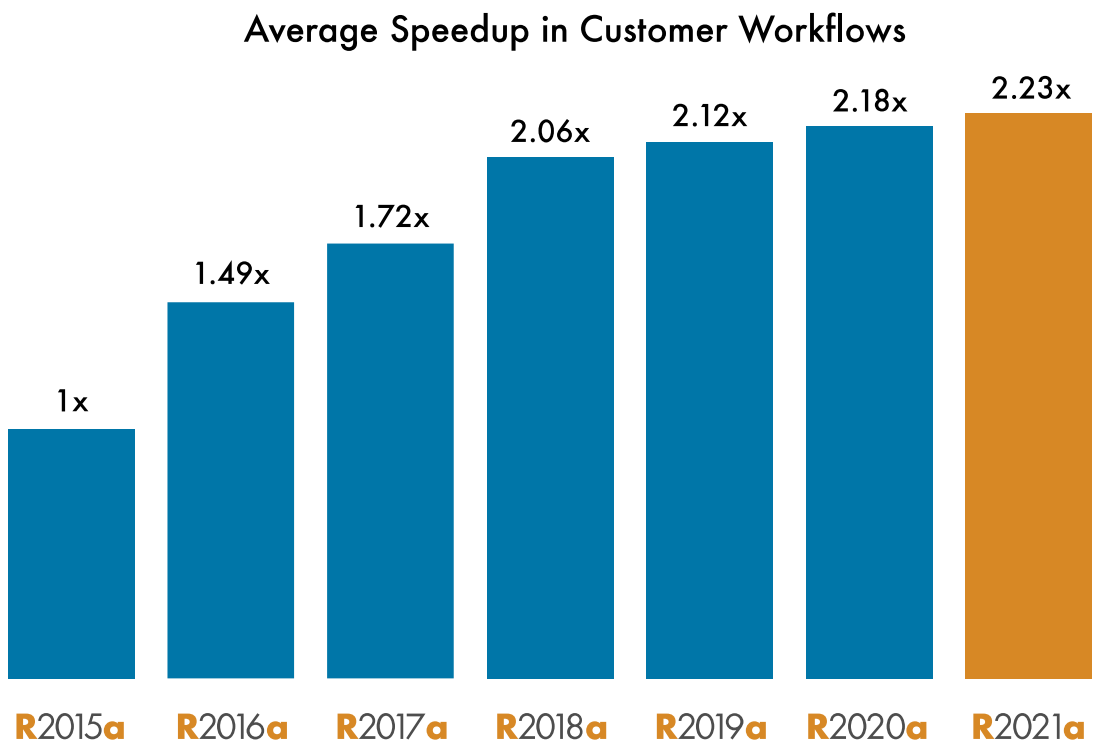


Simulink Cache



MATLAB的提速

Area	Description	Performance Improvement	Release
Graphics	rendering performance, large data sets in UI figures	6x	R2020a
Indexing	`datetime`, `duration`, and `calendarDuration` arrays	25x	R2020a
	`table` arrays	2x	R2020a
Sparse	matrix multiplication linear systems	4-5x	R2021a



MATLAB Release Notes

R2021a

R2021a

Performance

- Sparse Matrix Multiplication: Improved performance multiplying large sparse matrices
- Sparse Linear Systems: Improved performance solving sparse linear systems A*X = B with multicolumn B

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R2021a

Performance

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- Sparse Linear Systems: Improved performance solving sparse linear systems A*X = B with multicolumn B

Solving a linear system of the form `A*X = B` by executing `X = A\B` shows improved performance when `A` is a sparse square matrix and `B` is a matrix with two or more columns. The speedup applies to the solving step of the calculation but not the factorization step. The performance improvement arises from added support for multithreading, and therefore the speedup gets better as the number of columns in `B` increases.

For example, if you solve `A*X = B` using a `1e4`-by-`1e4` sparse coefficient matrix with approximately 40,000 nonzeros and a `B` matrix with 100 columns, performance in R2021a is about 5x faster than in R2020b on a machine with 6 physical cores. This code uses `decomposition` to factor the coefficient matrix, so only the solving process is timed. If you use `X = A\B` instead, you still see a speedup, but the time required to factor the matrix is included and has not changed.

```
function timingSparseBackslashMultRHS
rng default
A = sprand(1e4,1e4,0.0003) + speye(1e4);
B = sprand(1e4,100,0.002);
dA = decomposition(A);
tic
x = dA\B;
toc
end
```

The approximate execution times are:

R2020b: 1.5 s

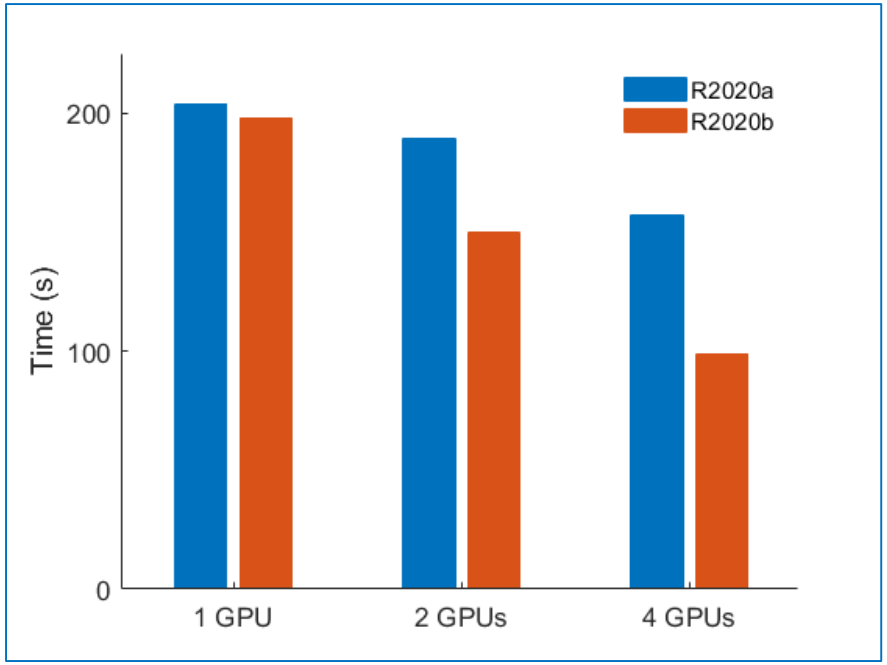
R2021a: 0.3 s

The code was timed on a Windows 10, Intel Xeon W-2133 CPU @ 3.60 GHz test system by calling the function `timingSparseBackslashMultRHS`.

MATLAB的提速

Deep Learning

Area	Description	Performance Improvement	Release
Training	Multi-GPU	1.6x	R2020a → R2020b
Inference	GPU	2.8x	R2018b → R2021a
	CPU	2.5x	



让写代码变得更容易

```
str = ["String was introduced in R2016b."
       " Pattern was added in R2020b."];
```

Create a pattern to match releases

```
pat = "R" + digitsPattern(4) + ("a"|"b");
```

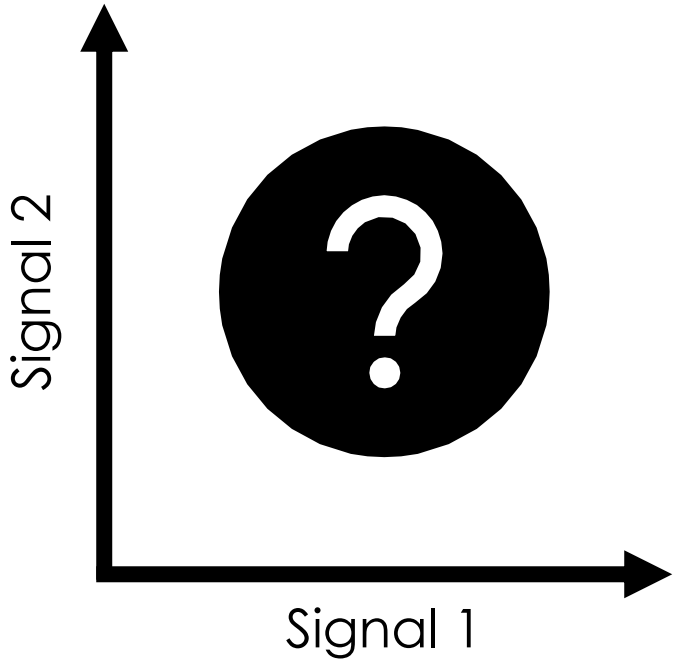
Extract the releases that were mentioned

```
extract(str,pat)
```

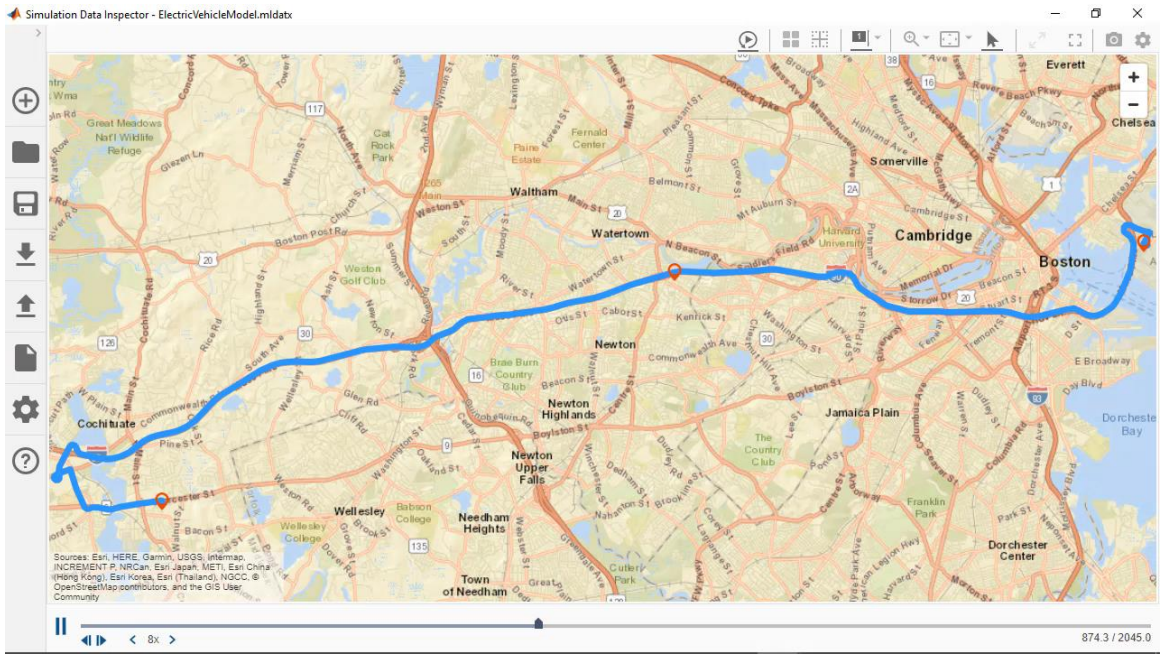
```
ans = 2×1 string
    "R2016b"
    "R2020b"
```

