MathWorks/ESRF Seminar: Application of Simulink for modeling and instrumentation development

Institute-wide Access and Ressources

22/04/2026

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Customer Success Engineer

Mathieu Cuenant
Application Engineer

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Application Engineer

Jérôme Lespinasse
Account Manager

Agenda for Today

8:30 AM → 8:45 AM **Welcome and introduction to the seminar** 15m

- Purpose of the seminar
- MathWorks/Simulink tools accessible today at ESRF

Speaker: Charbel Cherfan (MathWoks)

8:45 AM → 9:20 AM **Model-based design** 35m

- General overview and industrial use cases
- Simulation of physical systems
- Development of control systems
- Verification and validation workflows

Speaker: Mathieu Cuenant (MathWorks)

9:20 AM → 10:00 AM **Signal processing with Simulink for particle accelerators and RF systems** 40m

- Motivation and context
- What can you do with Simulink?
- Signal processing workflows in Simulink
- Integrating custom or external MATLAB/C code into Simulink models
- Simulating RF controlled components at the system-level

Speaker: Charbel Cherfan (MathWorks)

10:00 AM → 10:20 AM **Coffee brak** 20m

10:20 AM → 11:00 AM **Examples of application of Simulink at ESRF today** 40m

- Improving the accelerator fast-orbit feedback performance through Simulink-based modelling
- Real-time control of high resolution mechatronic devices with Simulink

Speakers: Marie Penot (ESRF), Thomas Dehaeze (ESRF)

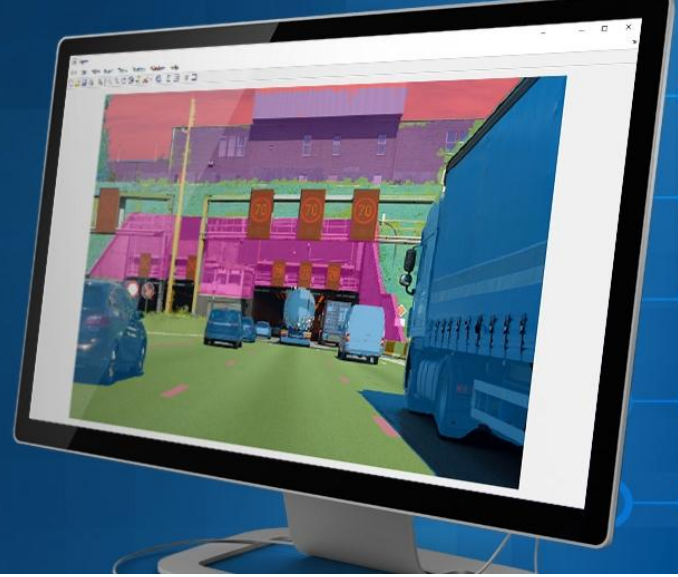
11:00 AM → 11:45 AM **From models to embedded code** 45m

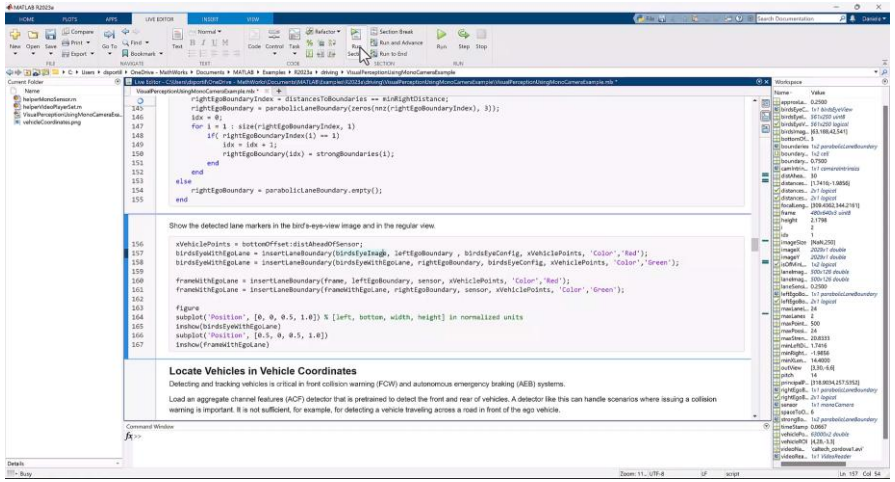
- Use cases and hardware platforms
  - Micro-controllers, system on chip (SoC), FPGAs, GPUs, PLCs
- Model development and code generation workflow
- Example of multicore C code generation
- Simulink Real-Time: QNX to Linux upcoming transition

Speaker: Morgan Fremovici (MathWorks)

