# Biomedical Systems Engineering Symposium

## Advanced Techniques for Biomedical Signal/Image Processing & Device Modeling


***Education & Sciences Team***

Sarah Fayyad: sfayyad@mathworks.com
Armando Garcia: agarcian@mathworks.com
Reza Fazel-Rezai: rfazelre@mathworks.com
Rob Holt: rholt@mathworks.com
Pourash Patel: ppatel@mathworks.com


# Largest Medical & Life Sciences center in the world

## 60+ Medical Institutions

## 10+ Academic & Research Institutions

**Accelerating the Pace of Engineering and Science**

# Agenda

| | |
|---|---|
| 9:00 - 9:40 | Introduction |
| 9:45 – 10:00 | Imaging Biomarker Development for Detection of Hepatocellular Carcinoma |
| 10:00 - 10:45 | EEG Classification using a CNN |
| 11:00 - 11:45 | Medical Image Processing |
| 11:45 – 12:15 | Lunch Break |
| 12:15 – 12:30 | Latest Research Intersecting Tech & Medicine |
| 12:45 – 1:30 | Simulink for In Silico Medicine |
| 1:30 – 2:00 | Networking and Q&A |

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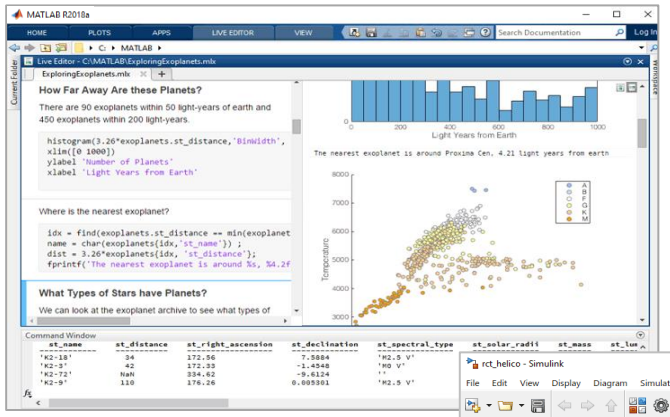
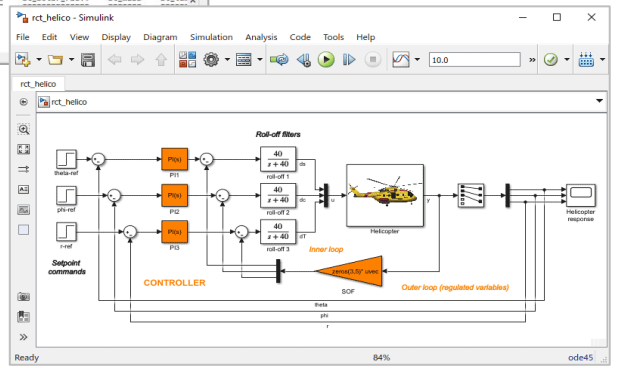
# MATLAB® & SIMULINK®

- **MATLAB** – Create algorithms and AI models for biomedical data analysis
- **Simulink** – Simulate complex medical devices with sensors and software
- **120+ products** for specialized R&D tasks

**MATLAB**




**Simulink**



# MATLAB

- Analyze data, develop algorithms, and create models
- Community-developed tools
- Leverage interoperability