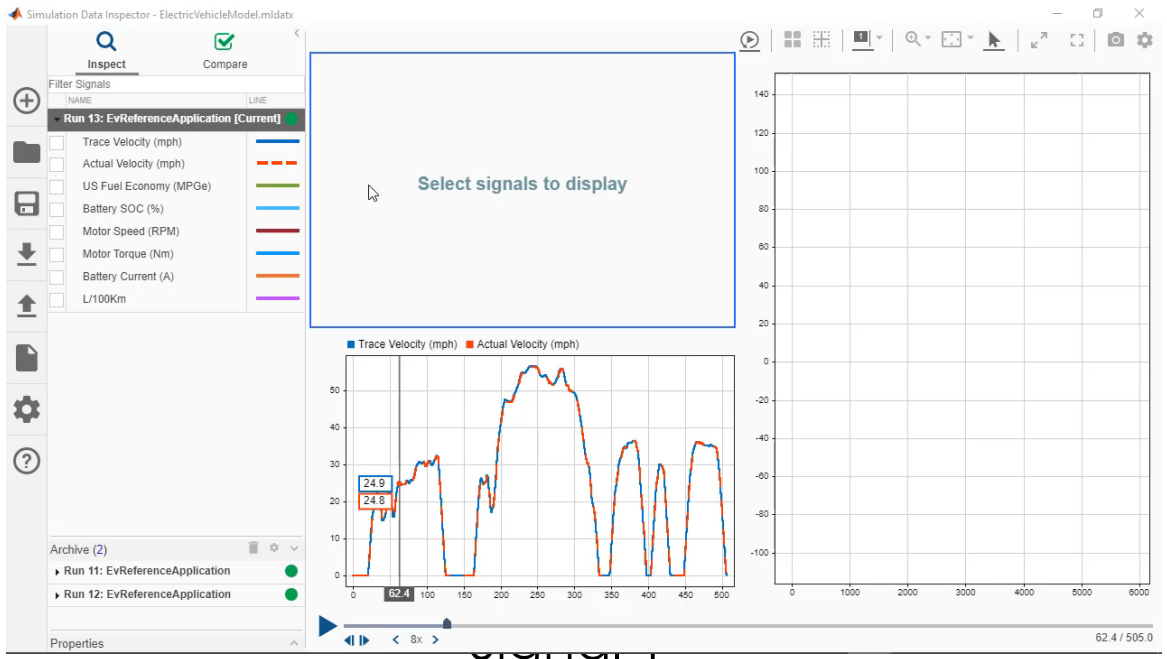
pattern object

快速提取仿真结果中的信息

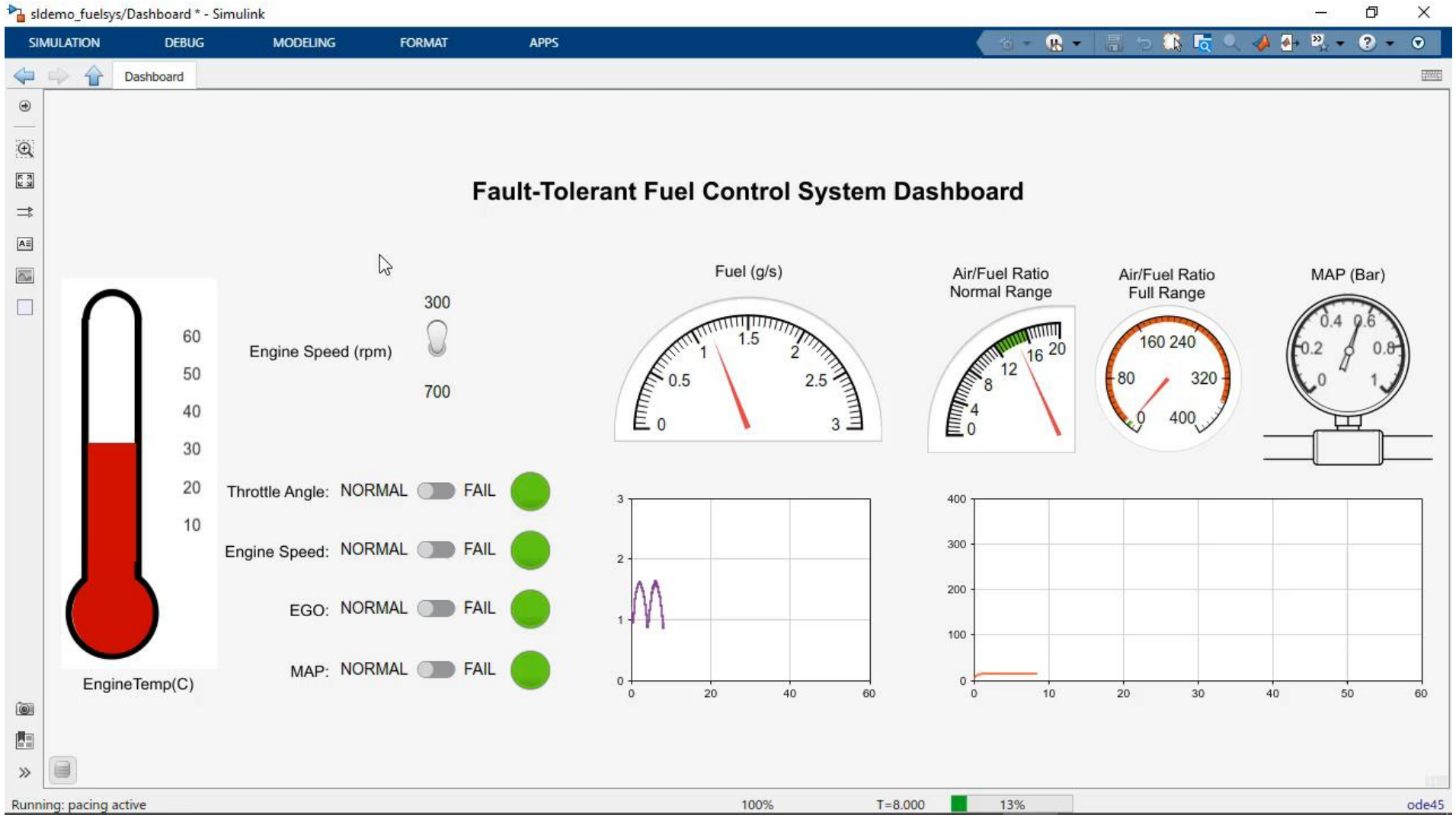


快速提取仿真结果中的信息





调试和监控仿真而不深入细节



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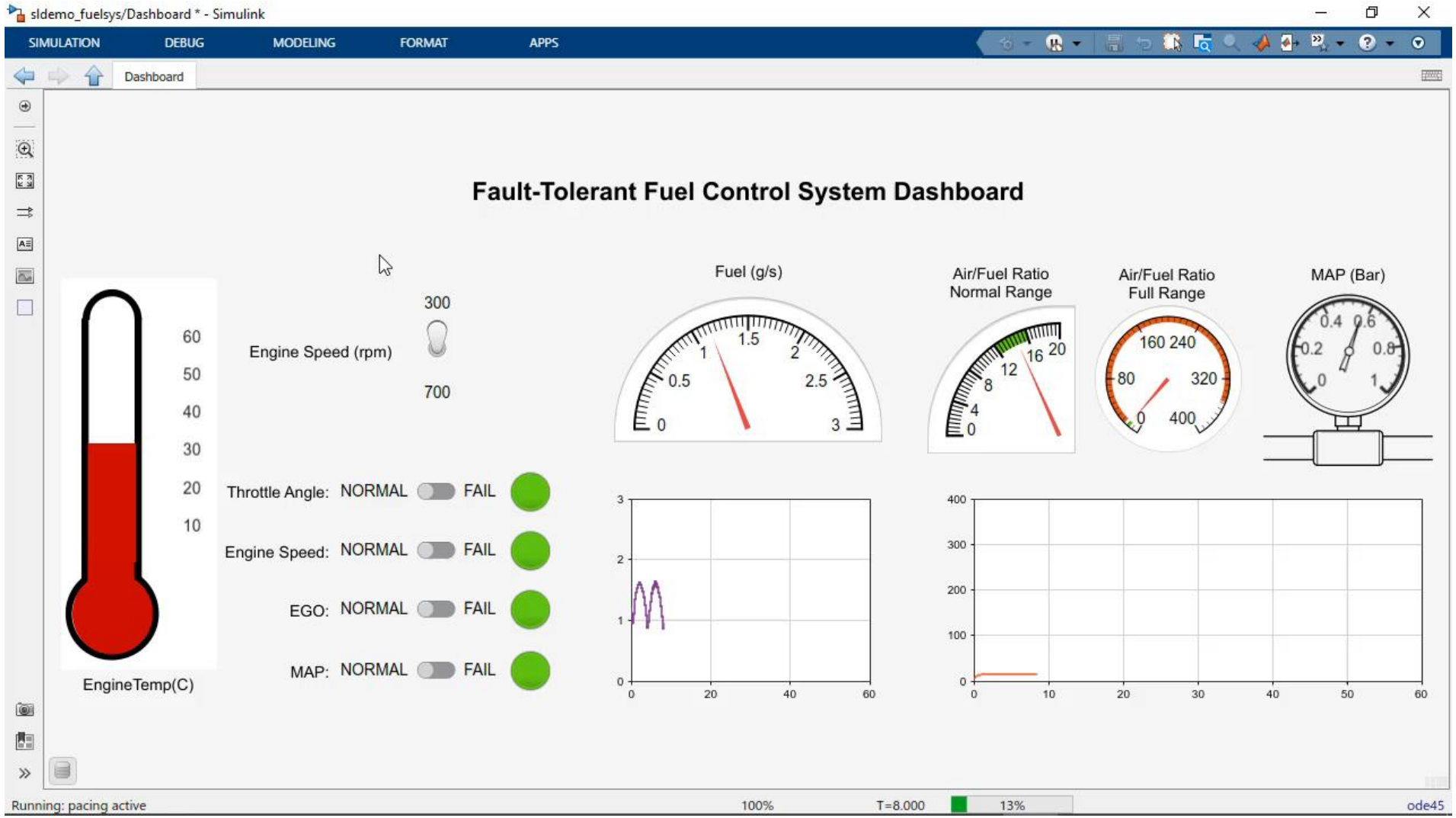
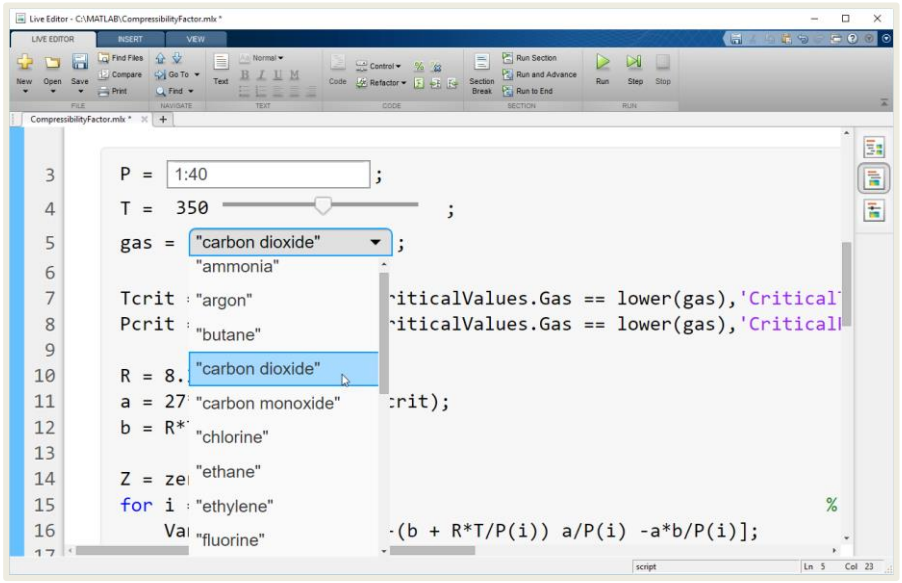
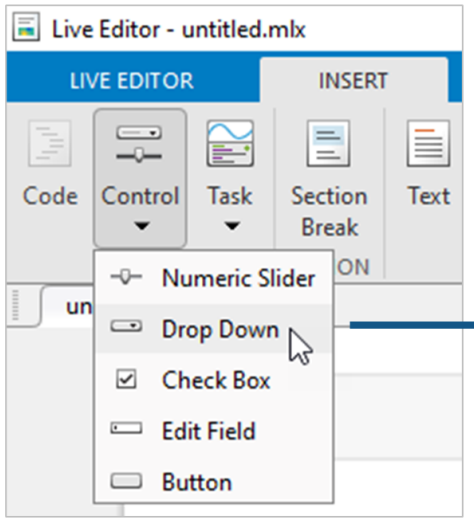
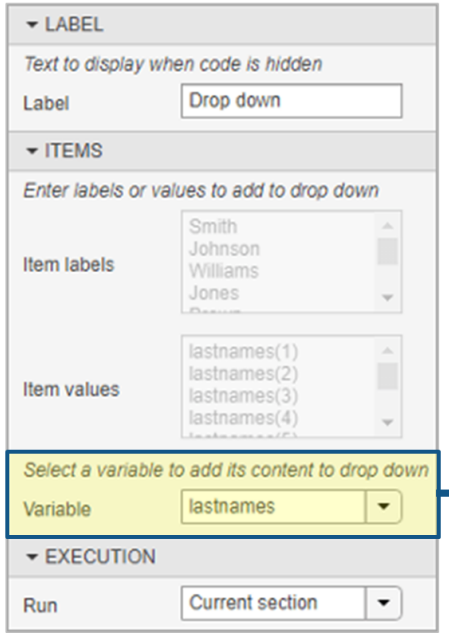


在几秒钟内将脚本变成一个简单的应用程序




```
lastnames = ["Smith", "Johnson", "Williams",
"Jones", "Brown", "Davis", "Miller", "Wilson"];
```





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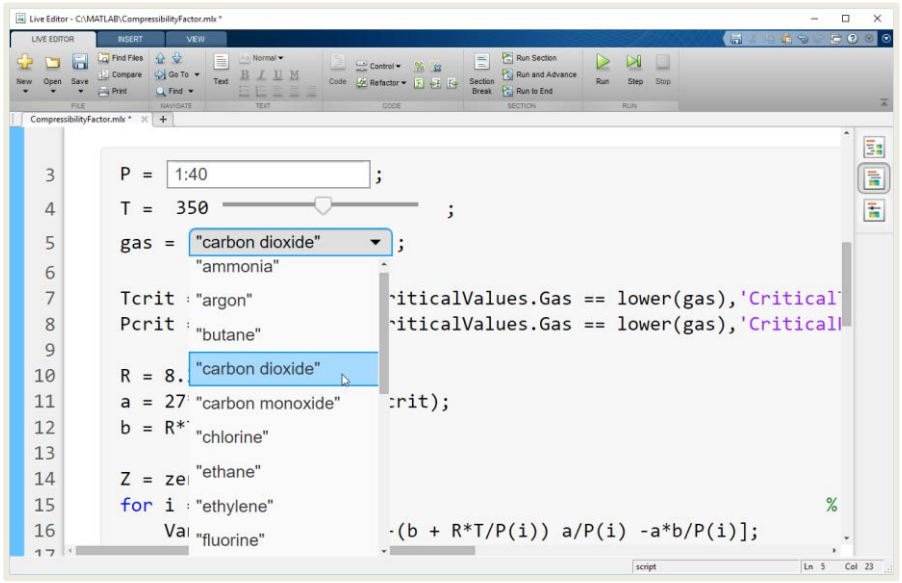