11:45 AM → 12:00 PM **General questions and seminar wrap-up** 15m

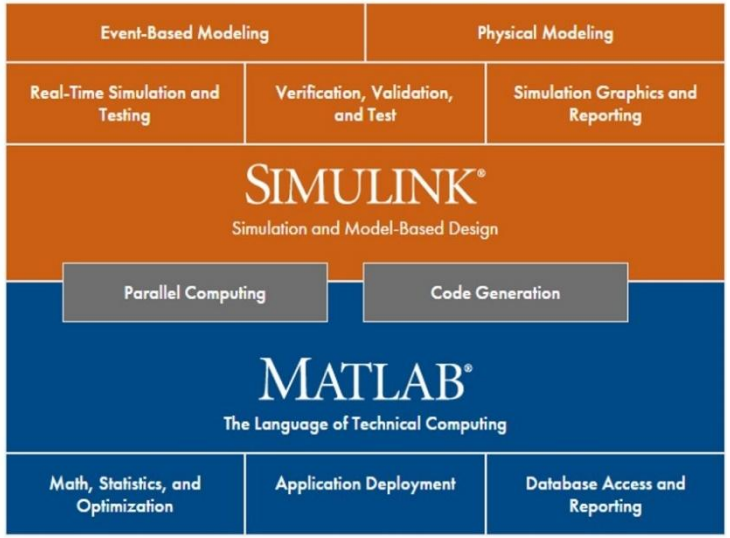
MATLAB® & SIMULINK®

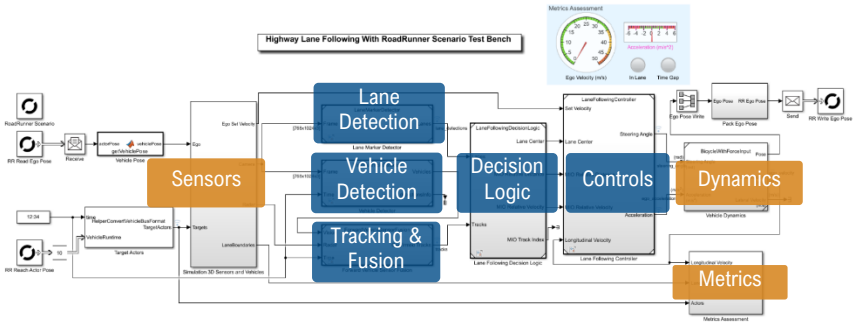




MATLAB

#Math #Graphics #Programming





Simulink

#Design #Simulate #Deploy

Applications and product family

MATLAB®
PRODUCT FAMILY

AI, Data Science, and Statistics

Parallel Computing

Math and Optimization

Reporting and Database Access

SIMULINK®
PRODUCT FAMILY

Event-Based Modeling

Physical Modeling

Systems Engineering

Real-Time Simulation and Testing

Code Generation

Application Deployment

Verification, Validation, and Test

APPLICATION PRODUCTS

Aerospace

Automotive

Computational Finance

Code Verification

Control Systems

FPGA, ASIC, and SoC Development

Image Processing and Computer Vision

Robotics and Autonomous Systems

Radar

RF and Mixed Signal

Signal Processing

Test and Measurement

Wireless Communications

Applications and product family

MATLAB PRODUCT FAMILY

MATLAB

MATLAB Copilot

Parallel Computing

Parallel Computing Toolbox
MATLAB Parallel Server

AI, Data Science, and Statistics

Deep Learning Toolbox
Statistics and Machine Learning Toolbox
Curve Fitting Toolbox
Text Analytics Toolbox

Math and Optimization

Optimization Toolbox
Global Optimization Toolbox
Symbolic Math Toolbox
Mapping Toolbox
Partial Differential Equation Toolbox

Reporting and Database Access

Database Toolbox
MATLAB Report Generator

Code Generation

MATLAB Coder
Embedded Coder
HDL Coder
HDL Verifier
Fixed-Point Designer
GPU Coder

Application Deployment

MATLAB Compiler
MATLAB Compiler SDK
MATLAB Production Server
MATLAB Web App Server

Verification, Validation, and Test

Requirements Toolbox
MATLAB Test

SIMULINK PRODUCT FAMILY

Simulink

Event-Based Modeling

Stateflow
SimEvents

Physical Modeling

Simscape
Simscape Battery
Simscape Driveline
Simscape Electrical
Simscape Fluids
Simscape Multibody

Real-Time Simulation and Testing

Simulink Real-Time
Simulink Desktop Real-Time

Reporting

Simulink Report Generator

Systems Engineering

System Composer
Requirements Toolbox

Code Generation

Simulink Coder
Embedded Coder
DDS Blockset
AUTOSAR Blockset
C2000 Microcontroller Blockset
Fixed-Point Designer
Simulink PLC Coder
Simulink Code Inspector
DO Qualification Kit (for DO-178)
IEC Certification Kit (for ISO 26262 and IEC 61508)
HDL Coder
HDL Verifier

Application Deployment

Simulink Compiler

Verification, Validation, and Test

Requirements Toolbox
Simulink Check
Simulink Coverage
Simulink Design Verifier
Simulink Fault Analyzer
Simulink Test
Polyspace Bug Finder
Polyspace Bug Finder Server
Polyspace Code Prover
Polyspace Test
Polyspace Access
Polyspace Code Prover Server
Polyspace Client for Ada
Polyspace Server for Ada