Data Analysis

Graphics

Programming

App Building

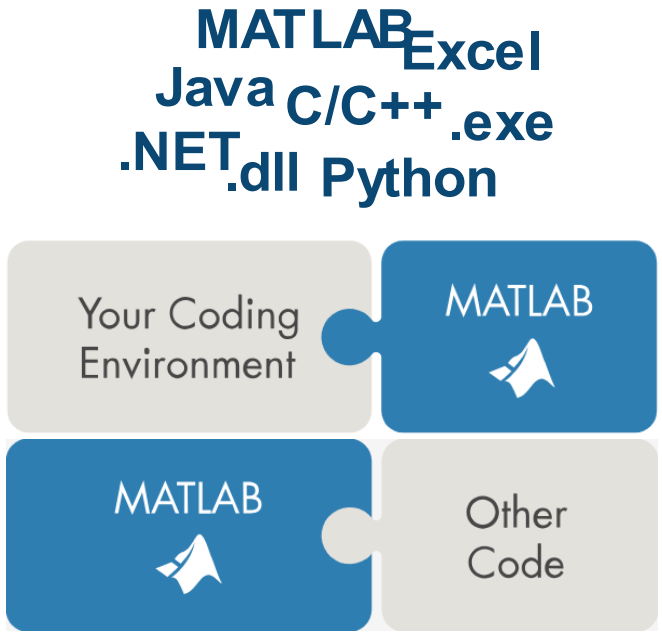
External Language Interfaces

Hardware

Parallel Computing

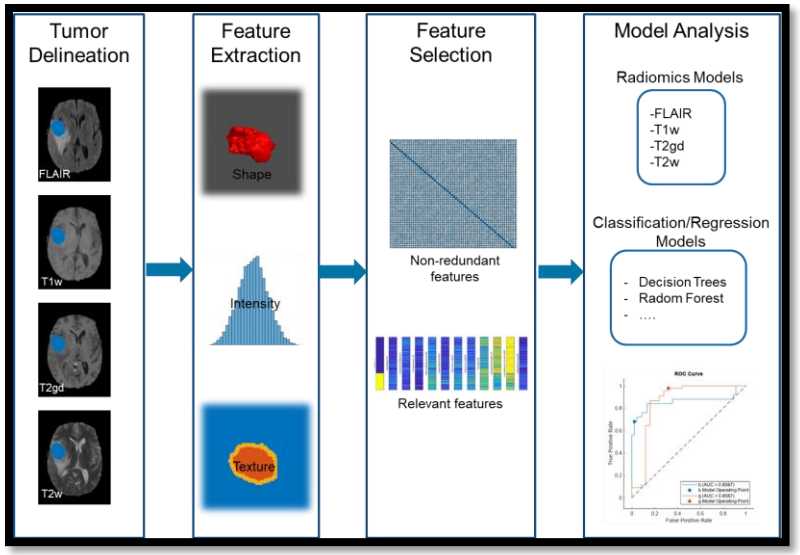
Web and Desktop Deployment

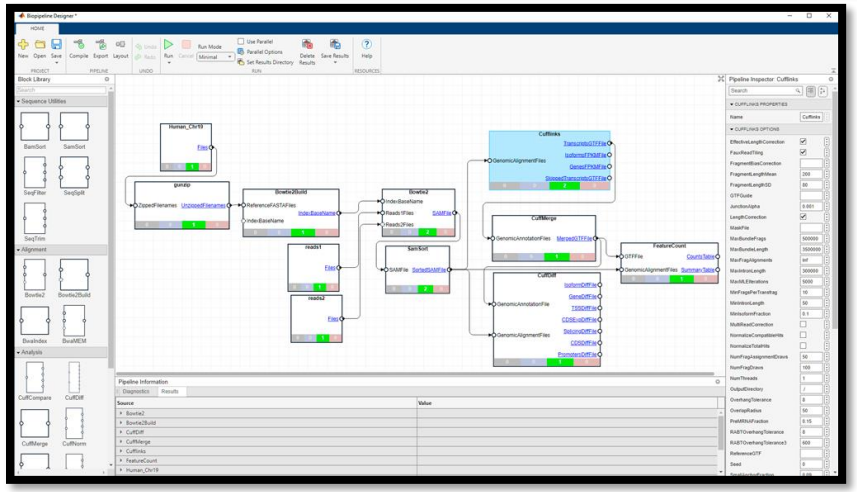
MATLAB in the Cloud

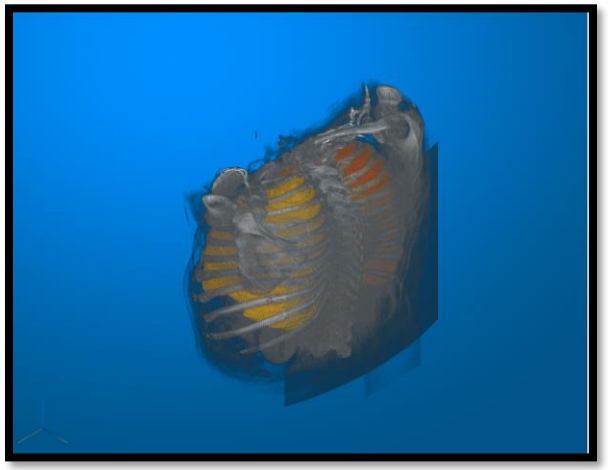


# MATLAB for biomed

- Create **classification and predictive** models
- Automate **image and signal analysis**
- Develop **bioinformatics analysis** workflows
- **Access data** where it lives, including live data from instruments, cards, sensors, or IoT