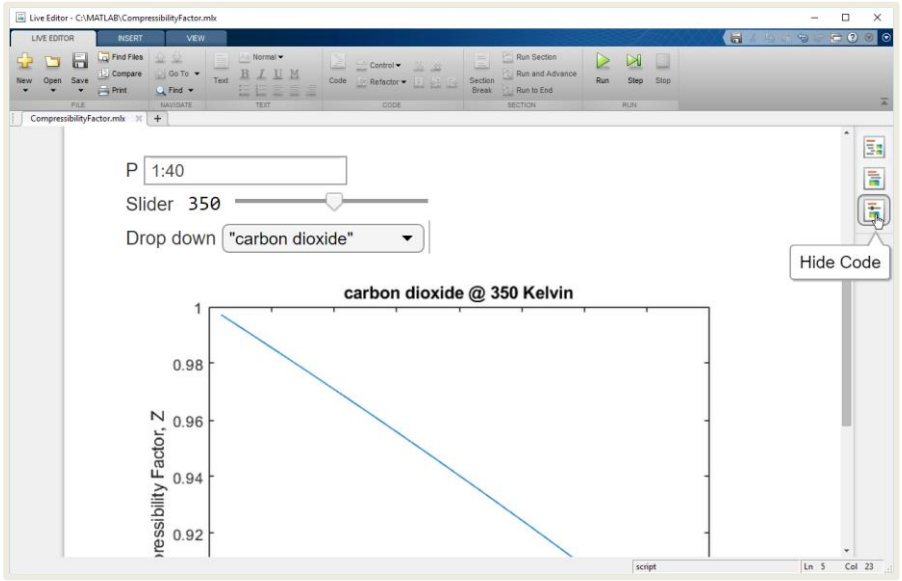


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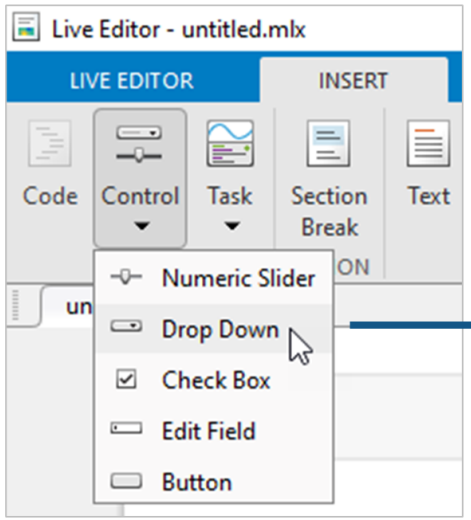
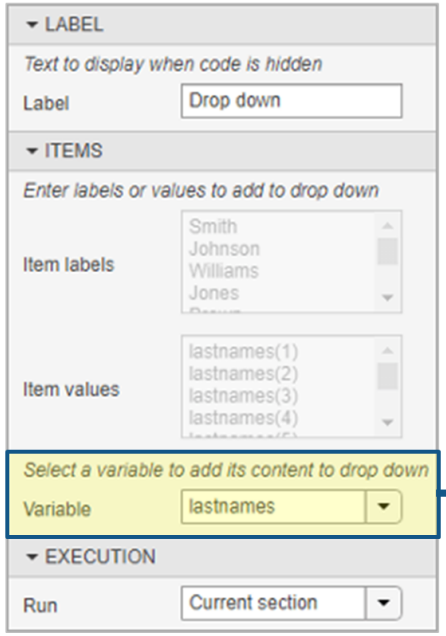
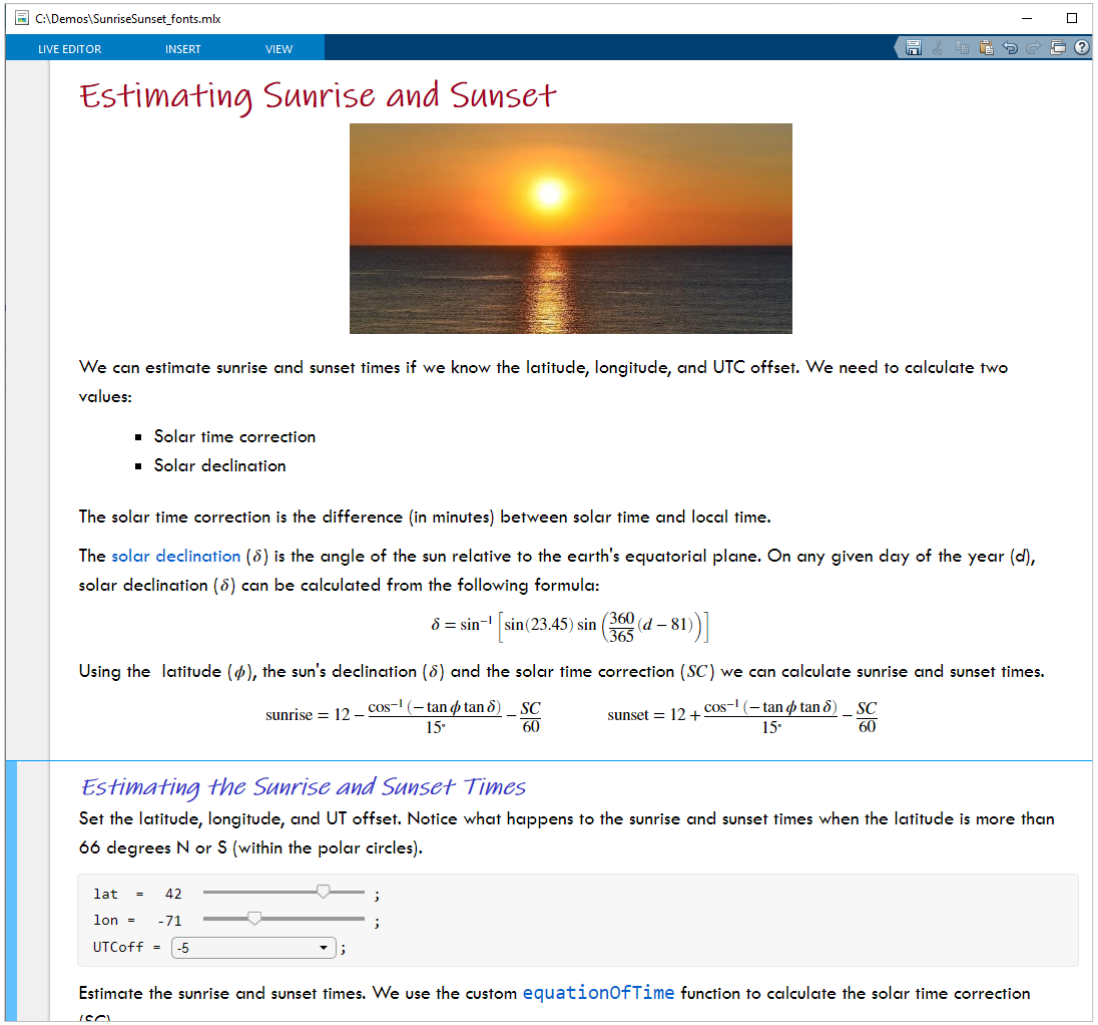
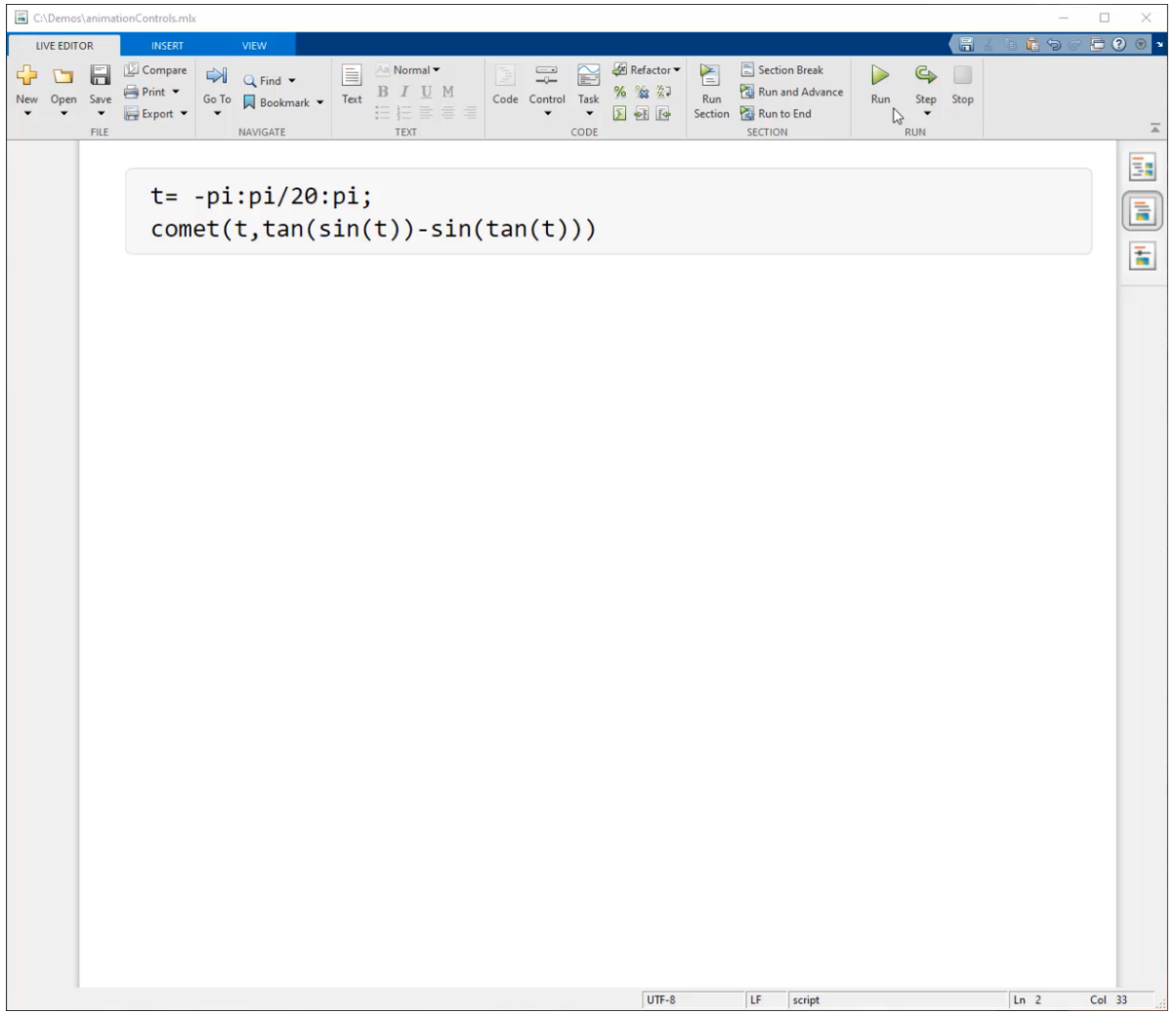
```





代码的呈现和共享


C:\Demos\SunriseSunset_fonts.mlx
LIVE EDITOR
INSERT
VIEW
Estimating Sunrise and Sunset
We can estimate sunrise and sunset times if we know the latitude, longitude, and UTC offset. We need to calculate two values:
Solar time correction
Solar declination
The solar time correction is the difference (in minutes) between solar time and local time.
The solar declination (δ) is the angle of the sun relative to the earth's equatorial plane. On any given day of the year (d), solar declination (δ) can be calculated from the following formula:
$$\delta = \sin^{-1}\left[\sin(23.45)\sin\left(\frac{360}{365}(d-81)\right)\right]$$
Using the latitude (ϕ), the sun's declination (δ) and the solar time correction (SC) we can calculate sunrise and sunset times.
$$\text{sunrise} = 12 - \frac{\cos^{-1}(-\tan\phi\tan\delta)}{15^\circ} - \frac{SC}{60} \qquad \text{sunset} = 12 + \frac{\cos^{-1}(-\tan\phi\tan\delta)}{15^\circ} - \frac{SC}{60}$$
Estimating the Sunrise and Sunset Times
Set the latitude, longitude, and UT offset. Notice what happens to the sunrise and sunset times when the latitude is more than 66 degrees N or S (within the polar circles).
lat = 42 ;
lon = -71 ;
UTCoff = -5 ;
Estimate the sunrise and sunset times. We use the custom equationOfTime function to calculate the solar time correction


C:\Demos\animationControls.mlx
LIVE EDITOR
INSERT
VIEW
New
Open
Save
Compare
Print
Export
Go To
Find
Bookmark
Text
Normal
Code
Control
Task
Refactor
Run Section
Section Break
Run and Advance
Run to End
Run
Step
Stop
FILE
NAVIGATE
TEXT
CODE
SECTION
RUN
t= -pi:pi/20:pi;
comet(t,tan(sin(t))-sin(tan(t)))
UTF-8
LF
script
Ln 2
Col 33

MATLAB® & SIMULINK®

专注　　协同　　实现

Languages

C/C++

Python

Java

Source Control & CI

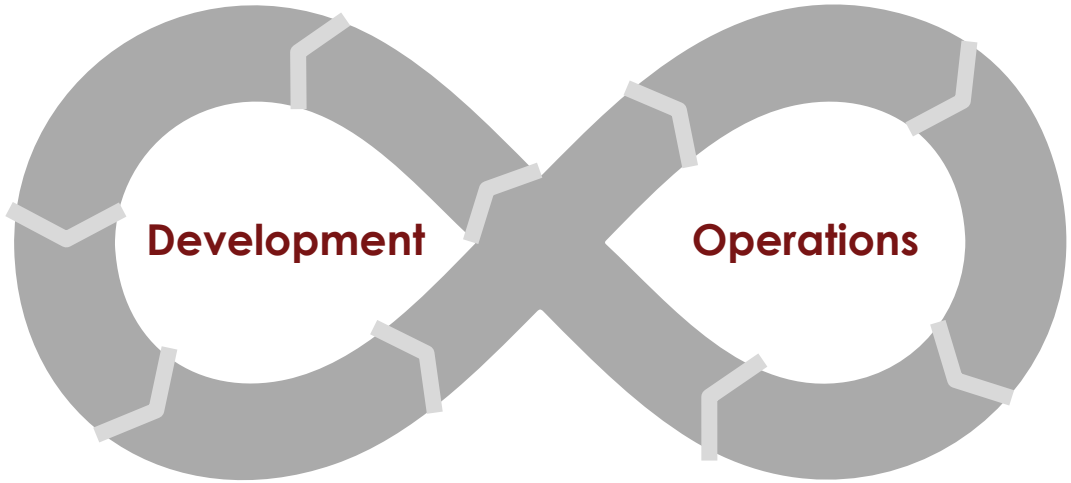
GitHub

Git

Jenkins

Travis CI

CircleCi



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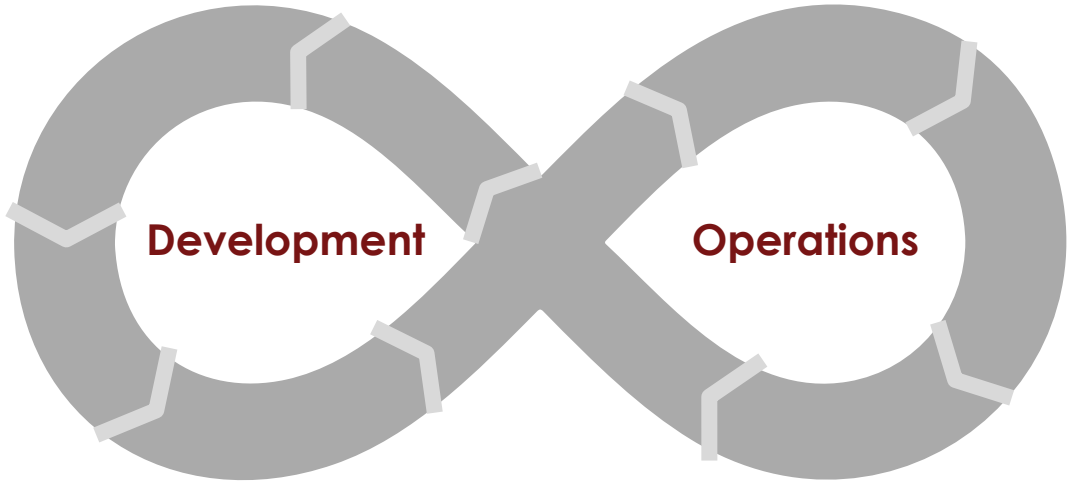


Data Platforms & Technology

Domino Data Lab

Databricks

Jupyter

Tableau

Kafka

Hadoop

MQTT

RabbitMQ

Cloud Platforms & Technology

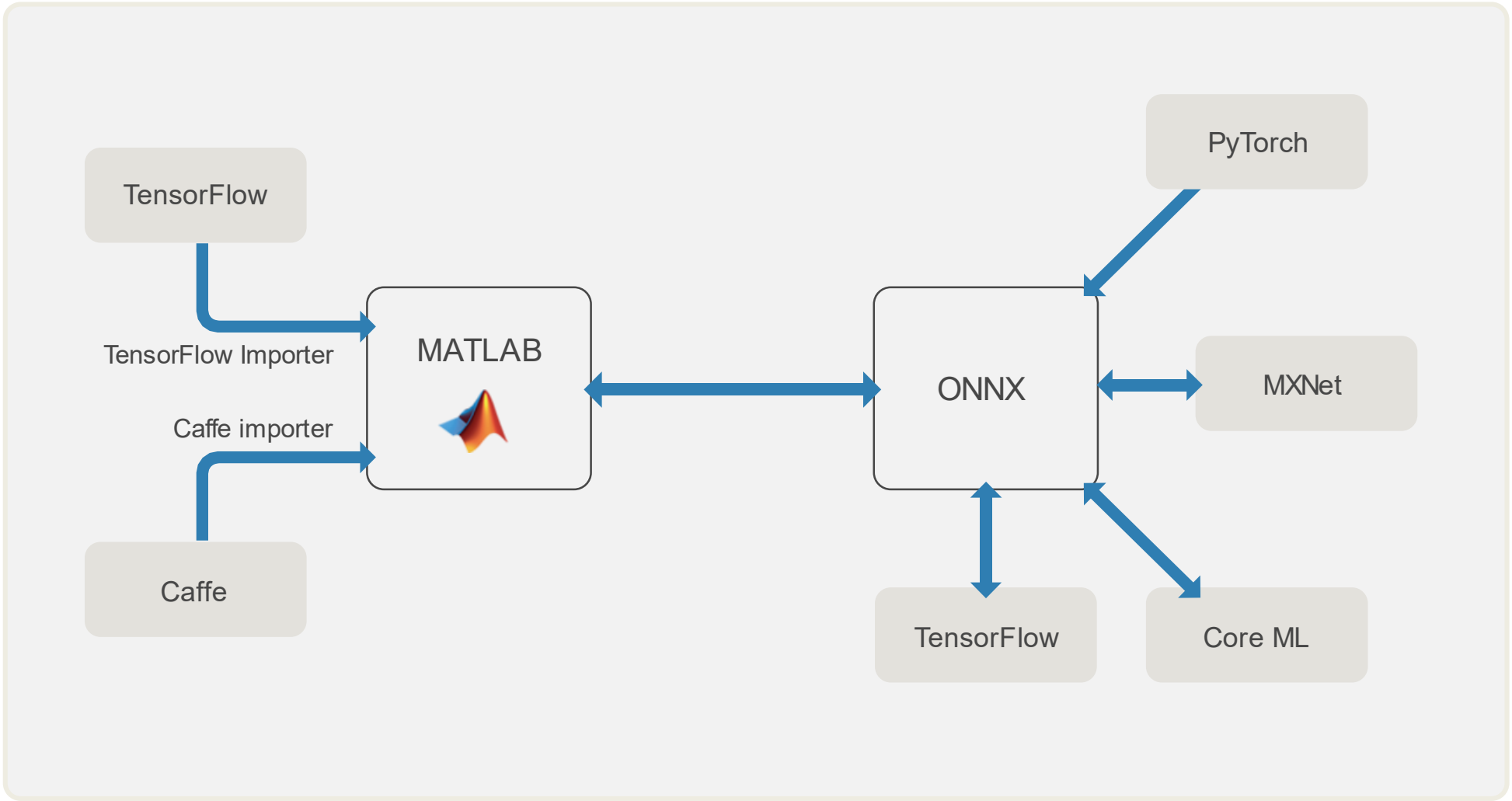
AWS

Azure

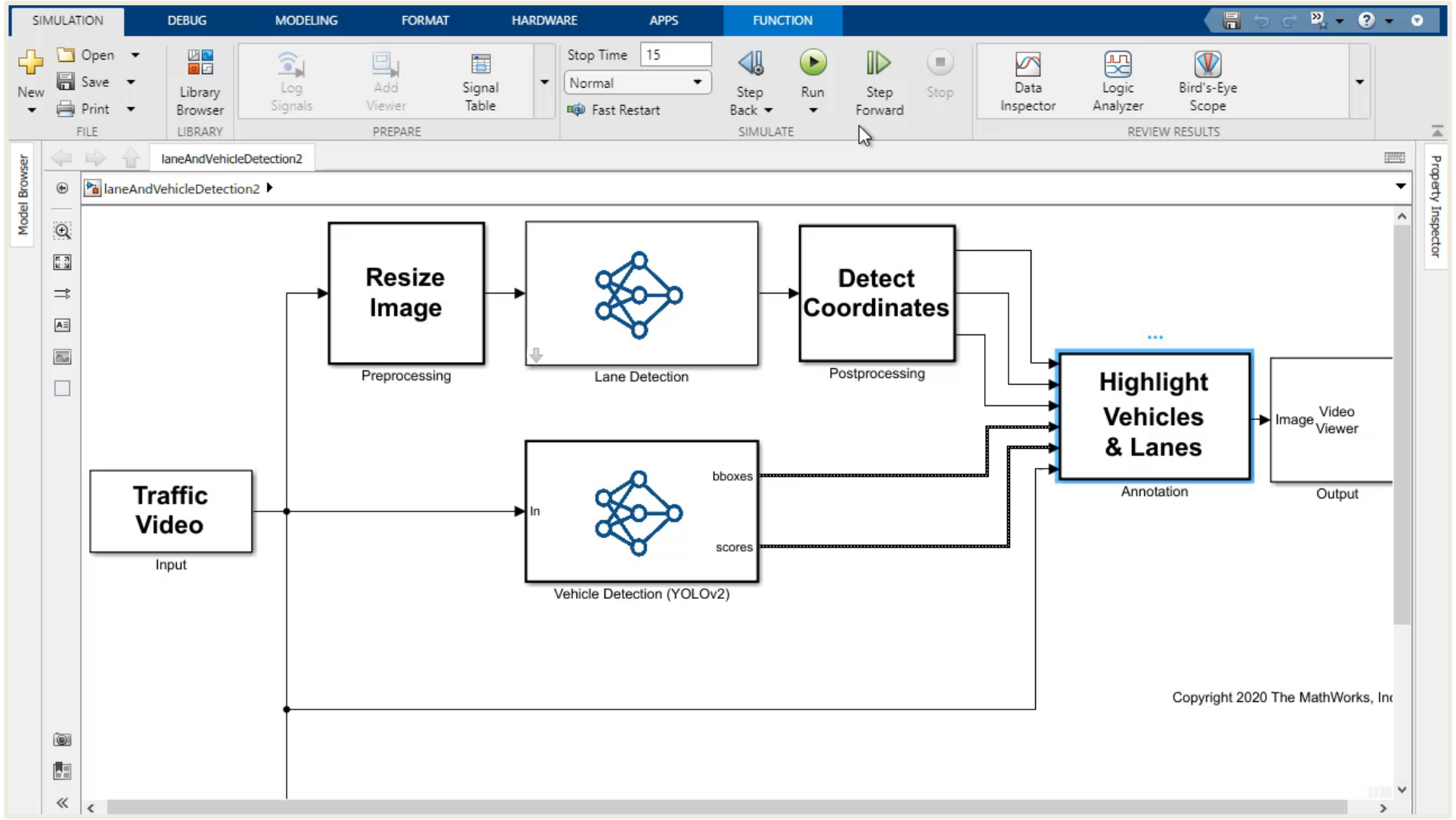
Docker

Docker Hub

与基于python的框架集成

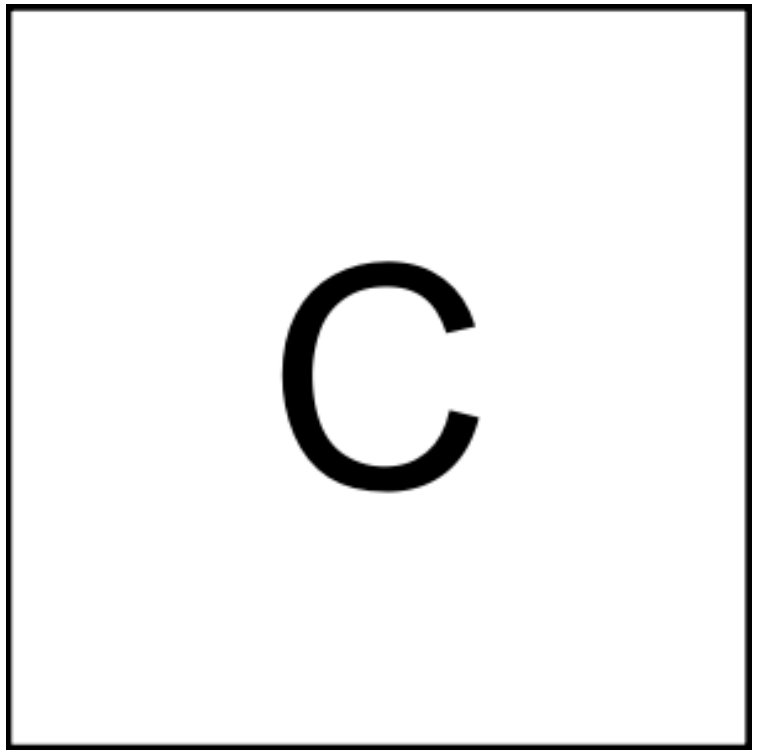


在Simulink中的深度学习



轻松将C代码集成到Simulink

R2020a



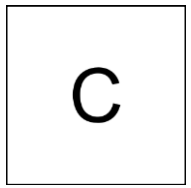
C Function

R2018b

C Caller

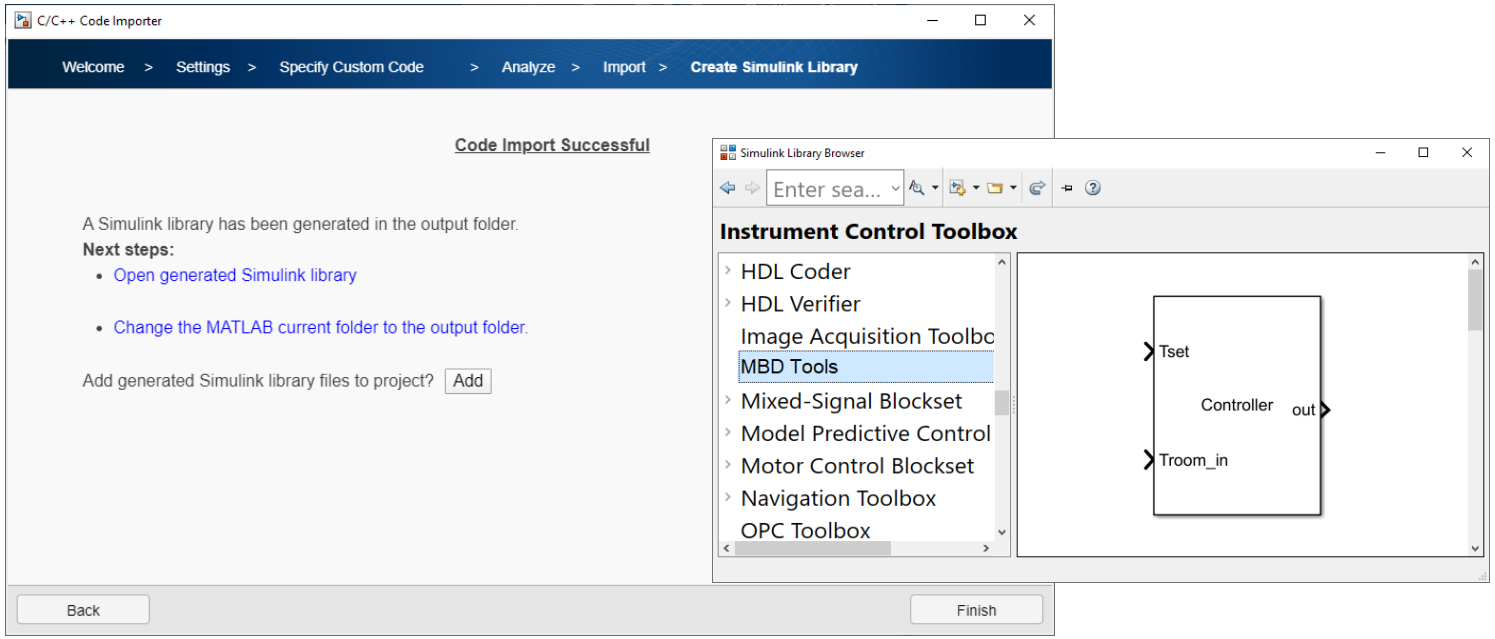
- Simulink Coverage
- Simulink Test
- Simulink Design Verifier
- Simulink Coder

R2020a



C Function

R2021a



Code Importer

R2018b

<FunctionName>

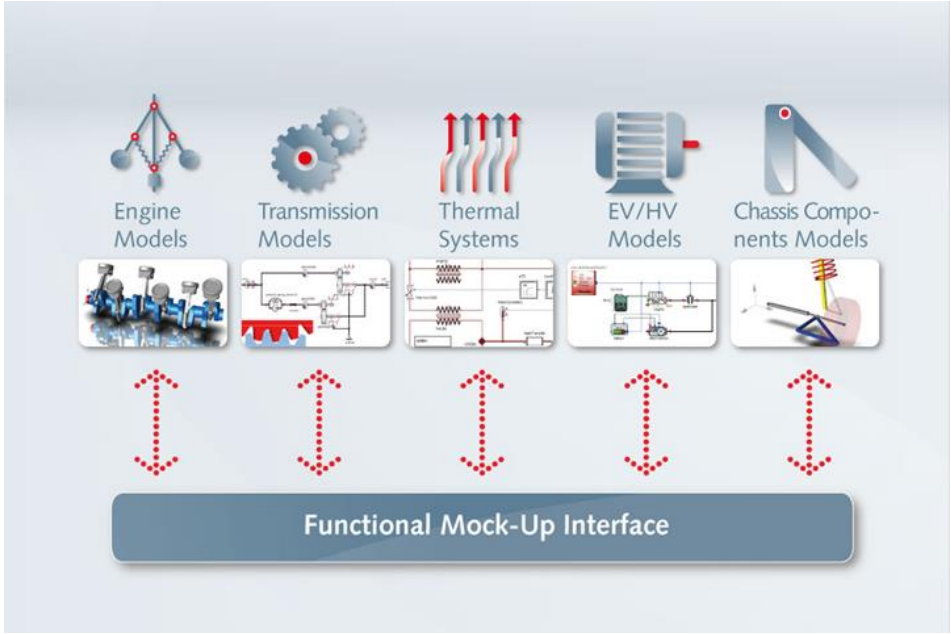
