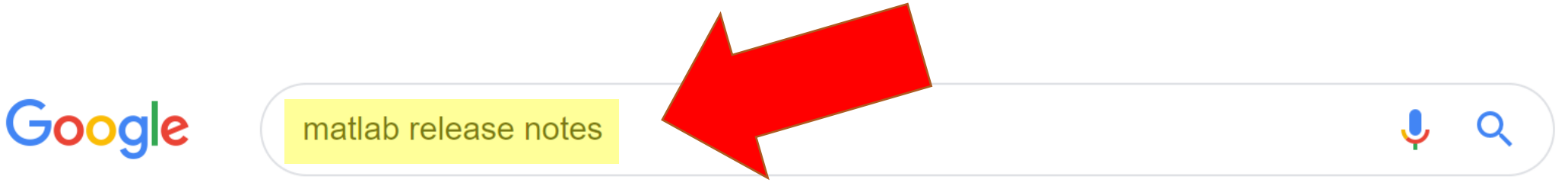
What's New in MATLAB

Joe Hicklin & Ned Gulley

MATLAB EXPO 2019
UNITED KINGDOM

2 October | Silverstone, Northamptonshire

MathWorks®

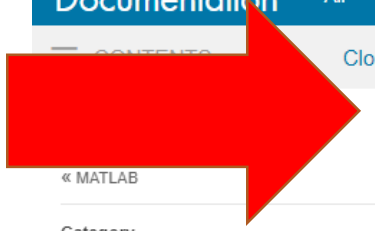


About 7,520,000 results (0.40 seconds)

Release Notes for MATLAB - MATLAB & Simulink - MathWorks

https://www.mathworks.com › help › matlab › release-notes ▾

MATLAB Release Notes. Bug Reports; |; Bug Fixes. expand all in page. Your Selections.



Category

MATLAB
- Environment
- Language and Programming
- Data Analysis
- Data Import and Export
- Mathematics
- Graphics
- App Building
- Performance
- Software Development Tools
- External Language Interfaces
- Hardware Support

Simulink

5G Toolbox

Aerospace Blockset

Aerospace Toolbox

Text Filter

Release Range:

R2019a to R2019b

Compatibility Considerations ⚠

- Incompatibilities Only

MATLAB Release Notes

R2019b

Bug Reports | Bug Fixes

expand all in page

Found 208 notes | Release Range: R2019a to R2019b

Sort by: Release: Latest to Earliest

R2019b

New Features, Bug Fixes, Compatibility Considerations

expand all

R2019b: Bug Fixes

Environment

- Live Editor Tasks: Add interactive tasks to live scripts to explore parameters and automatically generate code
- Live Editor Output: Animate plots to show changes in data over time
- Live Editor Output: Adjust the width of columns in tables
- Live Editor Output: Scroll through and copy data in arrays such as cell arrays, object arrays, and struct arrays
- Live Editor Export: Customize figure format as well as document paper size, orientation, and margins when exporting
- Live Editor Code: Duplicate one or more lines of code
- Live Editor Code: Suppress Code Analyzer warning messages
- Live Editor Debugging: Set breakpoints for anonymous functions
- Live Editor Internationalization: Add non-English language such as Chinese, Japanese, and Korean characters on Windows and macOS Platforms
- Add-On Manager: Update MATLAB and other installed add-ons
- Add-On Manager: Programmatically manage add-ons by name
- Settings: Create persistent settings for custom apps, toolboxes, and across MATLAB sessions
- MATLAB Drive: Share folders and collaborate with others
- Functionality being removed or changed ⚠

Language and Programming

- `size` Function: Find lengths of multiple array dimensions at a time
- `matches` Function: Determine if input strings are equal
- Hexadecimal and Binary Numbers: Specify numbers using hexadecimal and binary literals
- Indexing: Use dot indexing into function calls

CONTENTS Close

« Documentation Home
« Release Notes
« MATLAB

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Trial Software Product Updates

MATLAB Release Notes

R2019b

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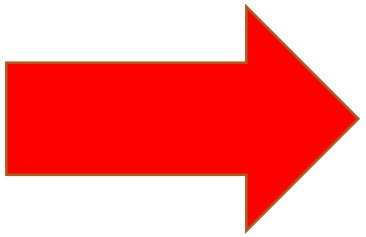