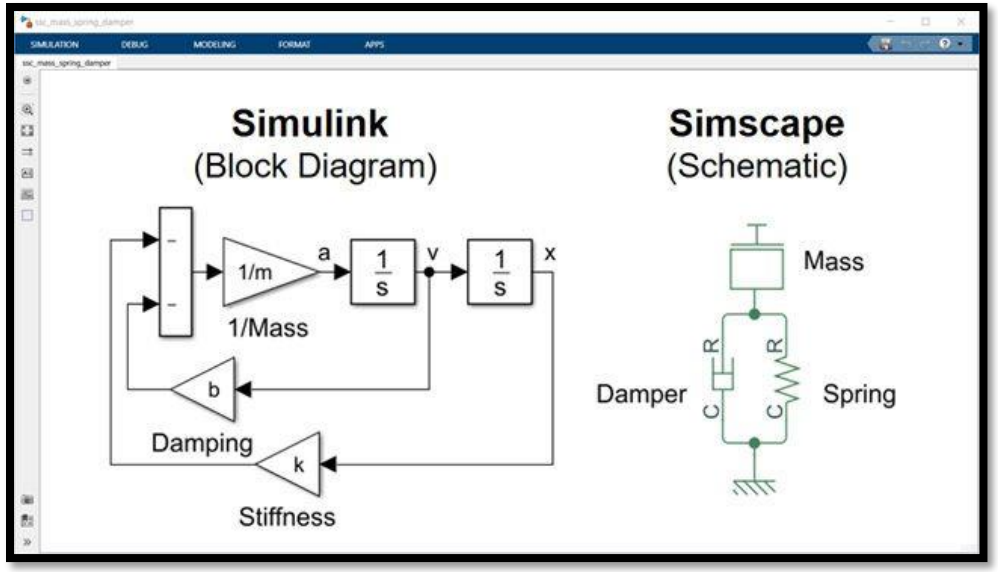


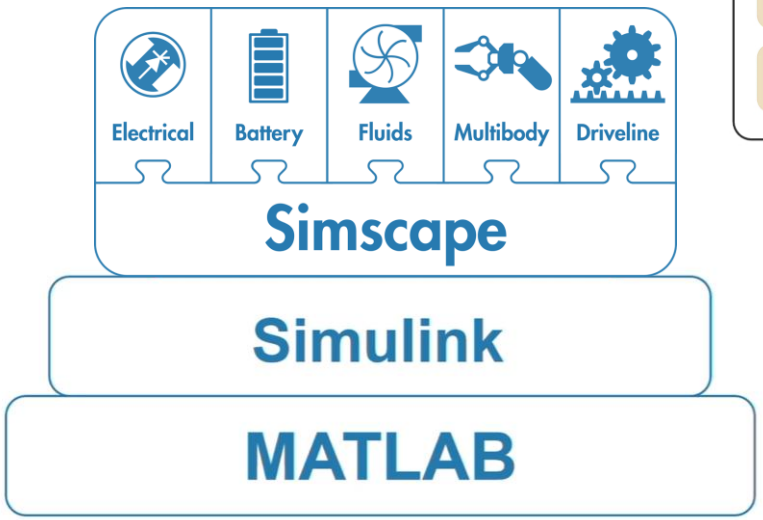



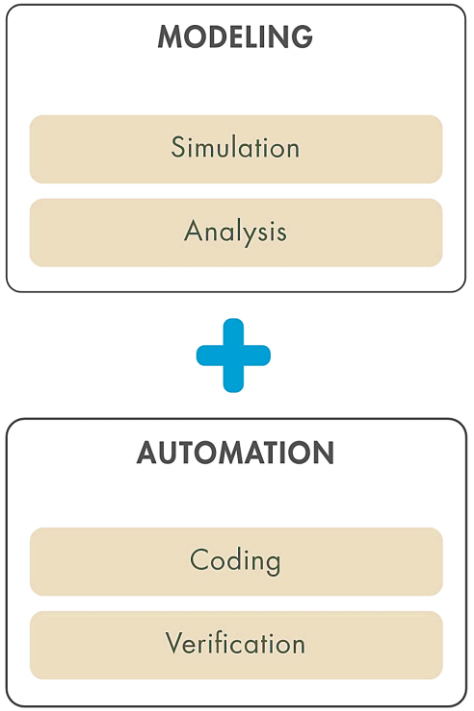


# Simulink

- Model and simulate **dynamical systems**
- **Graphical** environment
- **Multi-domain** with built-in custom components
- **Simulate** before moving to hardware
- **Deploy** without writing code