C Caller

R2020a

C

C Function

灵活地进行联合仿真



FMU Import and Export

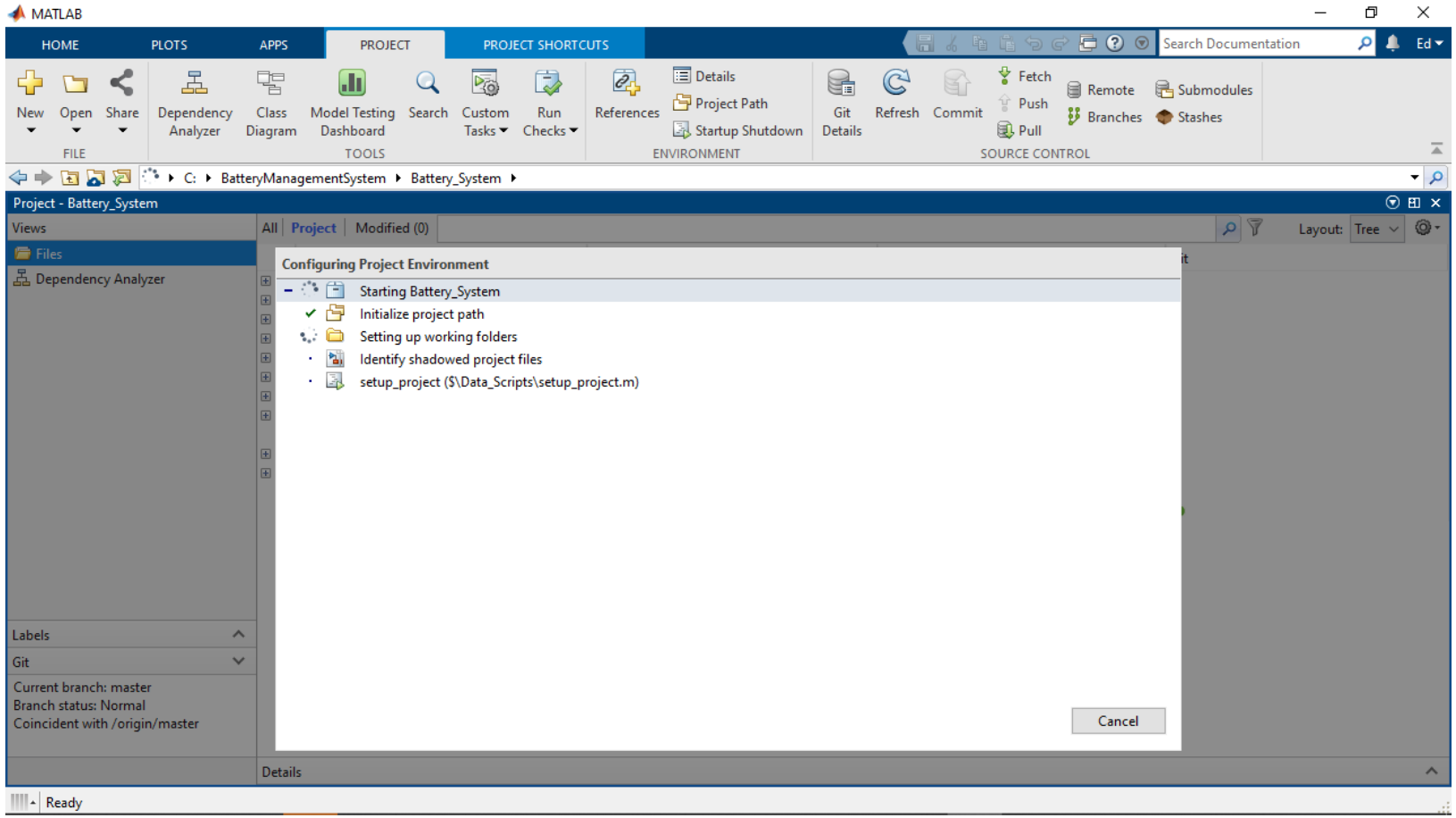
R2018b **R2020a** **R2021a**

<FunctionName>

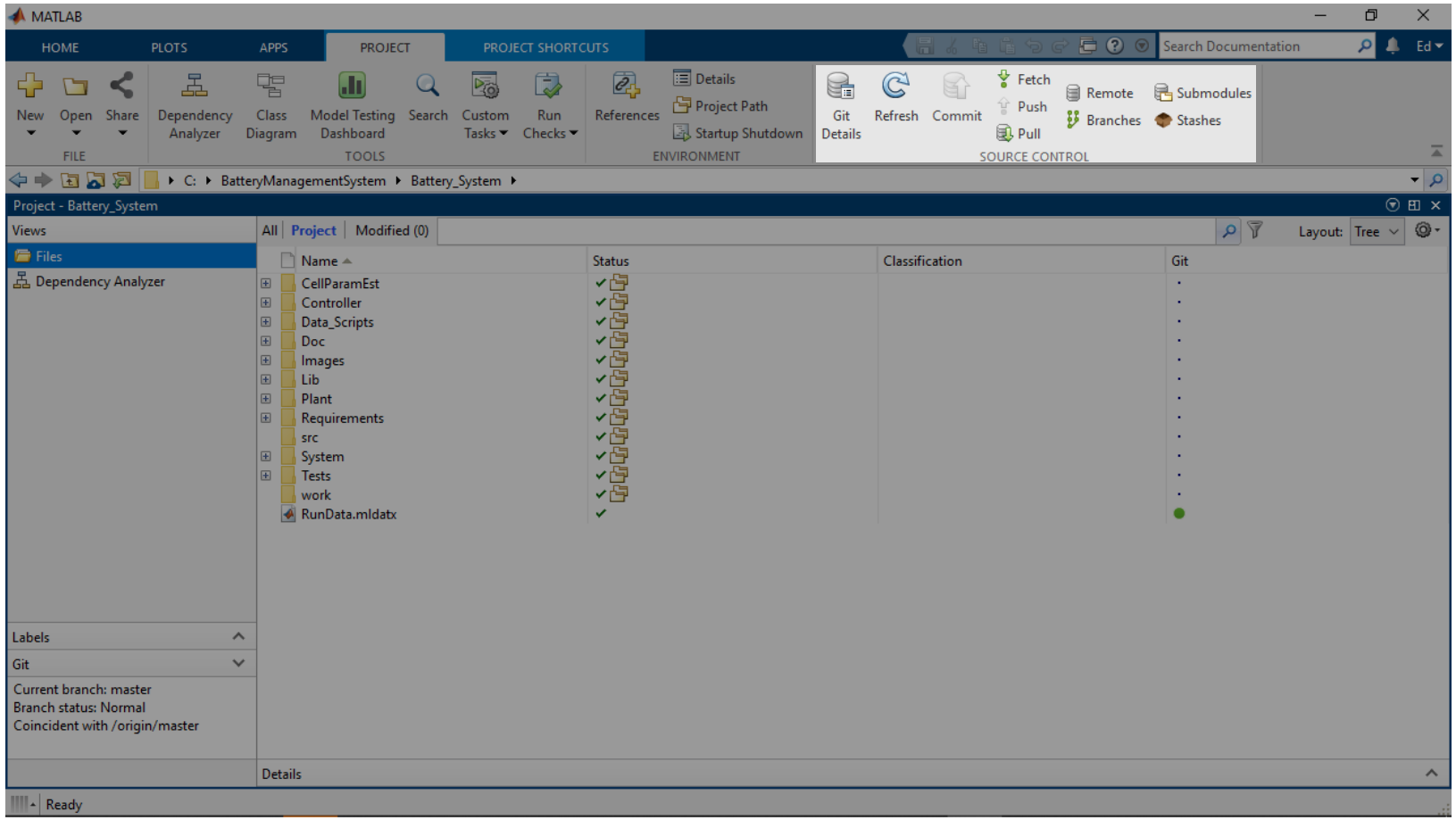
C

C Caller C Function Code Importer

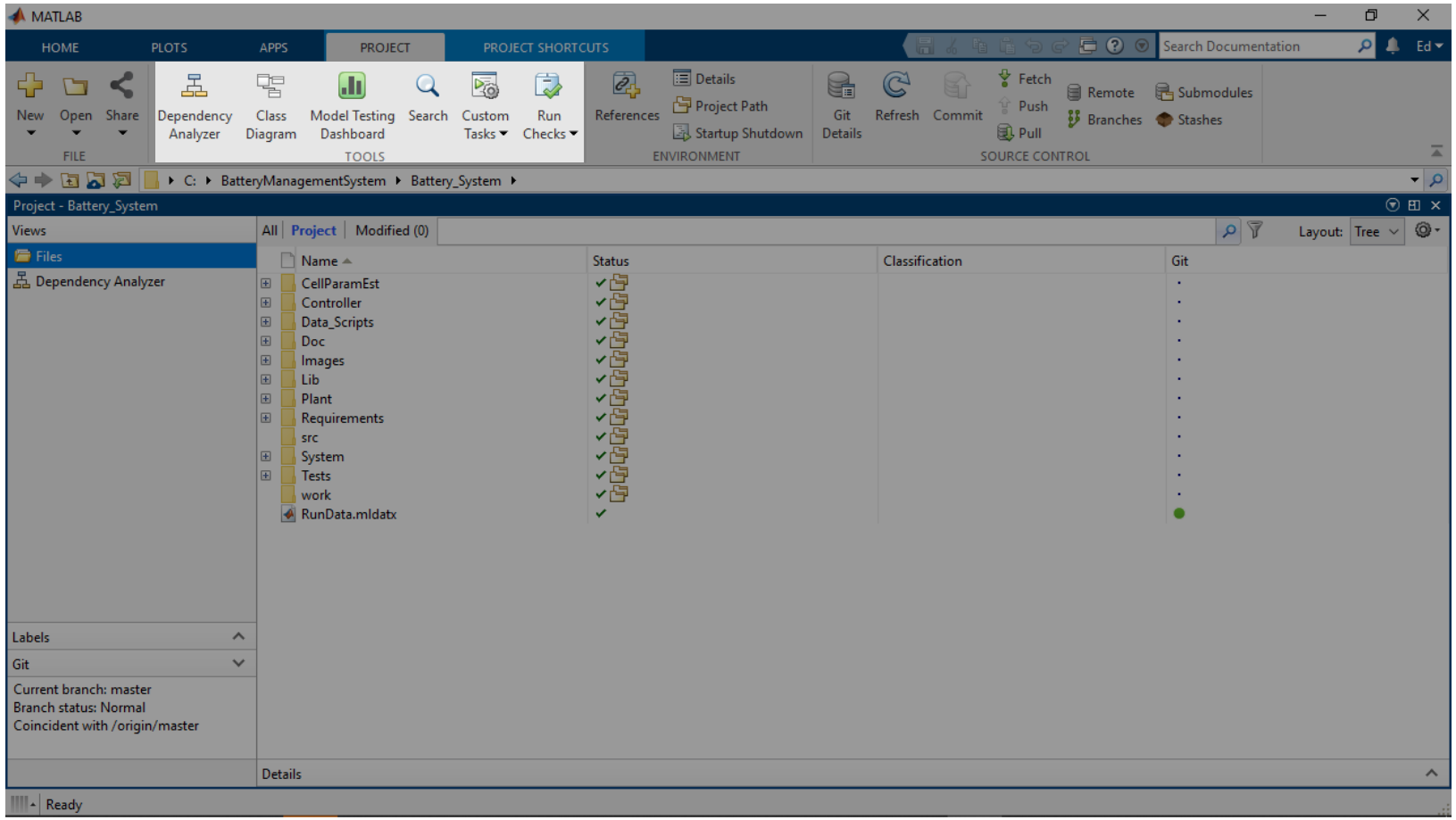
MATLAB&Simulink项目



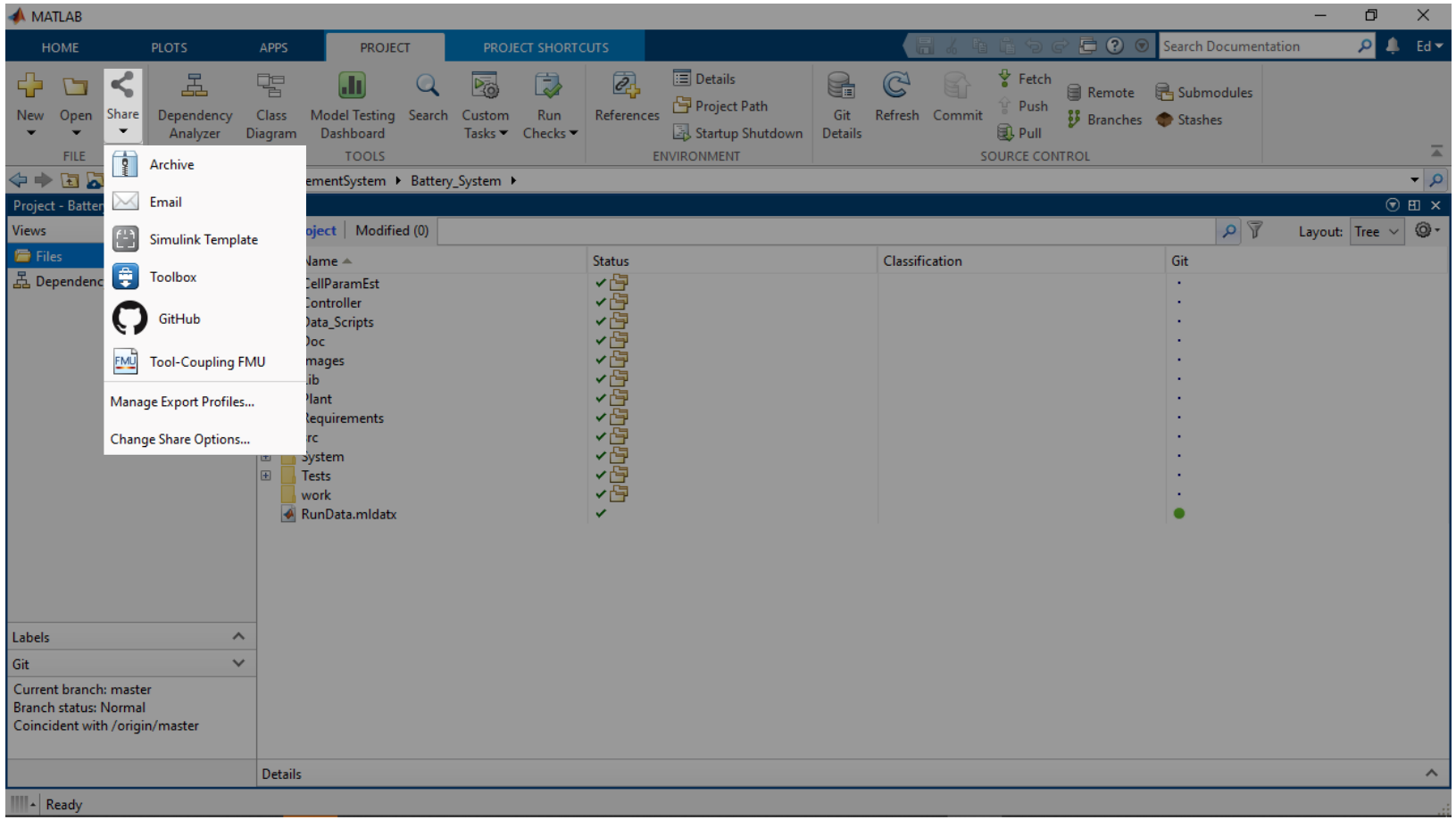
MATLAB&Simulink项目

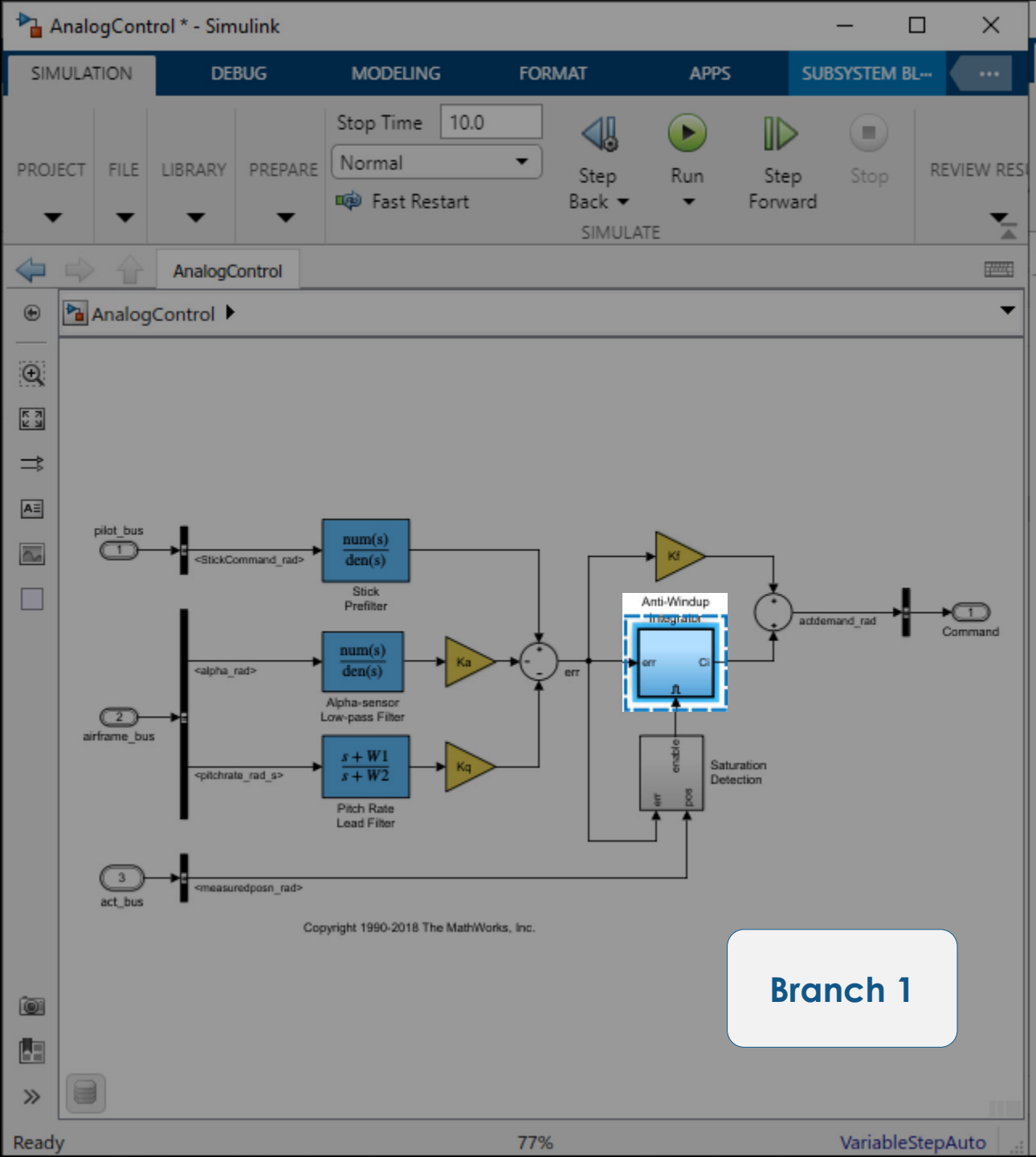


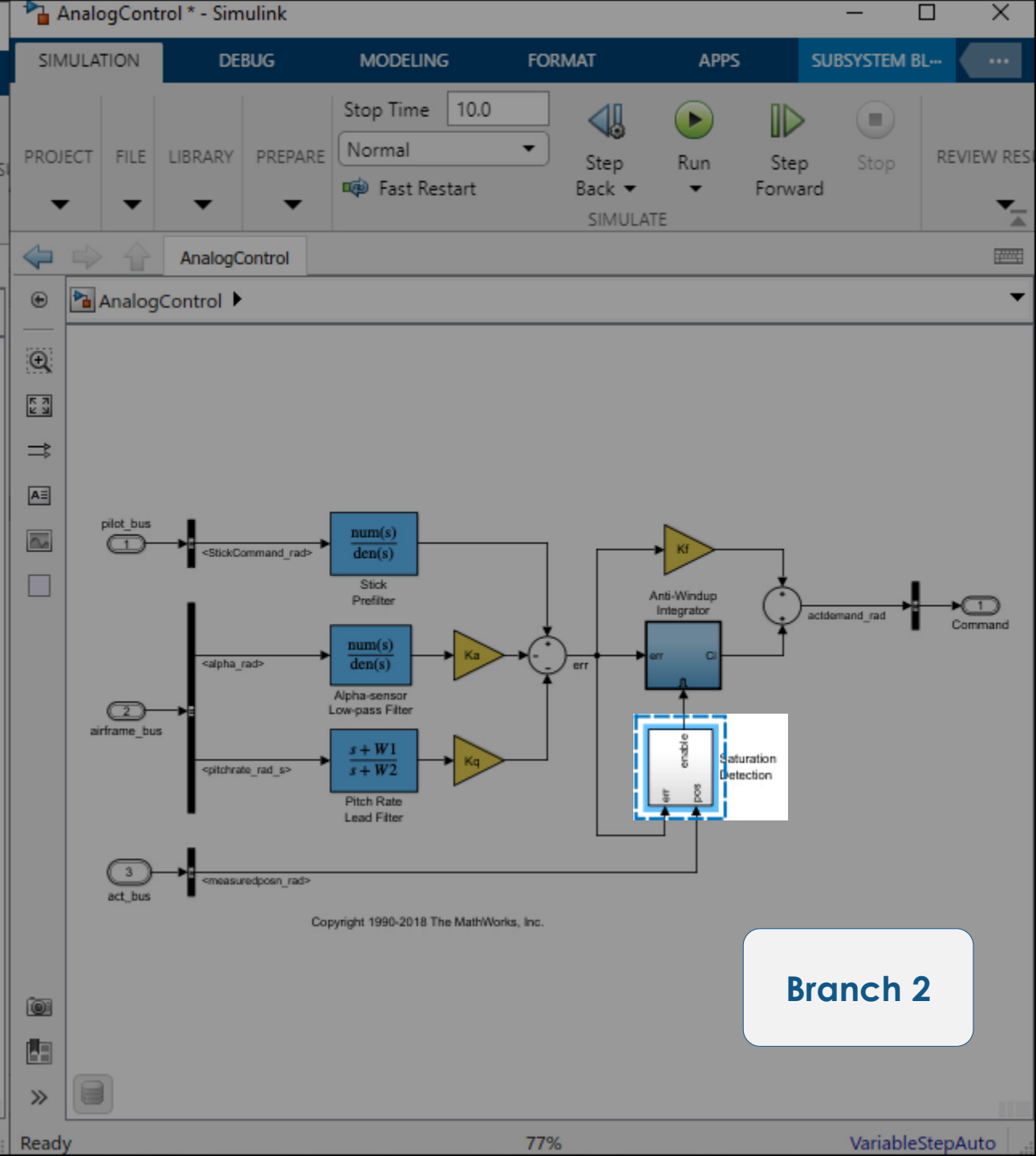
MATLAB&Simulink项目

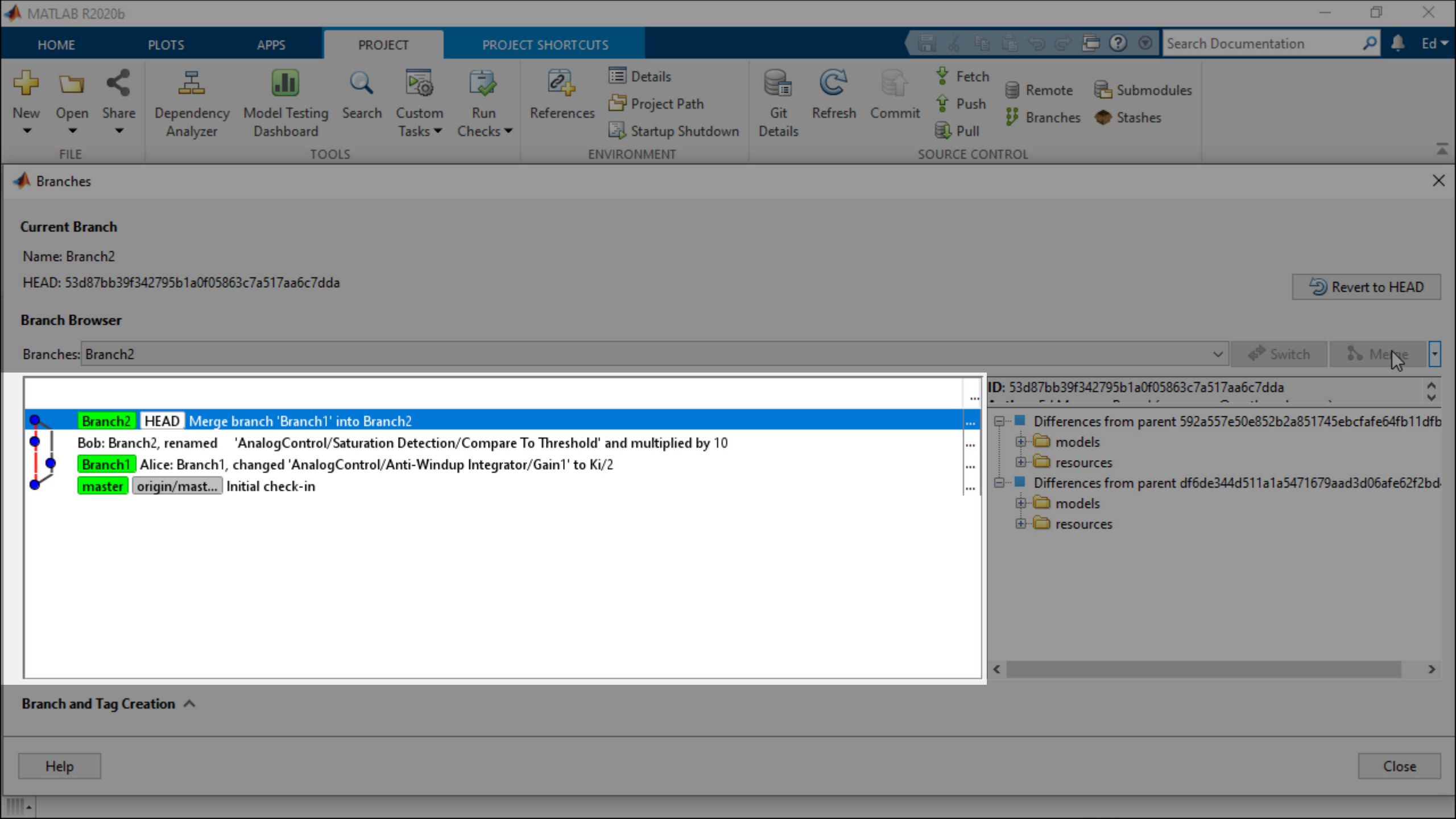


MATLAB&Simulink项目




AnalogControl * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
SUBSYSTEM BL...
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
AnalogControl
pilot_bus
<StickCommand_rad>
num(s) den(s)
Stick Prefilter
<alpha_rad>
Alpha-sensor Low-pass Filter
airframe_bus
<pitchrate_rad_s>
s + W1 / s + W2
Pitch Rate Lead Filter
act_bus
<measuredposn_rad>
Ka
Kq
Kf
err
Anti-Windup Integrator
Saturation Detection
actdemand_rad
Command
Copyright 1990-2018 The MathWorks, Inc.
Branch 1
Ready
77%
VariableStepAuto


AnalogControl * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
SUBSYSTEM BL...
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
AnalogControl
pilot_bus
<StickCommand_rad>
num(s) den(s)
Stick Prefilter
<alpha_rad>
Alpha-sensor Low-pass Filter
airframe_bus
<pitchrate_rad_s>
s + W1 / s + W2
Pitch Rate Lead Filter
act_bus
<measuredposn_rad>
Ka
Kq
Kf
err
Anti-Windup Integrator
Saturation Detection
actdemand_rad
Command
Copyright 1990-2018 The MathWorks, Inc.
Branch 2
Ready
77%
VariableStepAuto


MATLAB R2020b
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
Open
Share
FILE
Dependency Analyzer
Model Testing Dashboard
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
SOURCE CONTROL
Branches
Current Branch
Name: Branch2
HEAD: 53d87bb39f342795b1a0f05863c7a517aa6c7dda
Revert to HEAD
Branch Browser
Branches: Branch2
Switch
Merge
Branch2 HEAD Merge branch 'Branch1' into Branch2
Bob: Branch2, renamed 'AnalogControl/Saturation Detection/Compare To Threshold' and multiplied by 10
Branch1 Alice: Branch1, changed 'AnalogControl/Anti-Windup Integrator/Gain1' to Ki/2
master origin/mast... Initial check-in
ID: 53d87bb39f342795b1a0f05863c7a517aa6c7dda
Differences from parent 592a557e50e852b2a851745ebcfafe64fb11dfb
models
resources
Differences from parent df6de344d511a1a5471679aad3d06afe62f2bd
models
resources
Branch and Tag Creation
Help
Close

Dependency Analyzer - Battery_System

ANALYZER

Analyze | Restore to Default | MATLAB Files | Class Hierarchy | Model Hierarchy | All Dependencies | Impacted | Required | Horizontal | Vertical | Fit to View | Zoom In | Zoom Out | File List | Find | Project | Export

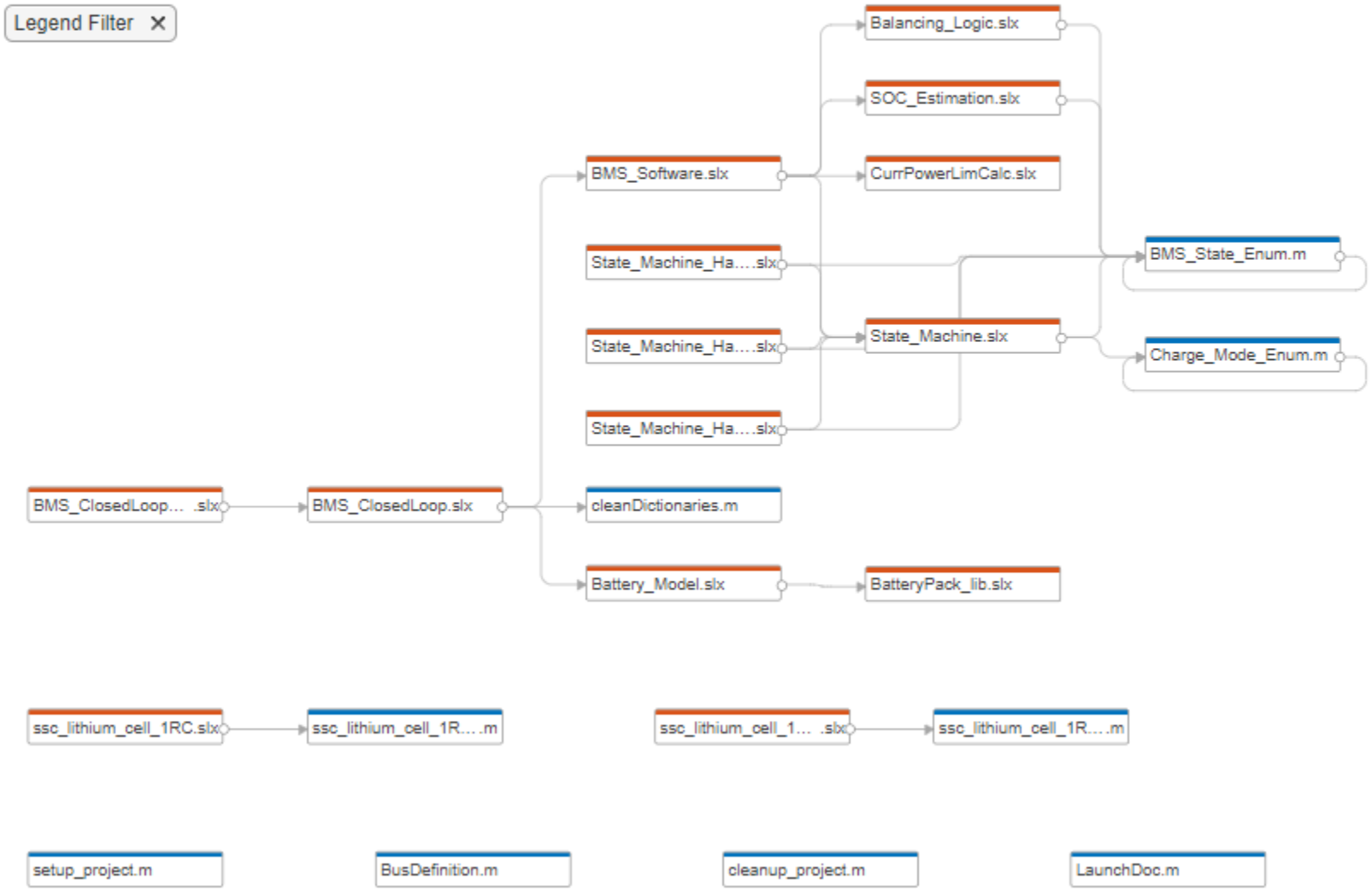
ANALYZE | VIEWS | IMPACT ANALYSIS | LAYOUT | NAVIGATE | SHOW | FIND | EXPORT

Legend

- [x] MATLAB Code (9 of 9)
- [x] Simulink Models and Libraries (14 of 14)