APPLICATION PRODUCTS

Wireless Communications

Communications Toolbox
5G Toolbox
LTE Toolbox
WLAN Toolbox
Bluetooth Toolbox
Satellite Communications Toolbox
Wireless HDL Toolbox
Wireless Testbench

Radar

Radar Toolbox
Phased Array System Toolbox
Sensor Fusion and Tracking Toolbox
Mapping Toolbox

Automotive

Model-Based Calibration Toolbox
Powertrain Blockset
Vehicle Dynamics Blockset
Automated Driving Toolbox
IEC Certification Kit (for ISO 26262 and IEC 6
Vehicle Network Toolbox
AUTOSAR Blockset
RoadRunner
RoadRunner Asset Library
RoadRunner Scenario
RoadRunner Scene Builder
Simulink 3D Animation

Aerospace

Aerospace Blockset
Aerospace Toolbox
UAV Toolbox
DO Qualification Kit (for DO-178)
Simulink 3D Animation

RF and Mixed Signal

Antenna Toolbox
RF Toolbox
RF PCB Toolbox
RF Blockset
Mixed-Signal Blockset
SerDes Toolbox
Signal Integrity Toolbox

Control Systems

Control System Toolbox
System Identification Toolbox
Predictive Maintenance Toolbox
Robust Control Toolbox
Model Predictive Control Toolbox
Fuzzy Logic Toolbox
Simulink Control Design
Simulink Design Optimization
Reinforcement Learning Toolbox
C2000 Microcontroller Blockset
Motor Control Blockset

Test and Measurement

Data Acquisition Toolbox
Instrument Control Toolbox
Image Acquisition Toolbox
Industrial Communication Toolbox
Vehicle Network Toolbox
ThingSpeak

Signal Processing

Signal Processing Toolbox
DSP System Toolbox
Audio Toolbox
Wavelet Toolbox
DSP HDL Toolbox

Image Processing and Computer

Image Processing Toolbox
Computer Vision Toolbox
Lidar Toolbox
Medical Imaging Toolbox
Vision HDL Toolbox
Image Acquisition Toolbox

Computational Finance

Datafeed Toolbox
Database Toolbox
Econometrics Toolbox
Financial Toolbox
Financial Instruments Toolbox
Risk Management Toolbox
Spreadsheet Link (for Microsoft Excel)

Computational Biology

Bioinformatics Toolbox
SimBiology

Code Verification

Polyspace Bug Finder
Polyspace Bug Finder Server
Polyspace Code Prover
Polyspace Test
Polyspace Access
Polyspace Code Prover Server
Polyspace Client for Ada
Polyspace Server for Ada

Robotics and Autonomous Systems

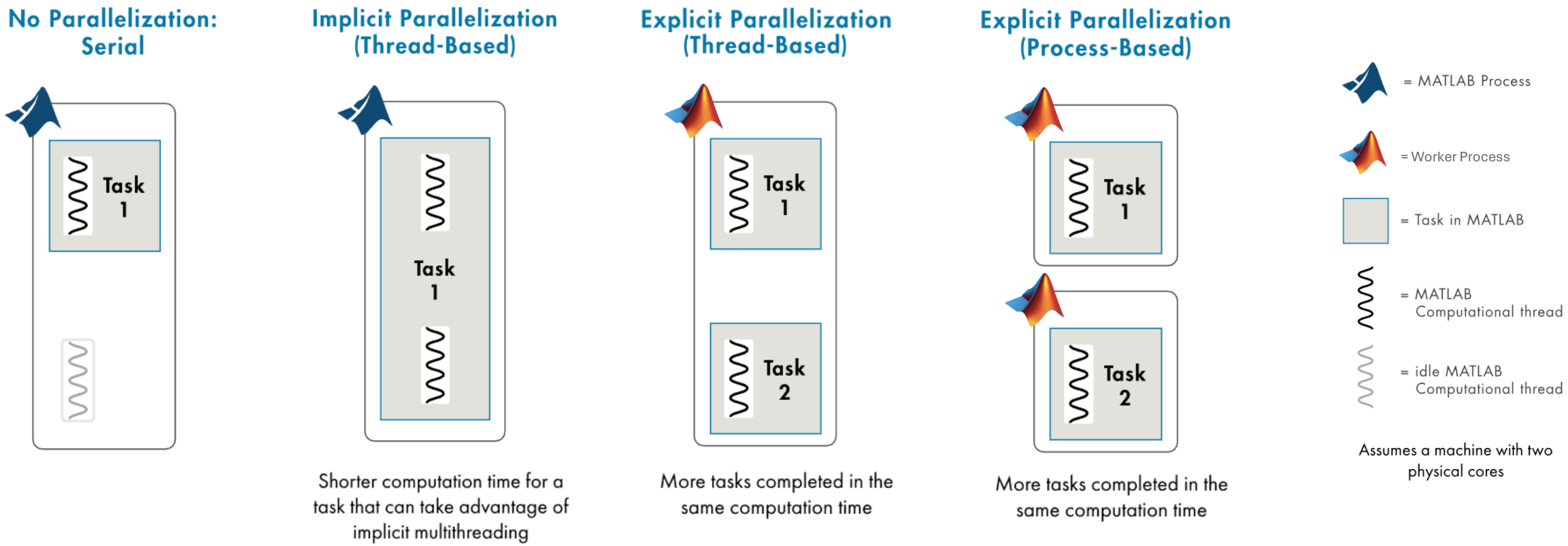
Automated Driving Toolbox
Robotics System Toolbox
UAV Toolbox
Navigation Toolbox
ROS Toolbox
Sensor Fusion and Tracking Toolbox
RoadRunner
RoadRunner Asset Library
RoadRunner Scenario
RoadRunner Scene Builder
Simulink 3D Animation