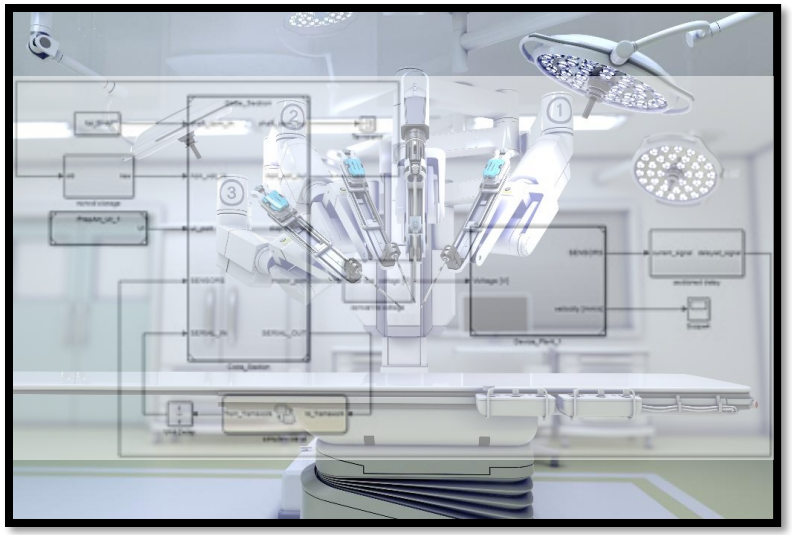


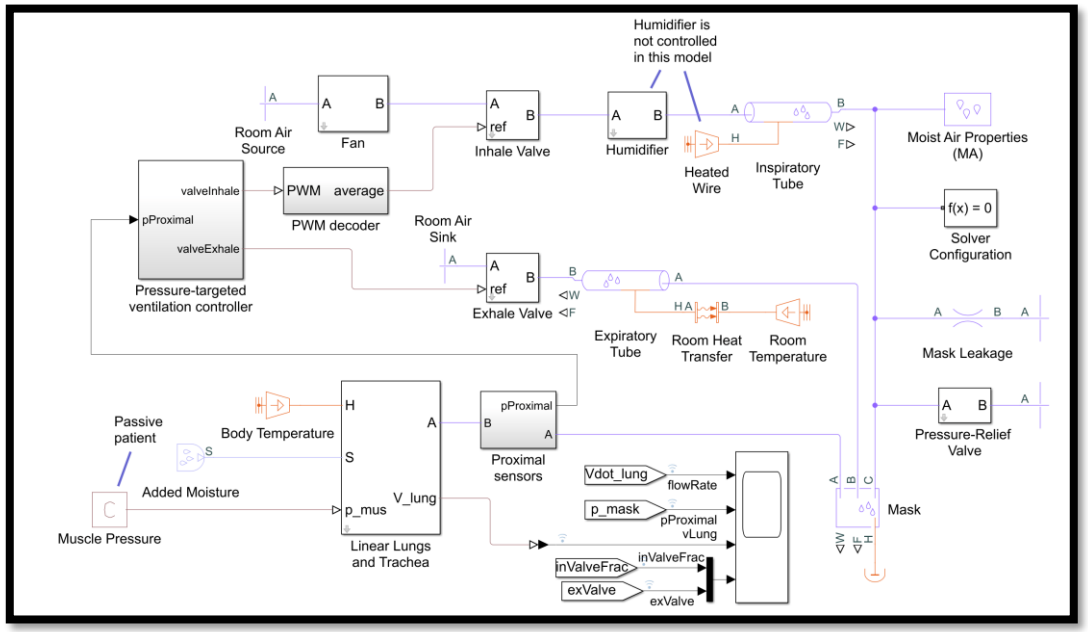



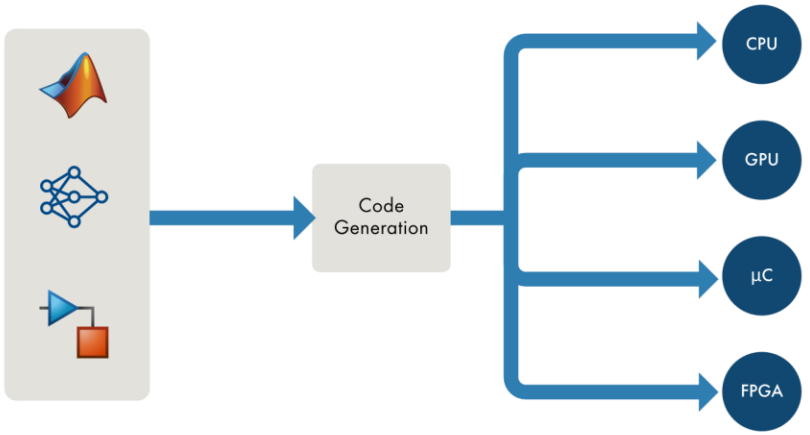



# Simulink for biomed

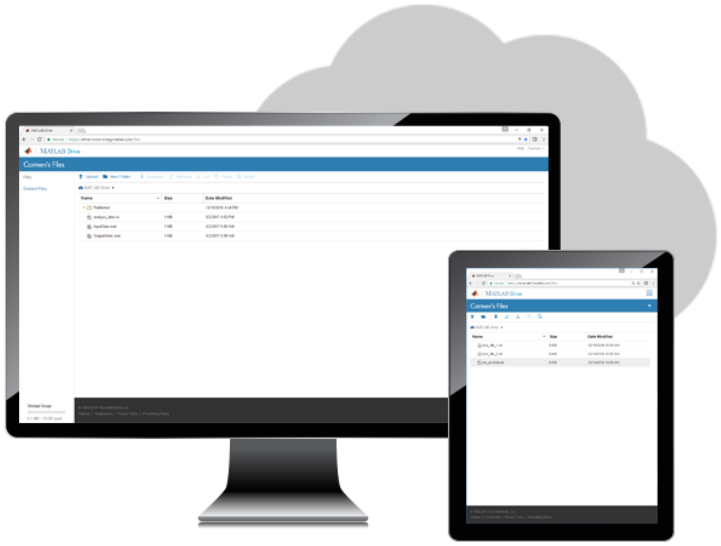
- Model and simulate **medical devices and biological systems**
- Automatically generate C, C++, and HDL code