- [ ] Data (0 of 16)
- [ ] Requirements (0 of 11)
- [ ] Other Files (0 of 36)

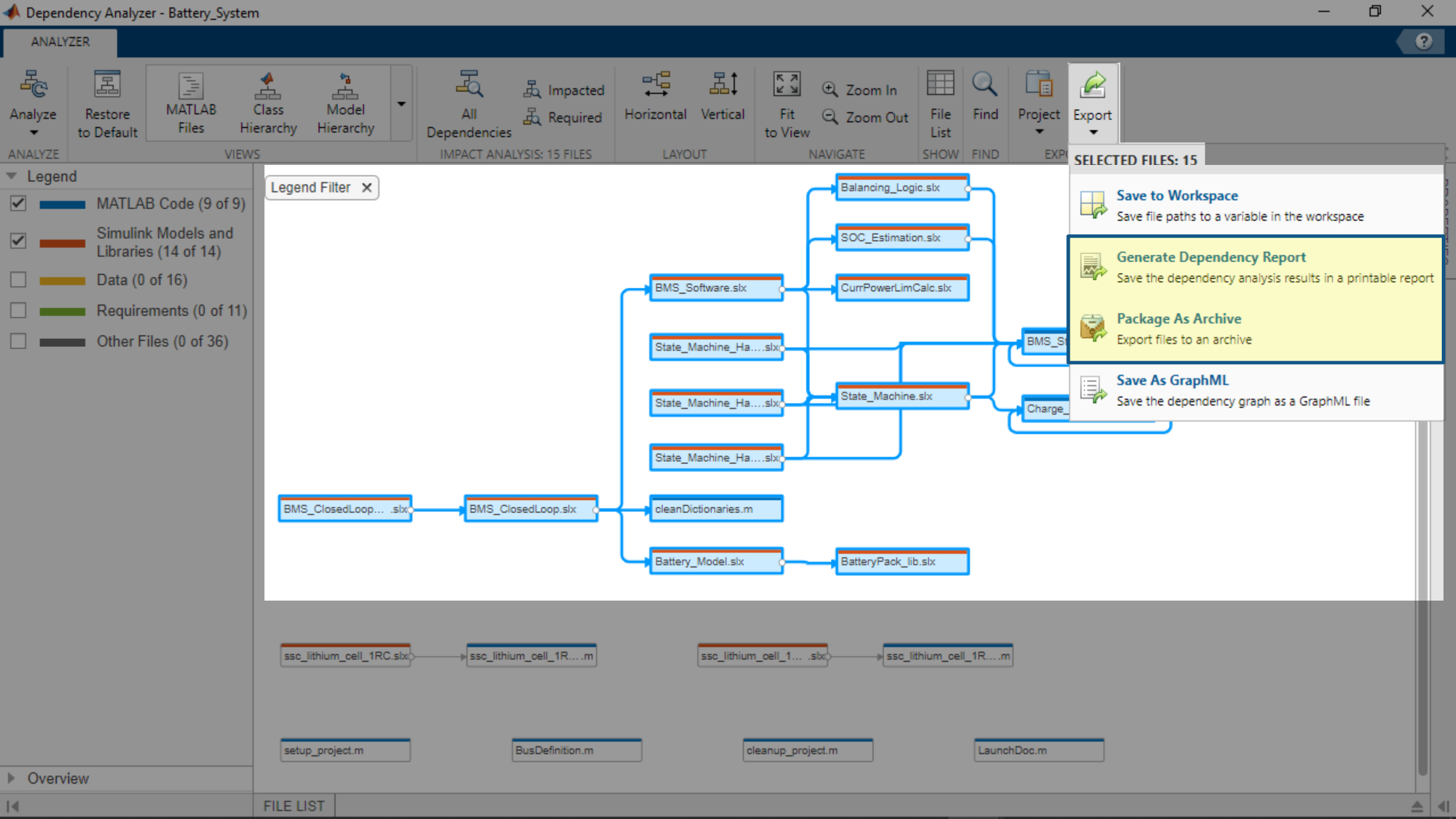
Overview

Legend Filter ×



PROPERTIES

FILE LIST


Dependency Analyzer - Battery_System
ANALYZER
Analyze
Restore to Default
MATLAB Files
Class Hierarchy
Model Hierarchy
All Dependencies
Impacted
Required
Horizontal
Vertical
Fit to View
Zoom In
Zoom Out
File List
Find
Project
Export
ANALYZE
VIEWS
IMPACT ANALYSIS: 15 FILES
LAYOUT
NAVIGATE
SHOW
FIND
SELECTED FILES: 15
Save to Workspace
Save file paths to a variable in the workspace
Generate Dependency Report
Save the dependency analysis results in a printable report
Package As Archive
Export files to an archive
Save As GraphML
Save the dependency graph as a GraphML file
Legend
MATLAB Code (9 of 9)
Simulink Models and Libraries (14 of 14)
Data (0 of 16)
Requirements (0 of 11)
Other Files (0 of 36)
Legend Filter
Balancing_Logic.slx
SOC_Estimation.slx
CurrPowerLimCalc.slx
BMS_Software.slx
State_Machine_Ha....slx
State_Machine_Ha....slx
State_Machine_Ha....slx
State_Machine.slx
BMS_ClosedLoop... .slx
BMS_ClosedLoop.slx
cleanDictionaries.m
Battery_Model.slx
BatteryPack_lib.slx
ssc_lithium_cell_1RC.slx
ssc_lithium_cell_1R....m
ssc_lithium_cell_1... .slx
ssc_lithium_cell_1R....m
setup_project.m
BusDefinition.m
cleanup_project.m
LaunchDoc.m
Overview
FILE LIST

`Simulink.exportToVersion(a,b,c)`

Project to export

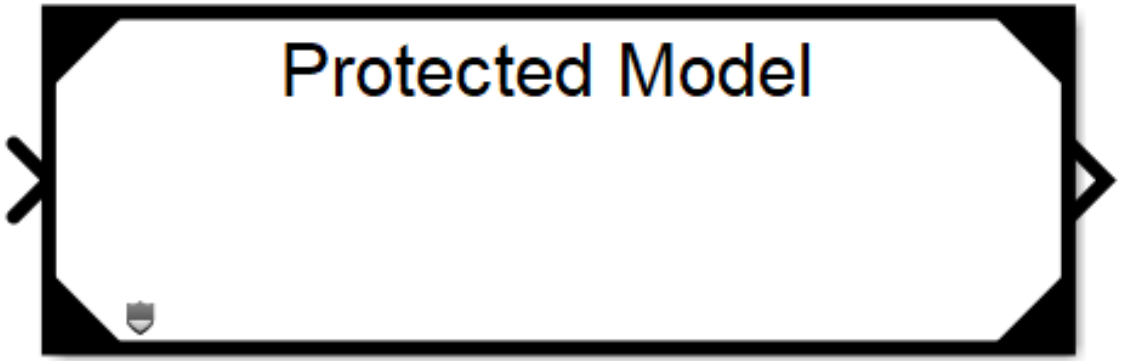
ZIP file name

Desired release

R2021a

Up to 7 years

R2014a



sl_sfcar_1.slx vs. sl_sfcar_2.slx

COMPARISON

Previous | Next | Swap | Refresh | Find | Linked Scrolling | Highlight Now | Always Highlight | FILTER | PUBLISH | MERGE

NAVIGATE | HIGHLIGHT

Left : sl_sfcar_1.slx

- Simulink
  - vehicle mph (yellow) & throttle %
  - Vehicle:2 -> transmission:3
    - SrcPort 2
    - SrcBlock Vehicle
    - DstBlock transmission
    - DstPort 3
    - Name transmission speed
  - shift_logic

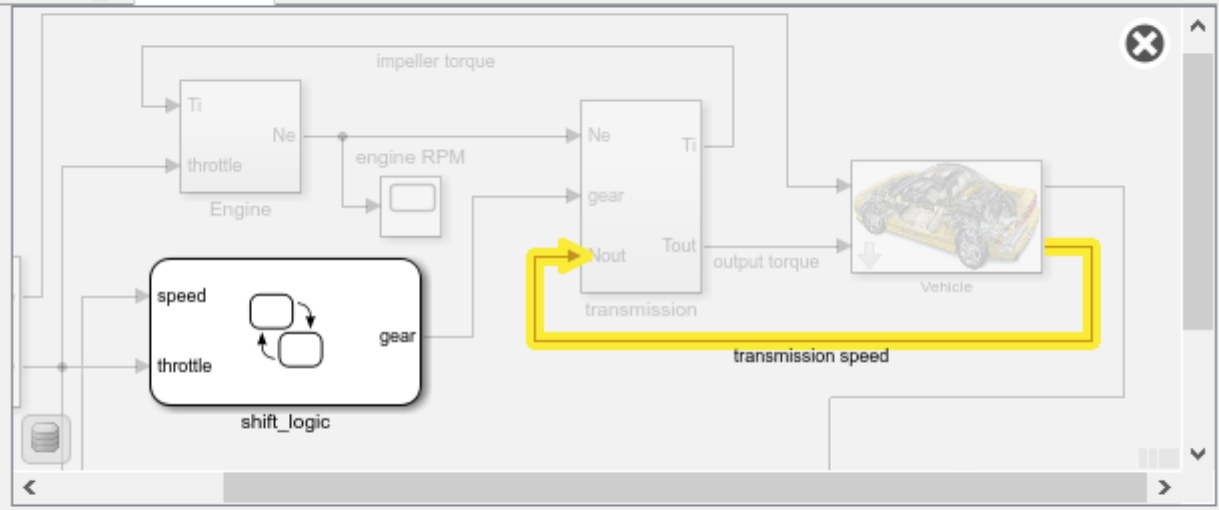
Right : sl_sfcar_2.slx

- Simulink
  - Out1
  - vehicle kph (yellow) & throttle %
  - Vehicle:2 -> Branch
  - shift_logic

Insertion | Deletion | Modification

sl_sfcar_1 - Simulink

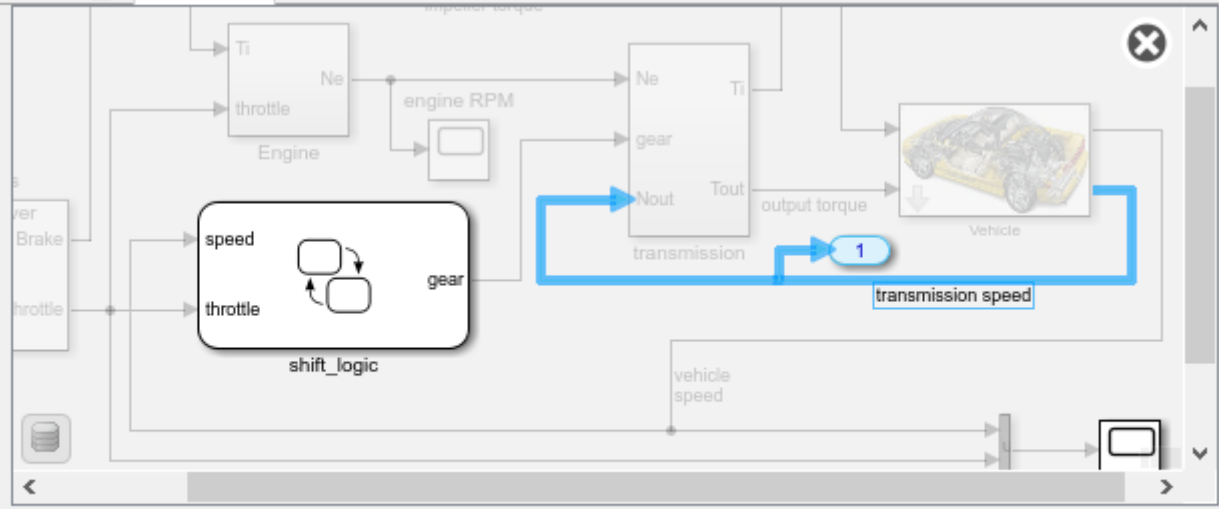
SIMULATION | DEBUG | MODELING | FORMAT | APPS



Ready | 100% | ode5

sl_sfcar_2 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS | SIGNAL



Ready | 100% | ode5

sl_sfcar_1.slx vs. sl_sfcar_2.slx

COMPARISON

Previous | Next | Swap | Refresh | Find | Linked Scrolling | Highlight Now | Always Highlight | FILTER | PUBLISH | MERGE

NAVIGATE | HIGHLIGHT

Left : sl_sfcar_1.slx

- Simulink
  - vehicle mph (yellow) & throttle %
  - Vehicle:2 -> transmission:3
    - SrcPort 2
    - SrcBlock Vehicle
    - DstBlock transmission
    - DstPort 3
    - Name transmission speed
  - shift_logic

Right : sl_sfcar_2.slx

- Simulink
  - Out1
  - vehicle kph (