FPGA, ASIC, and SoC Development

HDL Coder
HDL Verifier
Deep Learning HDL Toolbox
Wireless HDL Toolbox
Vision HDL Toolbox
DSP HDL Toolbox
Fixed-Point Designer
SoC Blockset

Selected application use cases

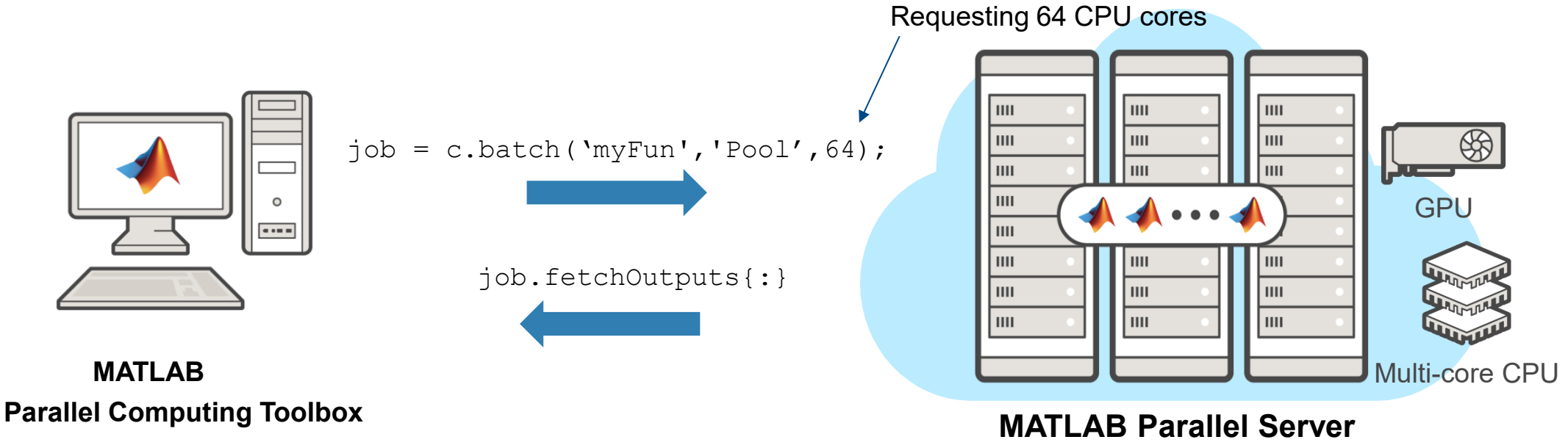
Take advantage of multicore CPUs with built-in multithreading and explicit parallelism using Parallel Computing Toolbox



Learn more here

MATLAB Parallel Server

…Without changing the code, you can run the same applications on clusters or clouds (using MATLAB Parallel Server).



No recoding for distributed memory! MATLAB uses all requested cores even if on different nodes!

MATLAB Connects to Your Hardware and Test Equipment

Instrument Control Toolbox

Benchtop and PXI test instruments from Keysight, Tektronix, R&S, NI and others






Data Acquisition Toolbox

Plug-in data acquisition devices from NI, Measurement Computing and advanced sound card support