- **Test and validate** to meet requirements and standards





## MATLAB Online

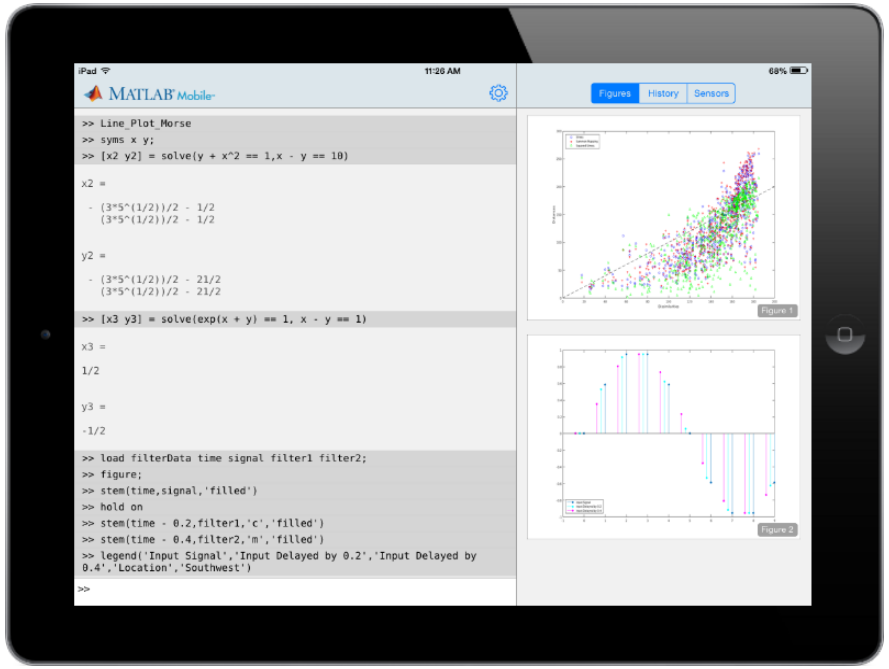


## Simulink Online


## MATLAB Drive


- No installation required
- Most recent version of MATLAB always
- No minimum device specs required – only an internet browser