  - Vehicle:2 -> Branch
  - shift_logic

Publish

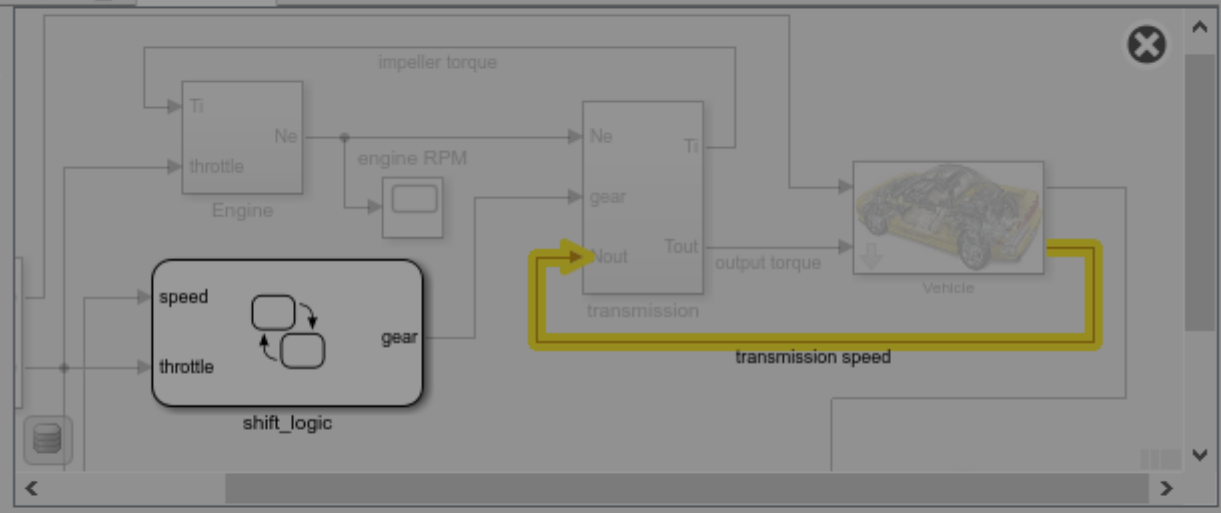
- HTML
- Word
- PDF
- Workspace Variable

Insertion | Deletion | Modification

sl_sfcar_1 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS

sl_sfcar_1

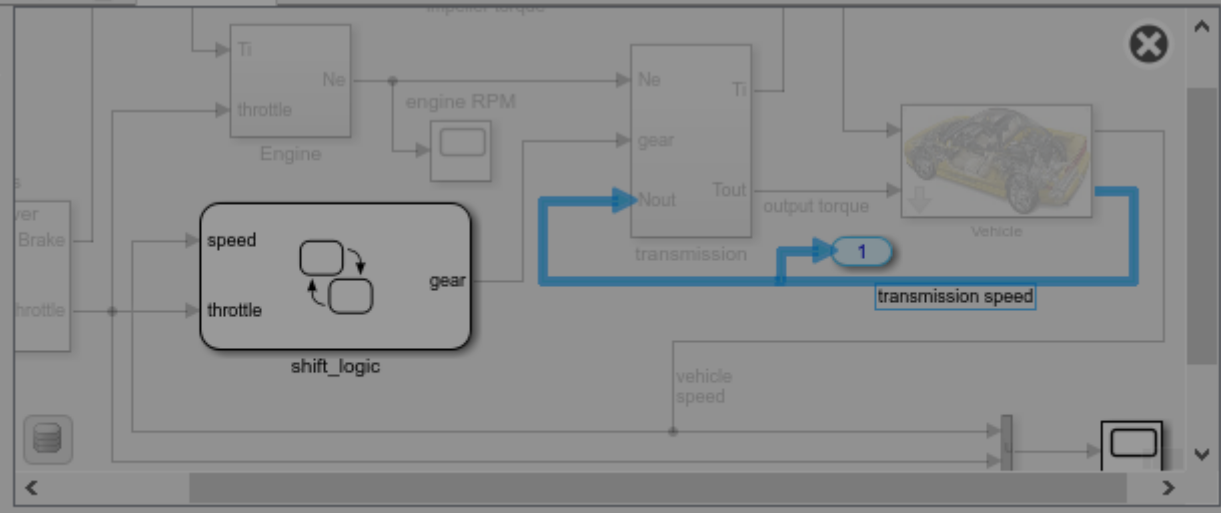


Ready 100% ode5

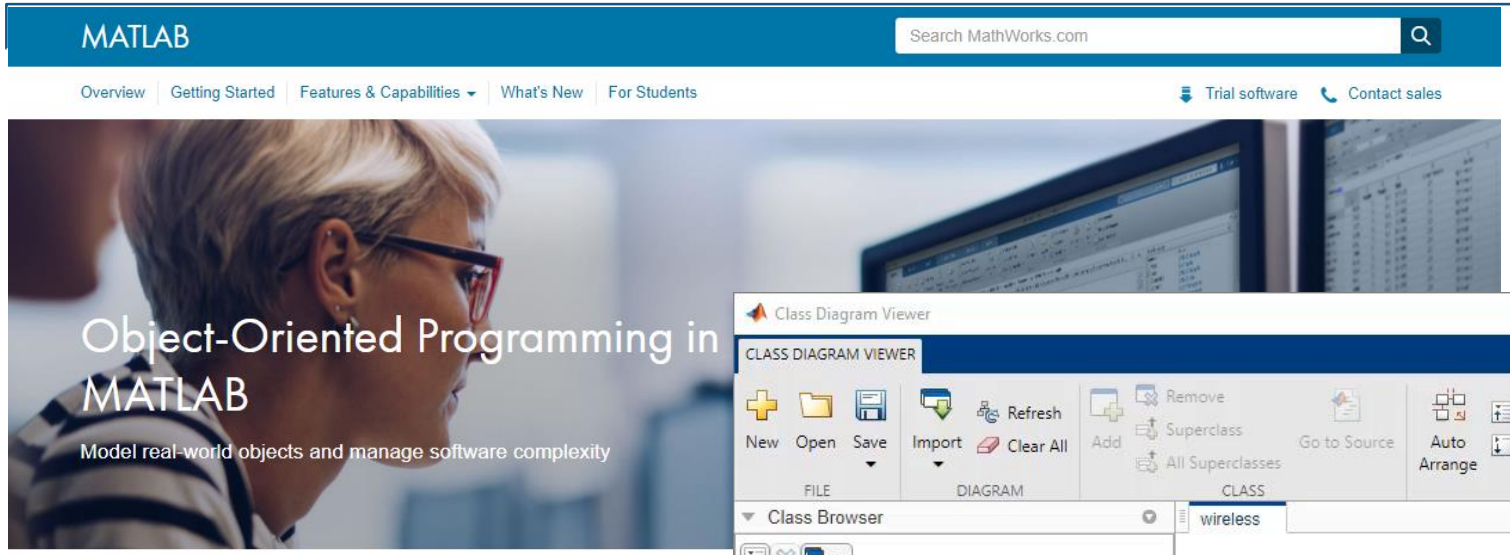
sl_sfcar_2 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS | SIGNAL

sl_sfcar_2

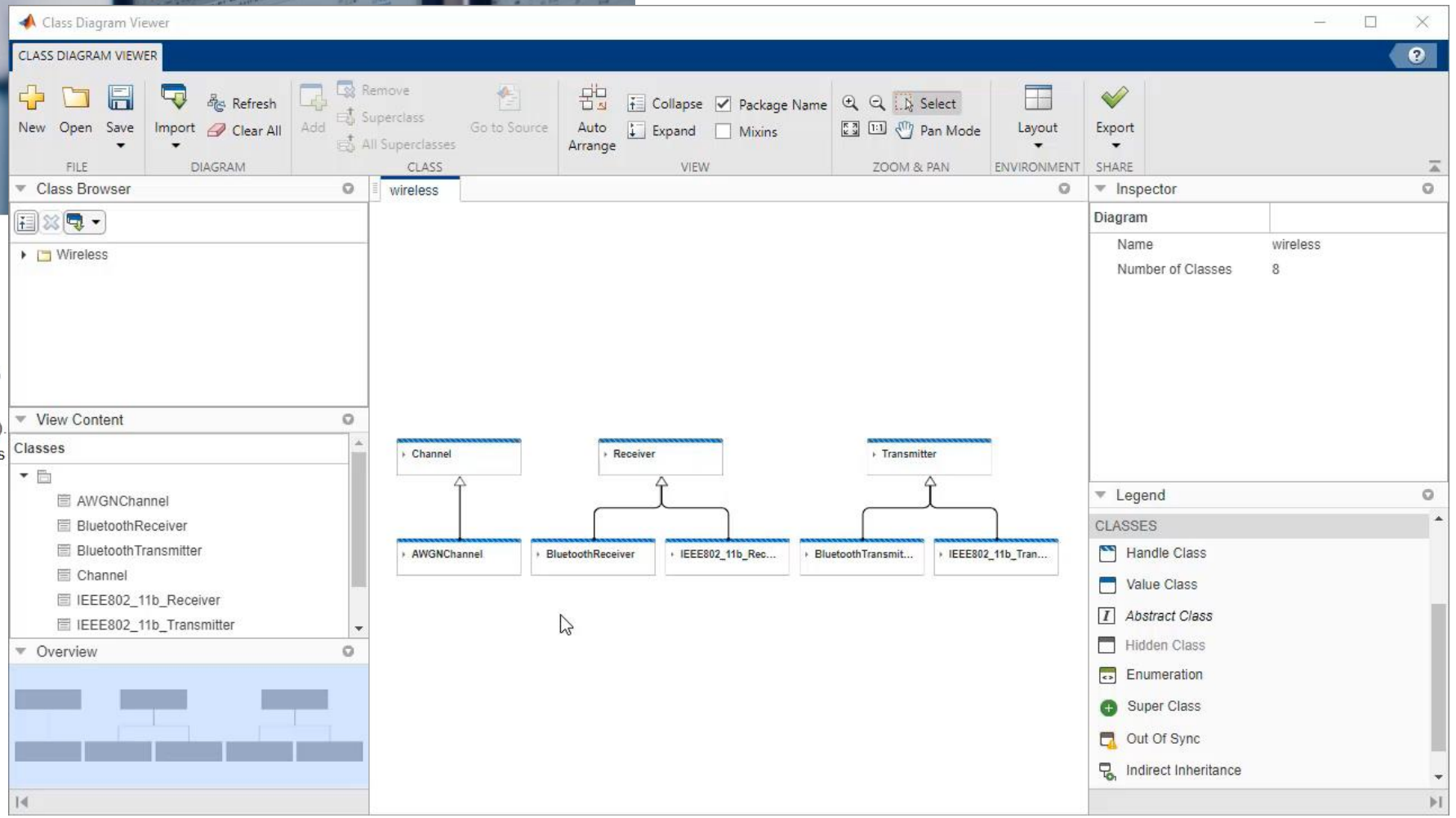


Ready 100% ode5



Use Object-Oriented Programming to Model Real-World Objects

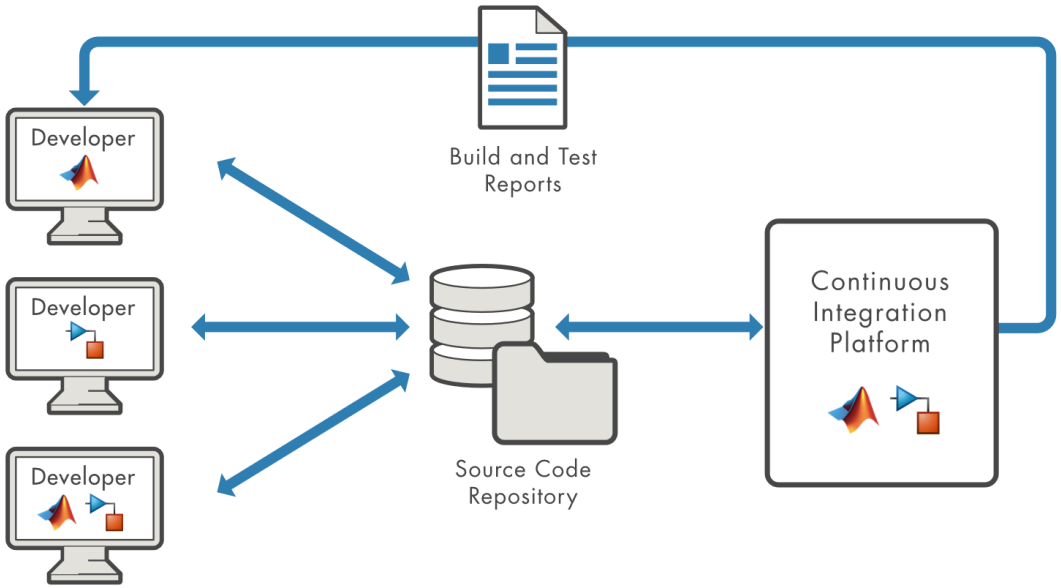
Object-oriented programming is a design approach that enables you to programmatically define structures called *objects* that combine data (properties) together with functions that operate on that data (methods). In MATLAB®, you can create objects that model the behavior of devices and systems in the real world. Those objects can then be used as building blocks in applications used to simulate and analyze complex systems.

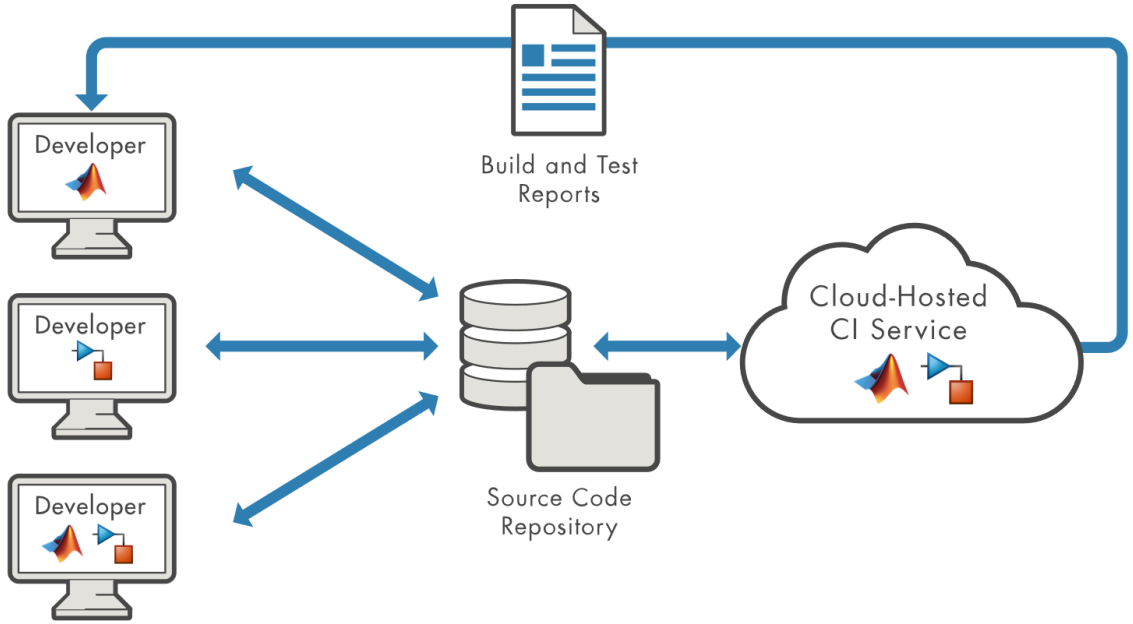


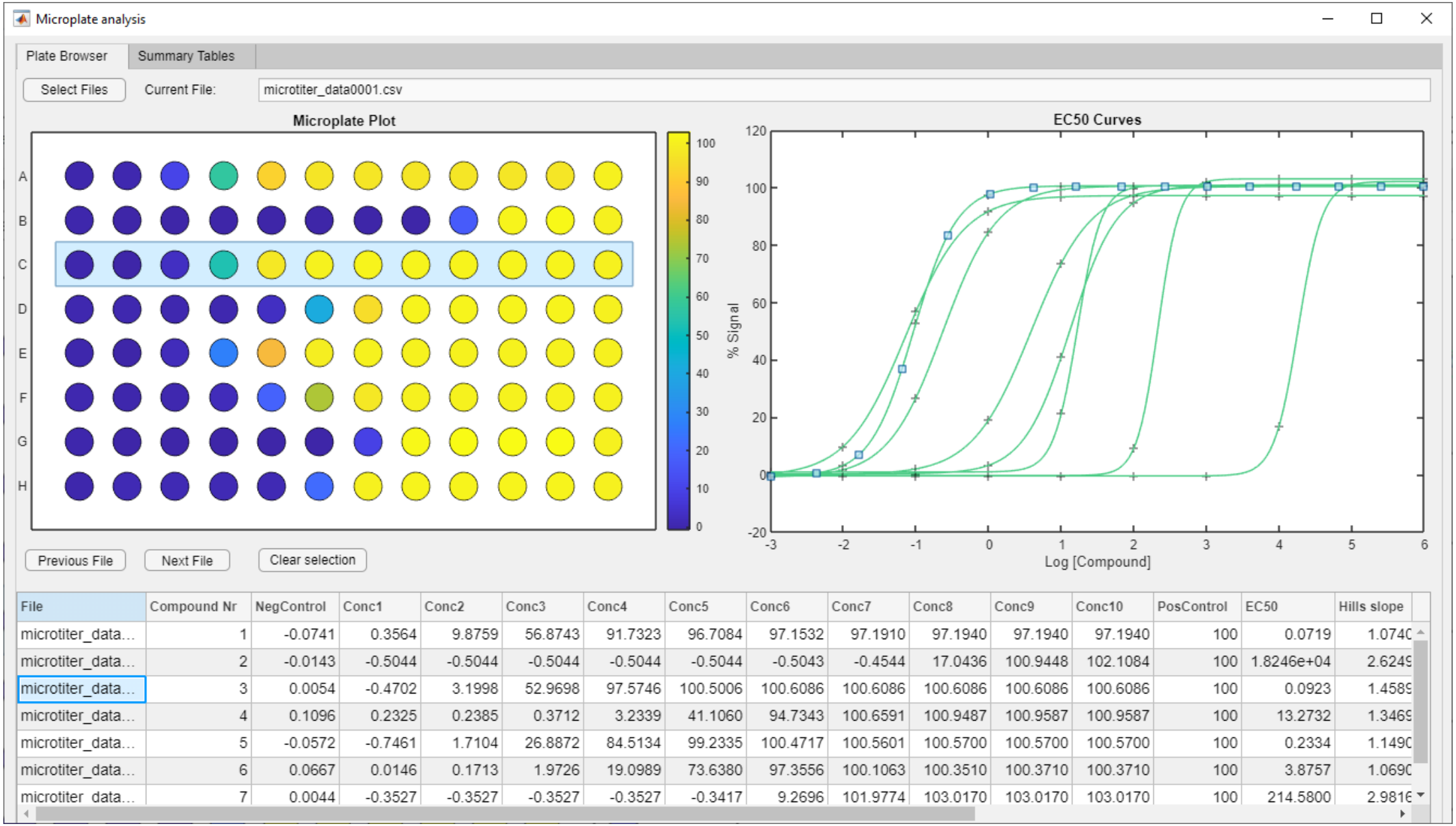
MATLAB® & SIMULINK®

专注　　协同　　实现

MATLAB&Simulink与持续集成







File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	Conc9	Conc10	PosControl	EC50	Hills slope
microtiter_data...	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	97.1940	97.1940	100	0.0719	1.0740
microtiter_data...	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	100.9448	102.1084	100	1.8246e+04	2.6249
microtiter_data...	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	100.6086	100.6086	100	0.0923	1.4589
microtiter_data...	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	100.9587	100.9587	100	13.2732	1.3469
microtiter_data...	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	100.5700	100.5700	100	0.2334	1.1490
microtiter_data...	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	100.3710	100.3710	100	3.8757	1.0690
microtiter_data...	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	103.0170	103.0170	100	214.5800	2.9816

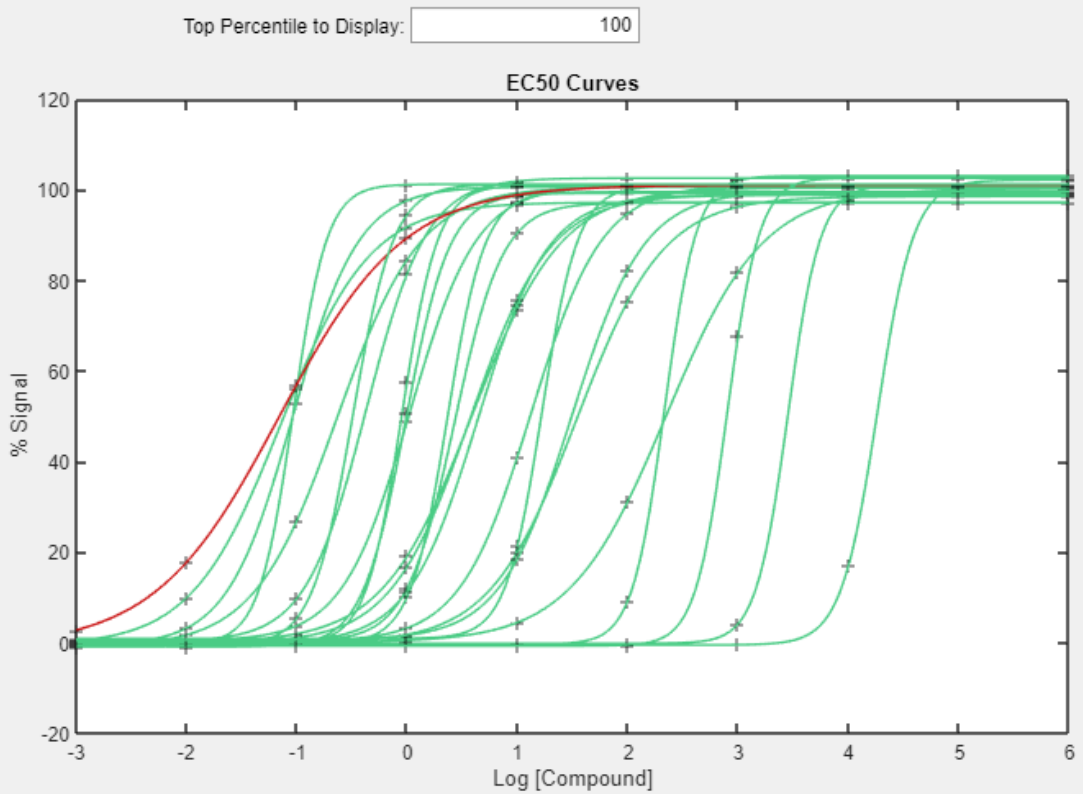
Microplate analysis

Plate Browser | Summary Tables

Analyze Selected Files | Save Results

Top Results | All Results

FileName	CompoundNumber	EC50	Reliable
microtiter_data0001.csv	1	0.0719	☑
microtiter_data0001.csv	3	0.0923	☑
microtiter_data0003.csv	17	0.0925	☑
microtiter_data0001.csv	5	0.2334	☑
microtiter_data0003.csv	23	0.3225	☑
microtiter_data0002.csv	16	0.4257	☑
microtiter_data0002.csv	13	0.8963	☑
microtiter_data0002.csv	14	0.9717	☑
microtiter_data0002.csv	10	1.0515	☑
microtiter_data0002.csv	15	2.3188	☑
microtiter_data0002.csv	11	2.6921	☑
microtiter_data0002.csv	9	3.7073	☑
microtiter_data0001.csv	6	3.8757	☑
microtiter_data0003.csv	21	4.3720	☑
microtiter_data0001.csv	4	13.2732	☑
microtiter_data0001.csv	8	16.6548	☑
microtiter_data0003.csv	24	31.1400	☑