MATLAB

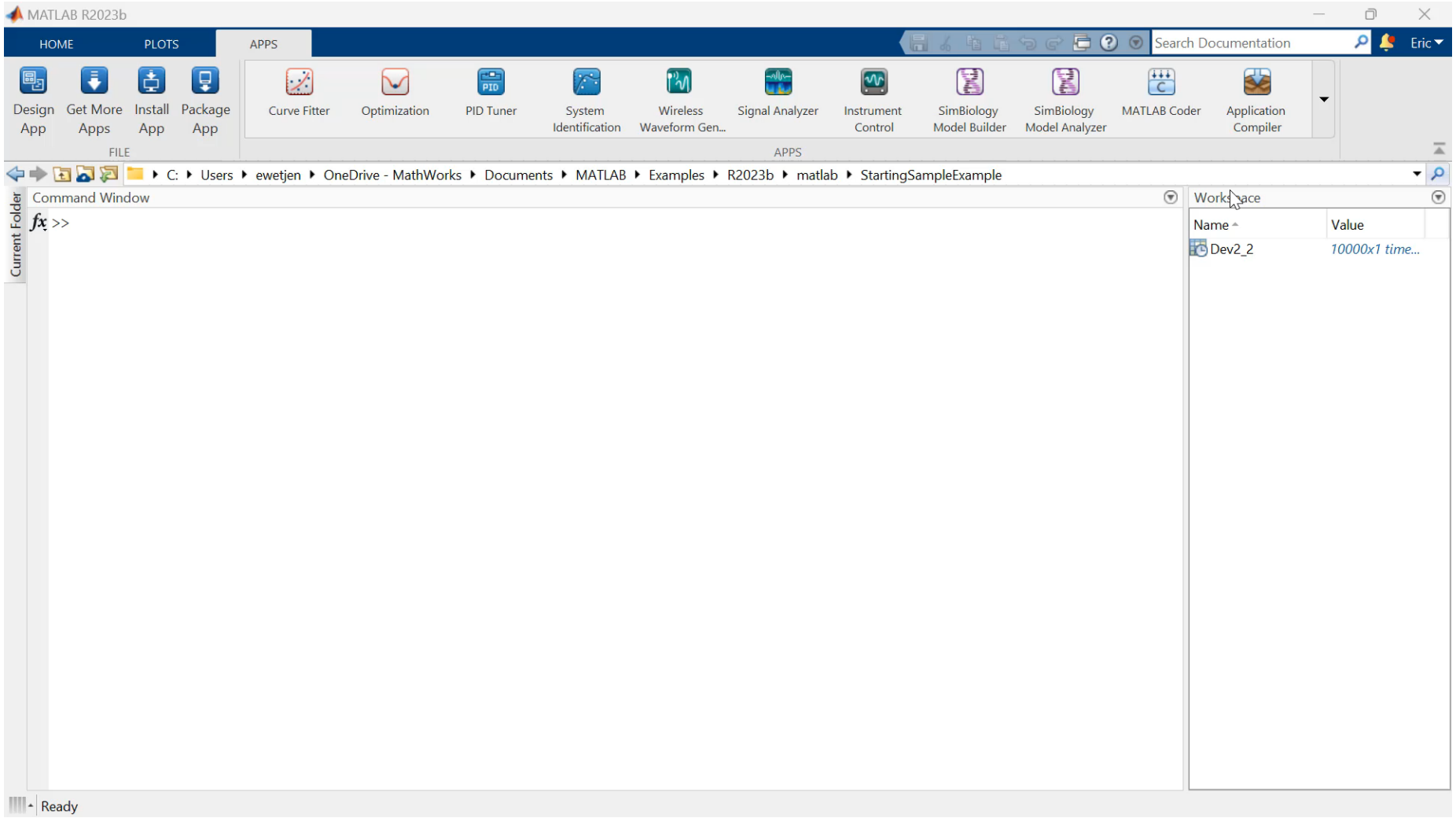
built-in and downloadable support for communicating with a wide range of devices like Arduino and Raspberry PI.


Image Acquisition Toolbox

Industrial and scientific cameras


Analog Input Recorder Video Demo

[Video Demo: Automate Data Acquisition in MATLAB Using the Analog Input Recorder App - MATLAB]