# MATLAB Mobile

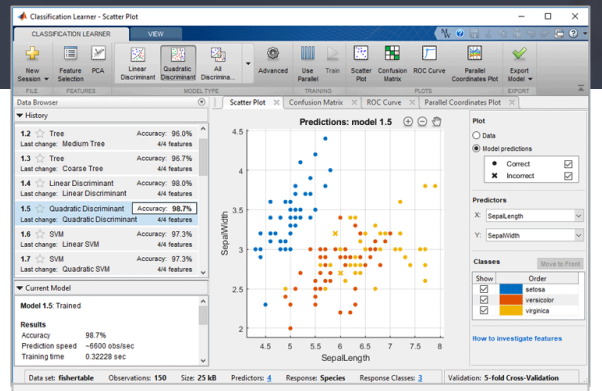

Connect to MATLAB Mobile

Acquire Sensor Data

Capture Images, Video, and Audio

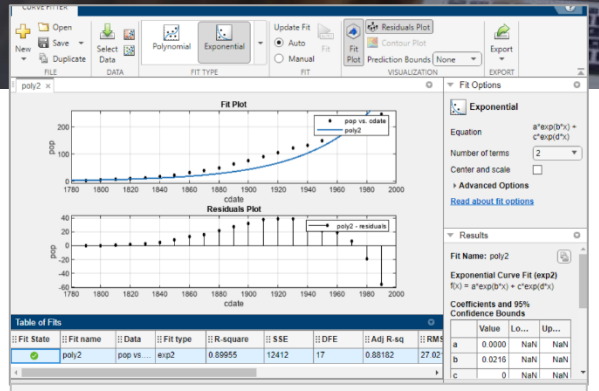
Learn and Teach

# Built-in apps to tackle complex workflows



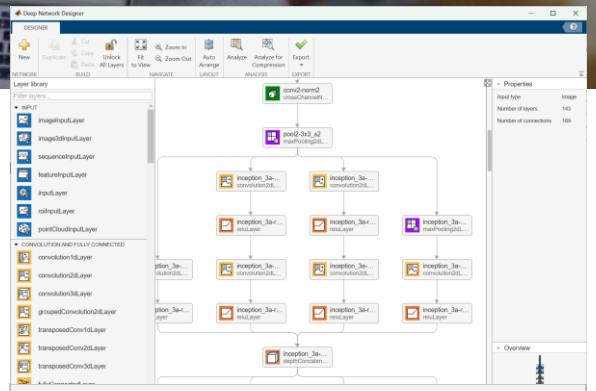
## Classification Learner

Train common classification models interactively and choose the best one for your application



## Curve Fitter App

Fit models to your data, including custom equations and obtain good of fit metrics

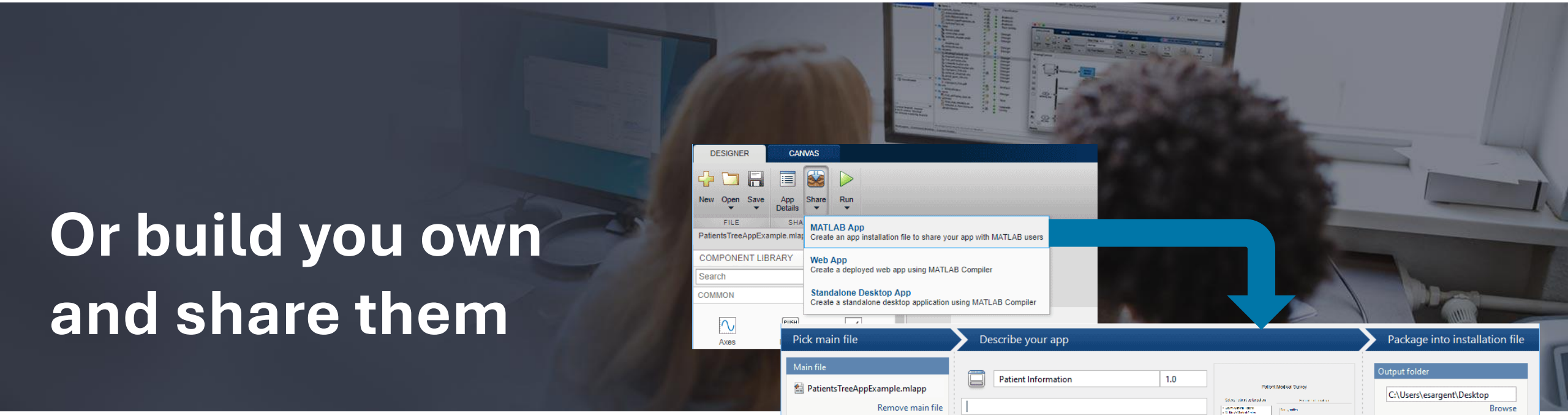


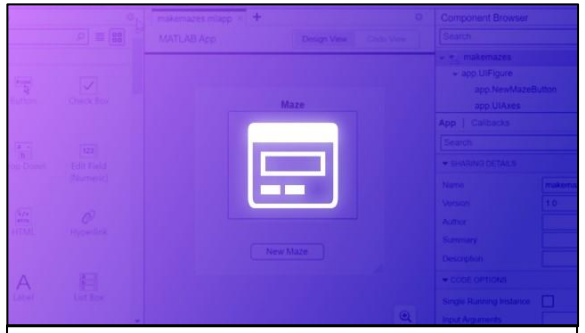
## Deep Network Designer

Import, build, visualize, and edit deep learning networks.

mathworks.com/discovery/matlab-apps.html

# Or build you own and share them



**App Building Onramp**

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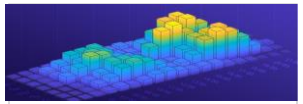
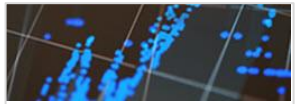
# 100+ hours of Online Training