microtiter_data0003.csv	22	34.1977	☑
microtiter_data0001.csv	7	214.5800	☑
microtiter_data0003.csv	18	222.6496	☑
microtiter_data0003.csv	20	797.6649	☑
microtiter_data0002.csv	12	2.8290e+03	☑
microtiter_data0001.csv	2	1.8246e+04	☑
microtiter_data0003.csv	19	0.0698	☐

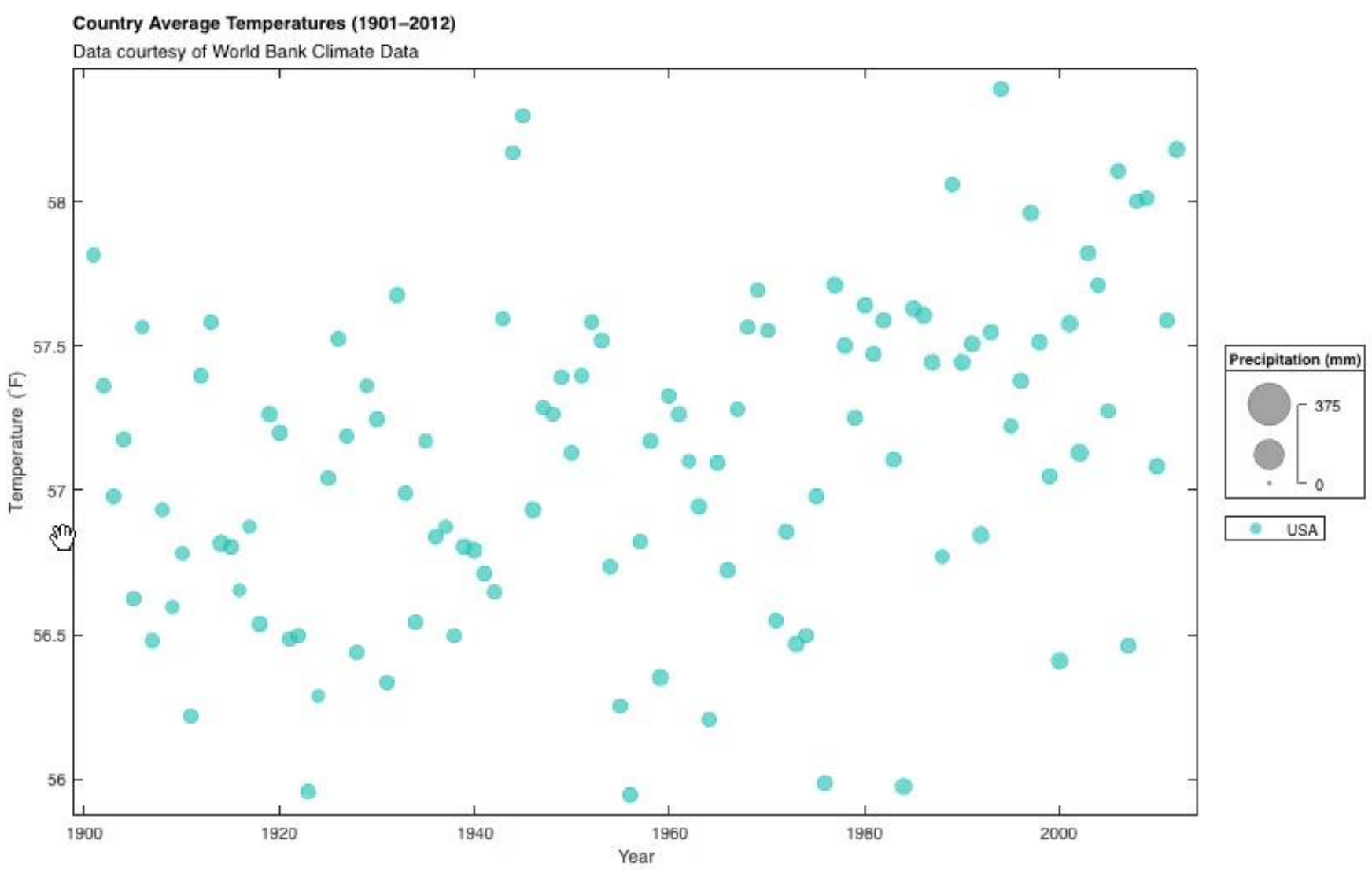


World Climate

Select a Country +

Select a Visualization +

Configure Settings +

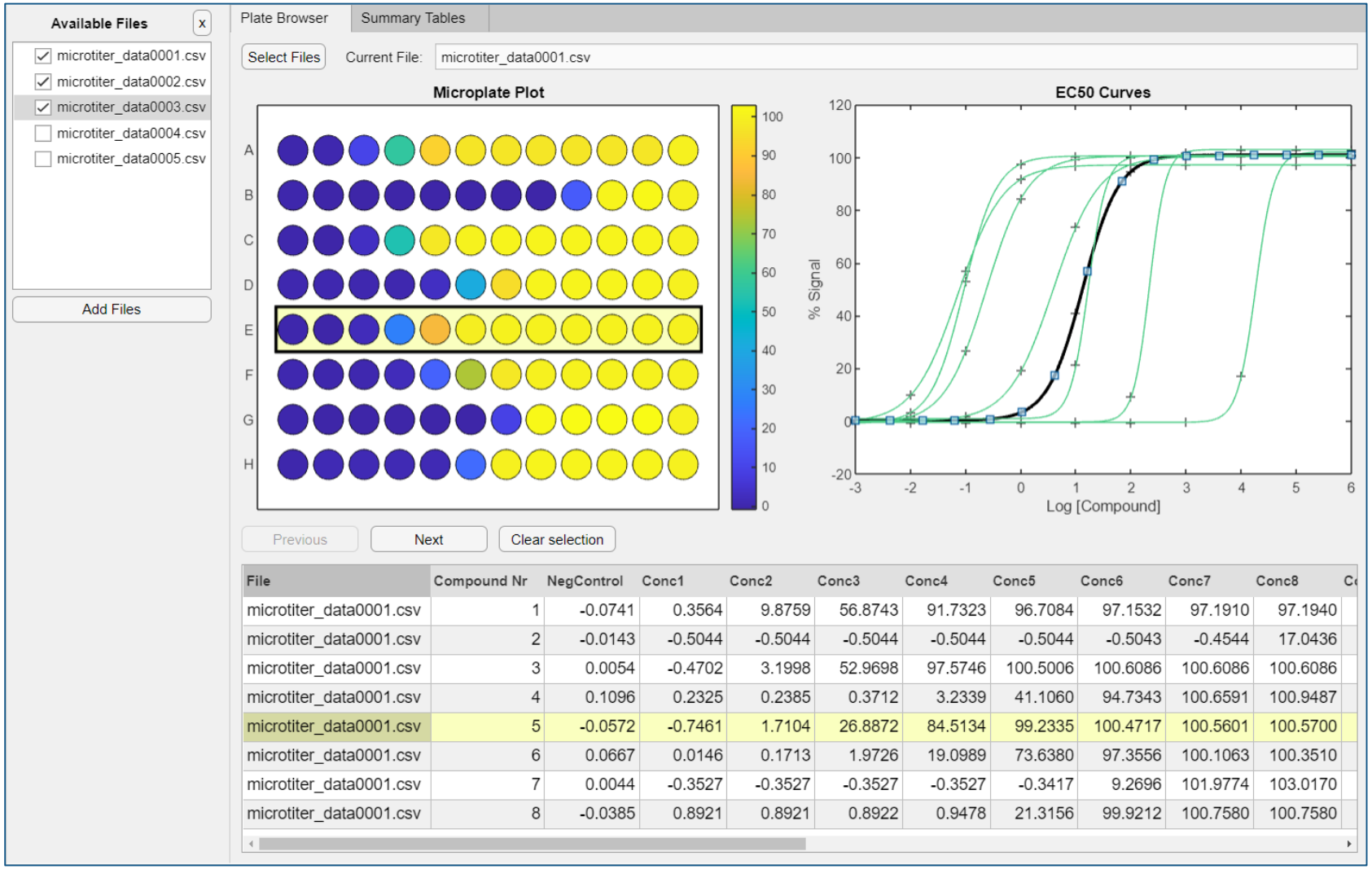


About This App

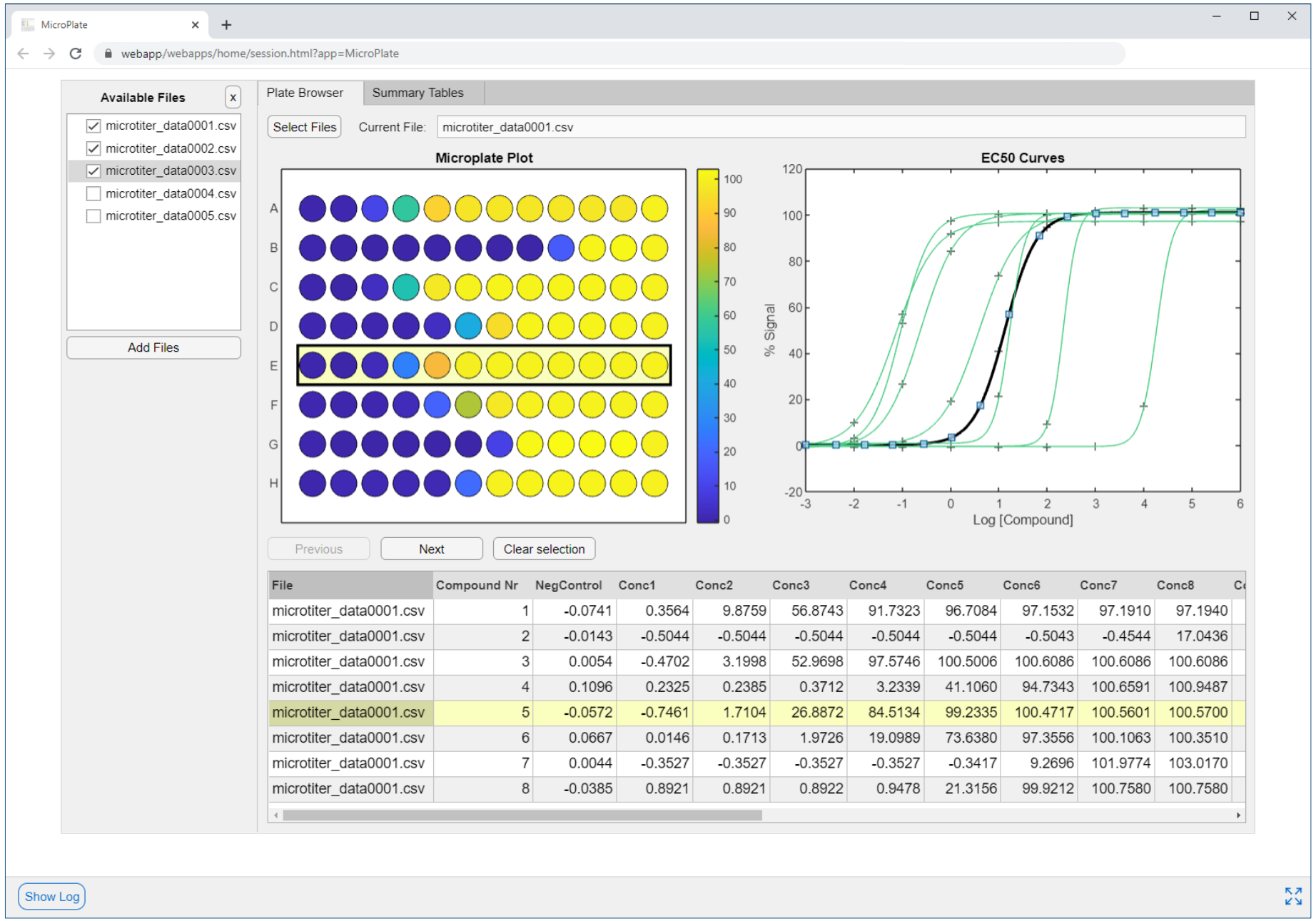
This app was built in MATLAB® using features from R2019a through R2021a. The app's layout is managed using **UIGRIDLAYOUT**. The side panel is a combination of HTML, JavaScript, and CSS integrated via the **UIHTML** function, plus **UIIMAGE** for the MathWorks logo. The layout for the legends and the **BUBBLECHART** and **SWARMCHART** visualizations are managed using a flow **TILEDLAYOUT**. Interactivity makes use of default interactions and custom **DataTipTemplate** properties. Lastly, this info panel uses an HTML interpreter for the label's text, and a **UIHYPERLINK** for the link.

Learn More

MathWorks



File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	Cc
microtiter_data0001.csv	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	
microtiter_data0001.csv	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	
microtiter_data0001.csv	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	
microtiter_data0001.csv	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	
microtiter_data0001.csv	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	
microtiter_data0001.csv	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	
microtiter_data0001.csv	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	
microtiter_data0001.csv	8	-0.0385	0.8921	0.8921	0.8922	0.9478	21.3156	99.9212	100.7580	100.7580	



File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	Cc
microtiter_data0001.csv	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	
microtiter_data0001.csv	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	
microtiter_data0001.csv	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	
microtiter_data0001.csv	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	
microtiter_data0001.csv	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	
microtiter_data0001.csv	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	
microtiter_data0001.csv	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	
microtiter_data0001.csv	8	-0.0385	0.8921	0.8921	0.8922	0.9478	21.3156	99.9212	100.7580	100.7580	

HEV P4 Reference Application

https://webapp.mathworks.com/session.html?app=HEVP4ReferenceApplication

Login | Drive Cycle Setup | Model Parameters Setup | Simulation and Visualization | Session Notes | Session Log

Control

Ready to simulate

Start Simulation

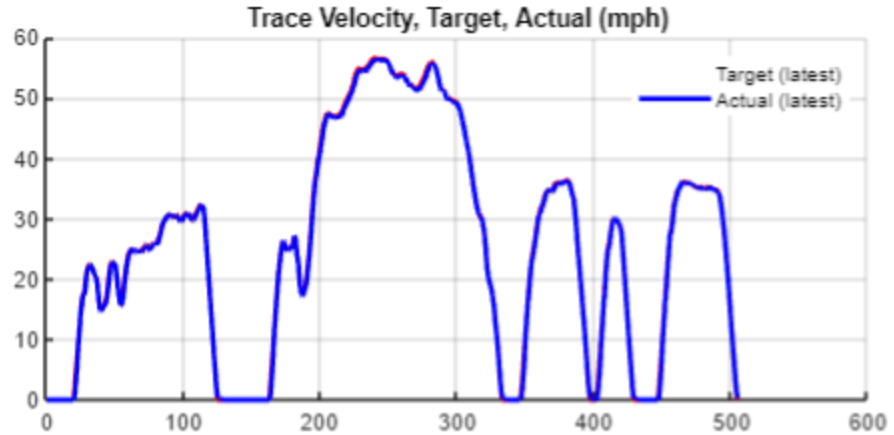