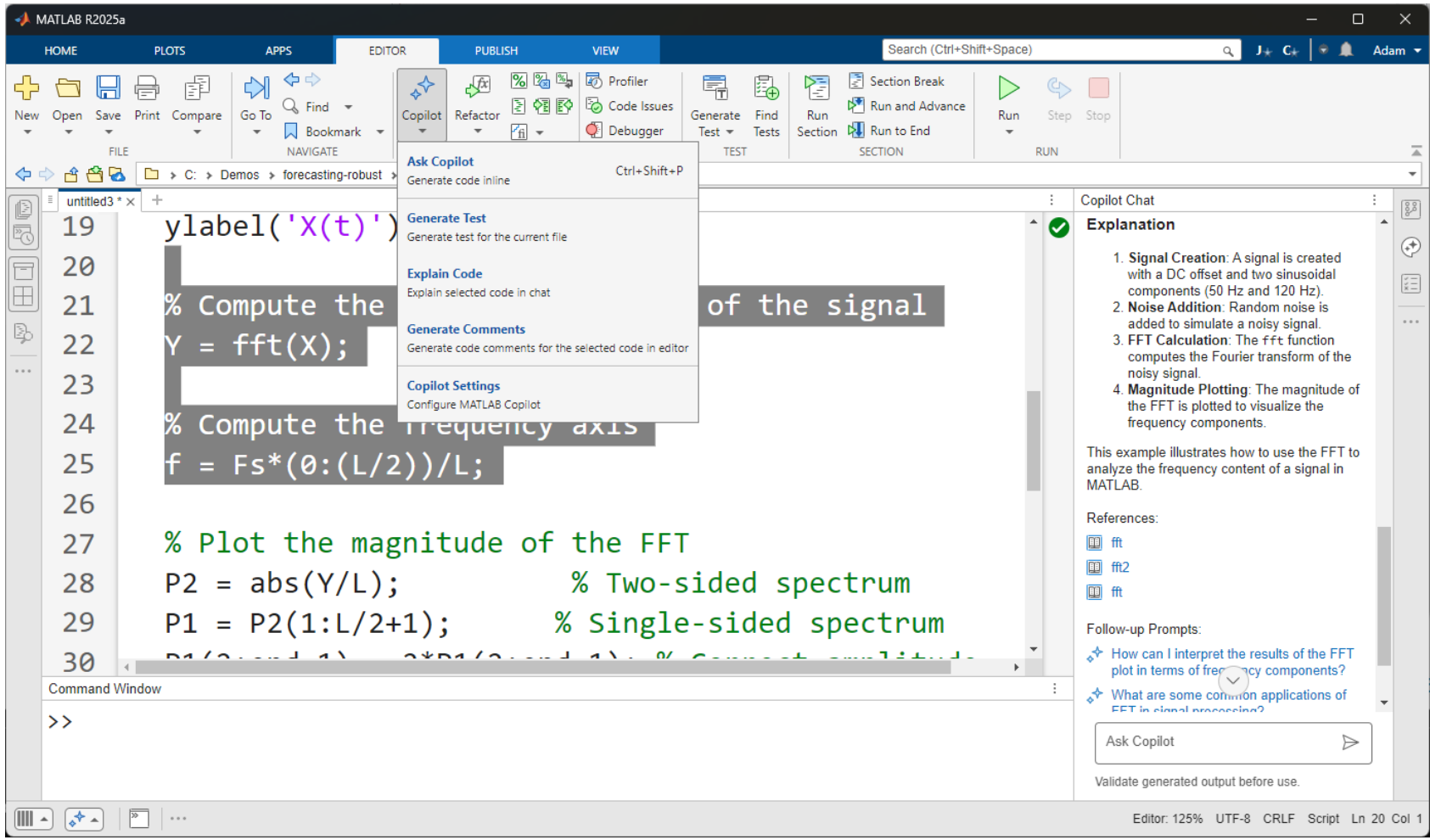
MATLAB Copilot – AI assistant optimized for MATLAB

R2025a

New product from MathWorks

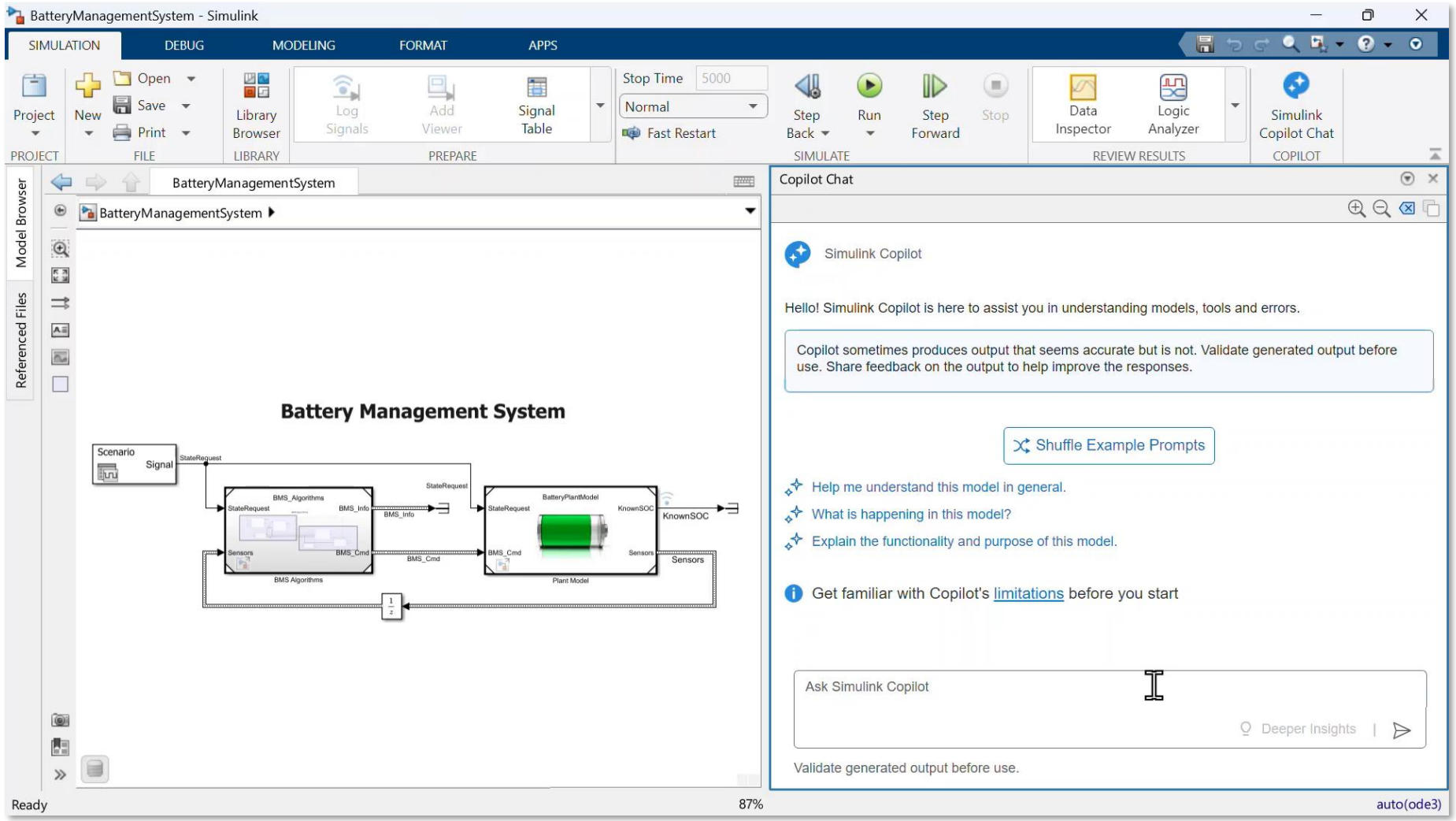
You can:

- Chat with MATLAB Copilot
- Autocomplete code
- Use Copilot Actions in the Editor



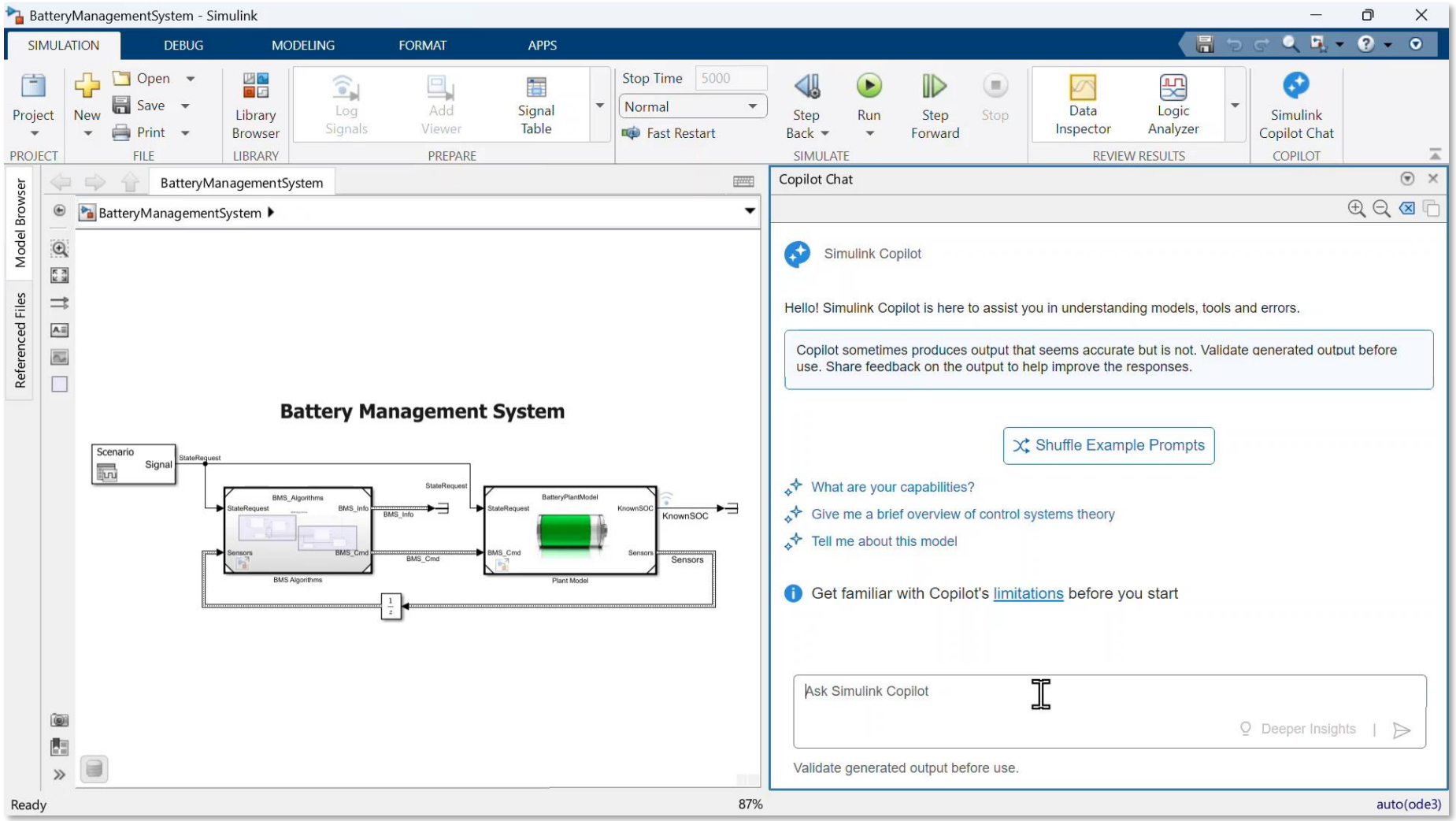
R2026a Copilot is built to help with your everyday work