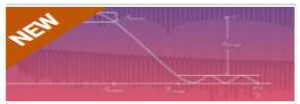


MATLAB Fundamentals

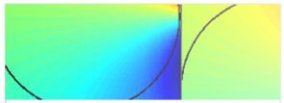

Simulink Fundamentals



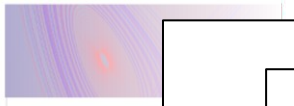
MATLAB for Data Processing and Visualization




Signal Processing with MATLAB



Solving Nonlinear Equations with MATLAB



Solving Or... Differen... Equations... MATL...

Deep Learning with MATLAB

Machine Learning with MATLAB

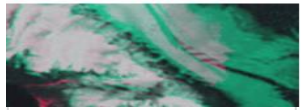
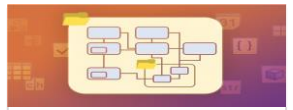


Image Processing with MATLAB



MATLAB Programming Techniques

Introduction to Statistical Methods with MATLAB

Introduct... Symbolic... with MA...


# MATLAB

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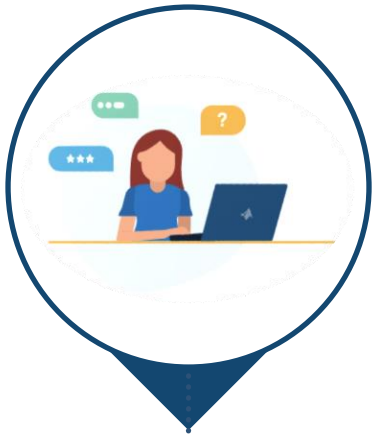
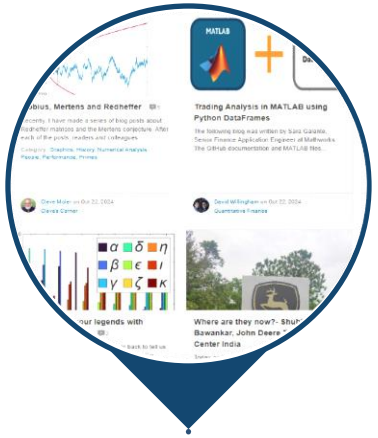
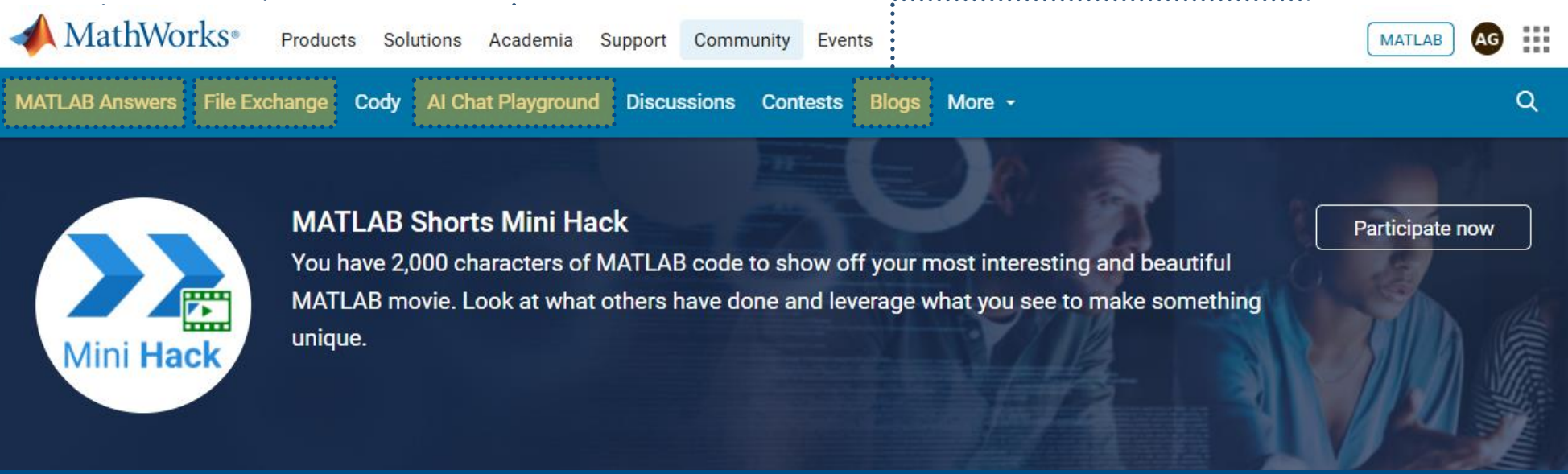