Generate Report

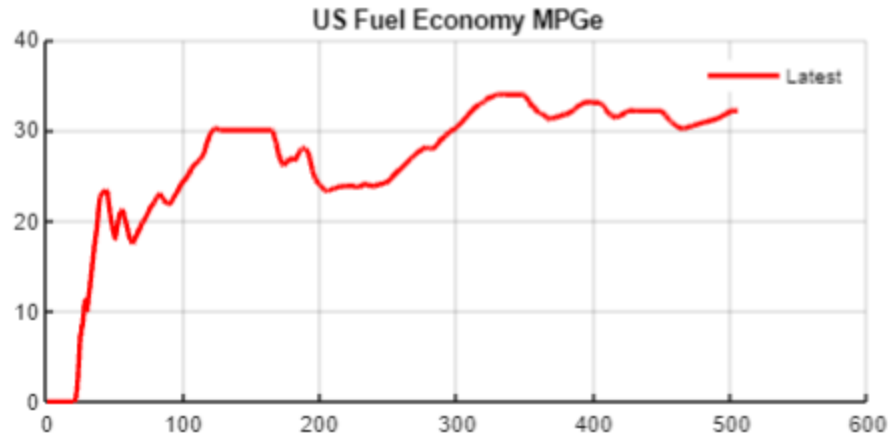
Output plots:

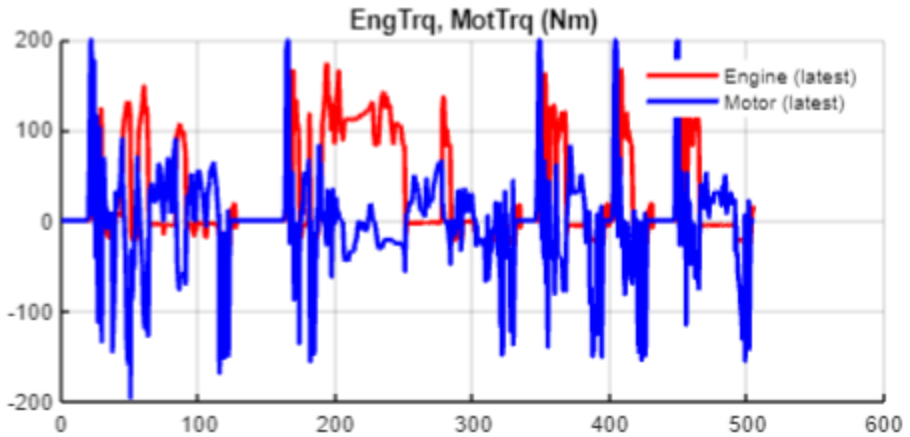
- [x] Velocity
- [x] Engine / Motor Torque (Nm)
- [x] Battery SOC
- [ ] TP HC Mass
- [ ] TP NOx Mass
- [ ] Engine / Motor Speed (RPM)
- [ ] Battery Current (A)
- [x] US Fuel Economy (MPGe)
- [ ] TP CO Mass
- [ ] TP CO2 Mass

Clear all

Visualization

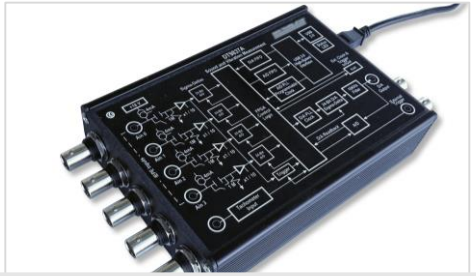


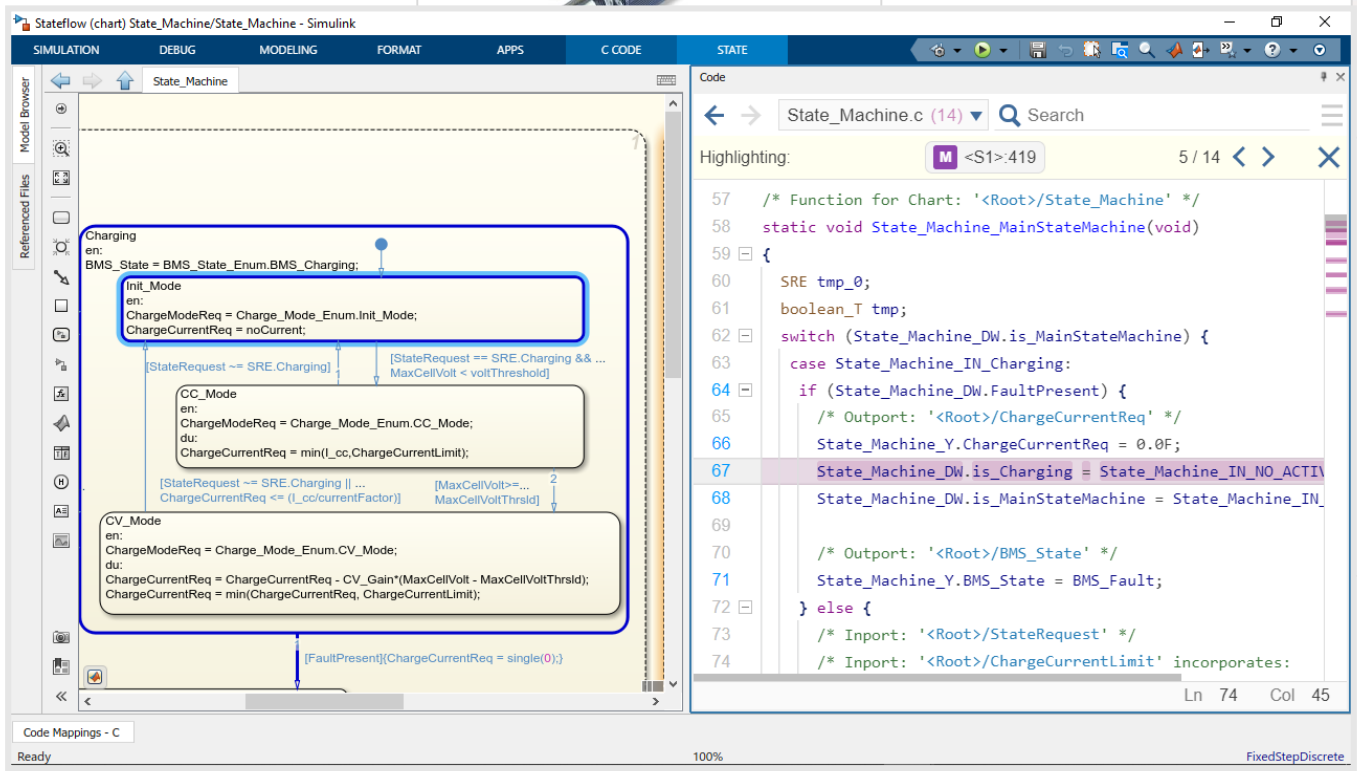


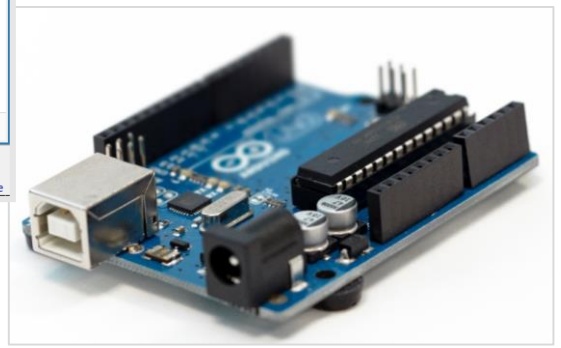


Show Log

MATLAB&Simulink与硬件部署



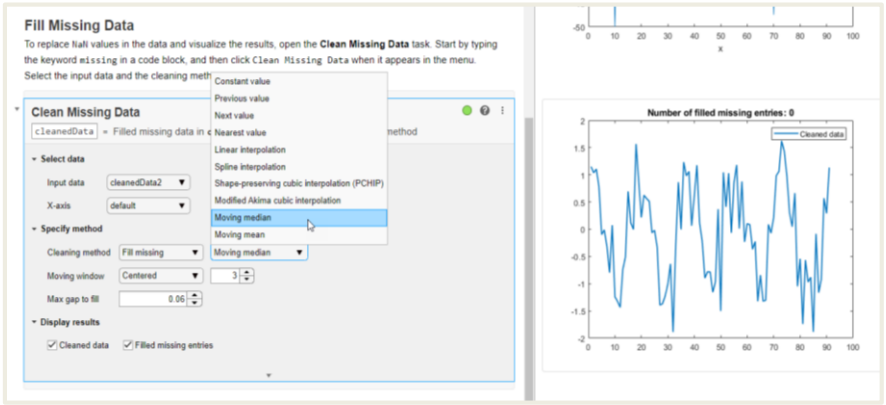


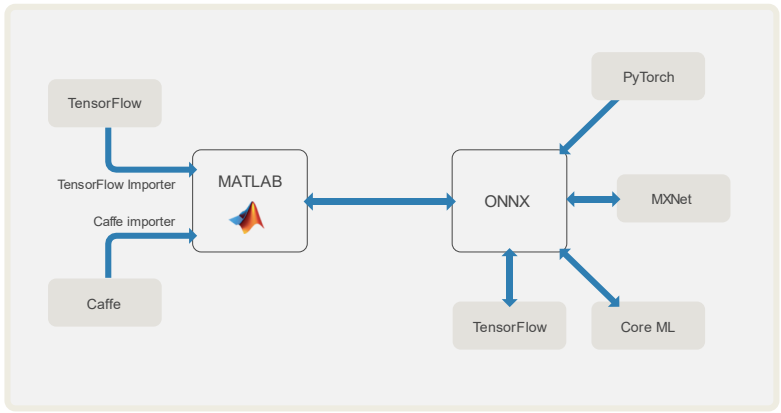


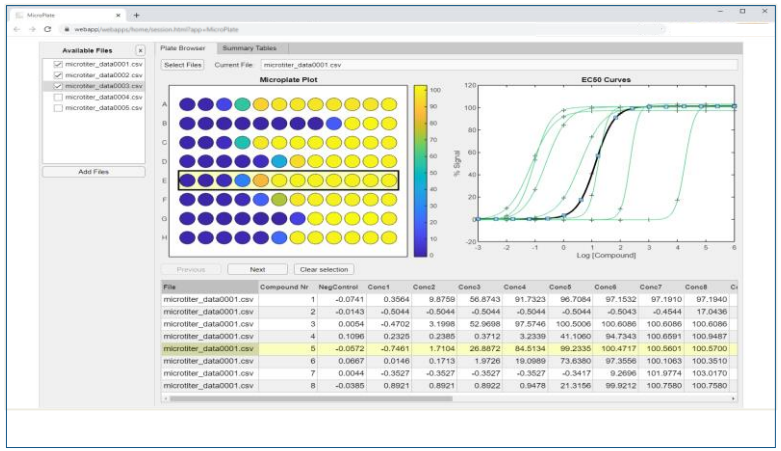
专注

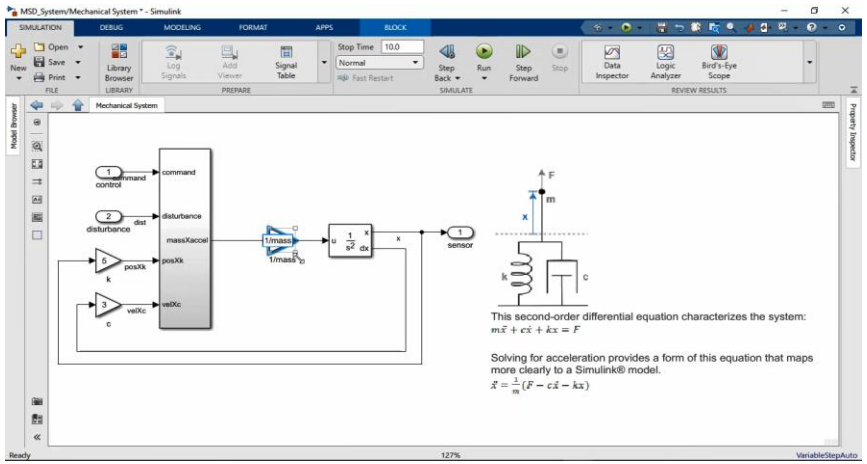
协同

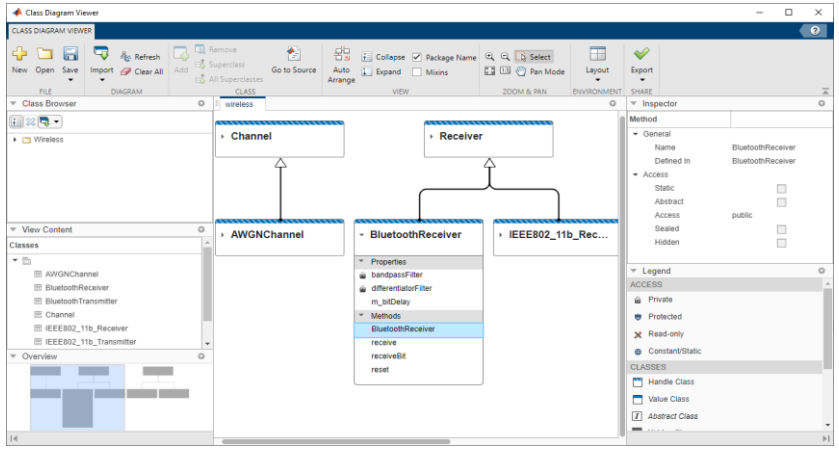
实现

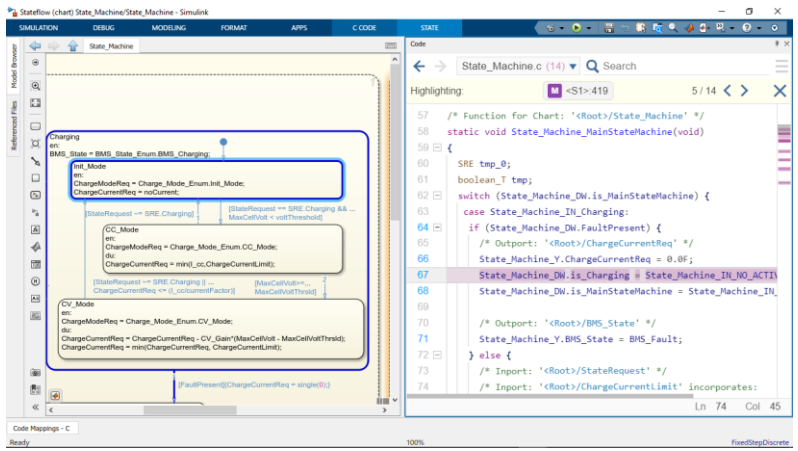

Fill Missing Data
To replace NaN values in the data and visualize the results, open the Clean Missing Data task. Start by typing the keyword missing in a code block, and then click Clean Missing Data when it appears in the menu.
Select the input data and the cleaning meth
Clean Missing Data
cleanedData = Filled missing data in
Select data
Input data
cleanedData2
X-axis
default
Specify method
Cleaning method
Fill missing
Moving window
Centered
Max gap to fill
0.06
Display results
Cleaned data
Filled missing entries
Constant value
Previous value
Next value
Nearest value
Linear interpolation
Spline interpolation
Shape-preserving cubic interpolation (PCHIP)
Modified Akima cubic interpolation
Moving median
Moving mean
Moving median
Number of filled missing entries: 0
Cleaned data


TensorFlow
TensorFlow Importer
Caffe importer
Caffe
MATLAB
ONNX
PyTorch
MXNet
TensorFlow
Core ML


Microplate Plot
EC50 Curves


MSD_System/Mechanical System * - Simulink
Mechanical System
command
disturbance
massXaccel
posXk
velXc
sensor
This second-order differential equation characterizes the system:
Solving for acceleration provides a form of this equation that maps more clearly to a Simulink® model.


Class Diagram Viewer
Channel
Receiver
AWGNChannel
BluetoothReceiver
IEEE802_11b_Rec...


Stateflow (chart) State_Machine/State_Machine - Simulink
State_Machine
State_Machine.c
/* Function for Chart: '<Root>/State_Machine' */
static void State_Machine_MainStateMachine(void)
switch (State_Machine_DW.is_MainStateMachine) {
case State_Machine_IN_Charging:
if (State_Machine_DW.FaultPresent) {
/* Outport: '<Root>/ChargeCurrentReq' */
State_Machine_Y.ChargeCurrentReq = 0.0F;
State_Machine_DW.is_Charging = State_Machine_IN_NO_ACTI
State_Machine_DW.is_MainStateMachine = State_Machine_IN_
/* Outport: '<Root>/BMS_State' */
State_Machine_Y.BMS_State = BMS_Fault;
} else {
/* Inport: '<Root>/StateRequest' */
/* Inport: '<Root>/ChargeCurrentLimit' incorporates:

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谢 谢

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