- ✓ Chat & Learn



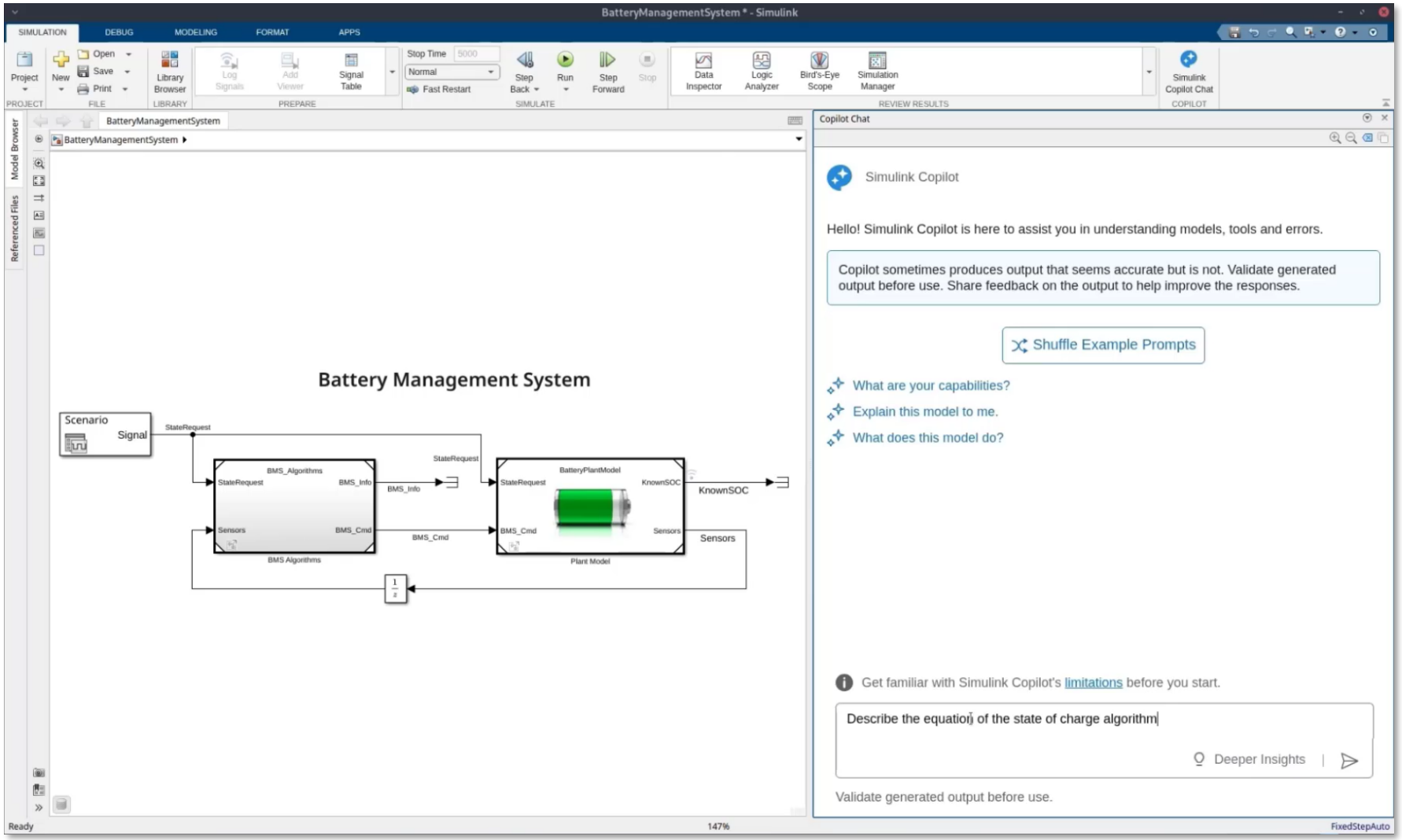
R2026a Copilot is built to help with your everyday work

- ✓ Chat & Learn
- ✓ Understand



R2026a Copilot is built to help with your everyday work

- ✓ Deeper Insights



Thank you !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