**Open-source MATLAB code Publish yours to help others**


**Experiment, generate draft code, answer questions**

**Get the inside view on MATLAB and Simulink**

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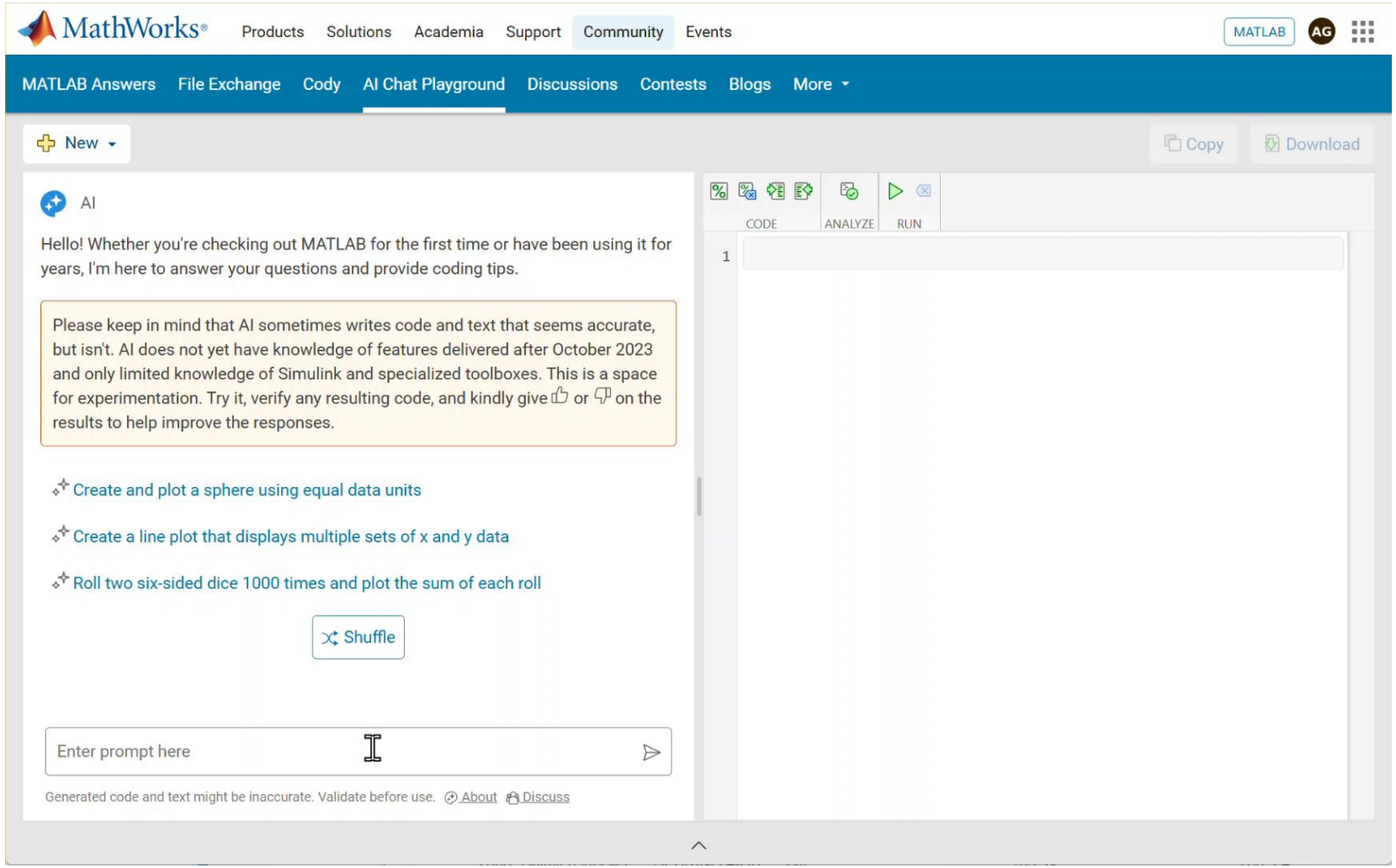
# Leverage Gen AI




**The MATLAB Blog**
Practical Advice for People on the Leading Edge

4 ways of using MATLAB with LLMs
tinyurl.com/4z6k2p86

# A dedicated team and many ways to collaborate

## Teaching

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Book Program

## Research

Technical guidance

Complementary licenses

Monetary funding

## Commercialization

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Partner with MathWorks Accelerator Program

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