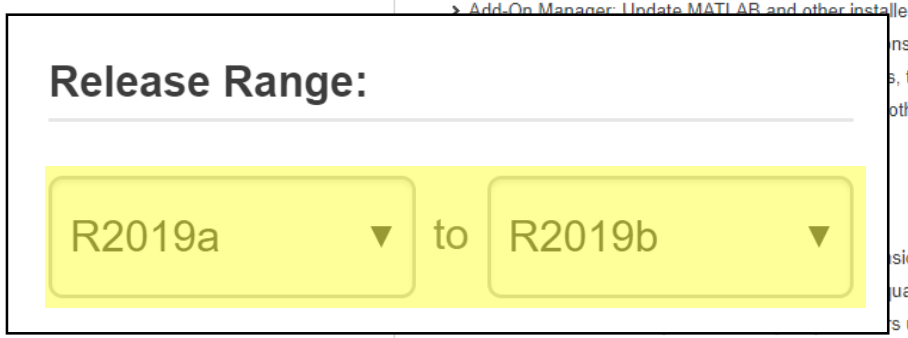

Category

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R2019b

New Features, Bug Fixes, Compatibility Considerations expand all

R2019b: Bug Fixes

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Release Range:

R2019a

Software Development Tools

- `checkcode` Function: Get the modified cyclomatic complexity of functions
- Source Control Integration: Synchronise MATLAB Git status with external Git clients
- Unit Testing Framework: Display code coverage metrics in HTML format
- Unit Testing Framework: Specify sources for collections of code coverage data with `runtests`
- Unit Testing Framework: `runperf` collects more samples to achieve its target margin of error
- Unit Testing Framework: Return performance test results as `TimeResult` arrays
- Unit Testing Framework: Load previously saved `MeasurementResult` objects as `DefaultMeasurementResult`
- Unit Testing Framework: Use `matlab.unittest.fixtures.Fixture.onFailure` method only in subclasses ⚠
- Unit Testing Framework: Compare tables that contain no rows ⚠
- Unit Testing Framework: Create test suite array from tests in project
- Unit Testing Framework: Run tests from files in project using `runtests` or `testsuite`
- Unit Testing Framework: Specify verbosity enumeration as a string or character vector
- App Testing Framework: Perform hover gesture on axes, UI axes, and UI figures
- App Testing Framework: Perform press gesture on axes, UI axes, and UI figures
- App Testing Framework: Perform type gesture on date picker objects
- Mocking Framework: Create mocks for classes that use custom metaclasses
- Mocking Framework: Create mocks for classes that use property validation
- Mocking Framework: Specify which methods to mock
- Functionality being removed or changed ⚠

External Language Interfaces

- C++: Use C++ classes from third-party libraries in MATLAB
- Python: Version 3.7 support ⚠
- Python engine: Data type support
- C++ MEX: Execute MEX function out of process
- MEX functions: Use customer version of Boost library
- MATLAB Data Array: Support for row-major memory layout
- Compiler support changed for building MEX files and standalone MATLAB engine and MAT-file applications ⚠

Hardware Support

- MATLAB Support Package for Parrot Drones: Control Parrot Mambo FPV drone from MATLAB and acquire sensor data
- Deploy Sense HAT functions on Raspberry Pi hardware
- Functionality being changed or removed ⚠

1. The Unit Testing Framework now returns performance test results as arrays of TimeResult objects.

Run performance tests for all the elements that contain `'Indexing'` in the name. Your results might vary, and you might see a warning if `runperf` doesn't meet statistical objectives.

```
results = runperf('preallocationTest','Name','*Indexing*')
```

```
Running preallocationTest
.......... .......... .......
Done preallocationTest
_________


results =

  1×2 TimeResult array with properties:

    Name
    Valid
    Samples
    TestActivity

Totals:
   2 Valid, 0 Invalid.
   2.4858 seconds testing time.
```

runperf

Run set of tests for performance measurement

Syntax

```
results = runperf
results = runperf(tests)
results = runperf(tests,Name,Value)
```

Description

`results = runperf` runs all the tests in your current folder for performance measurements and returns an array of `matlab.perftest.TimeResult` objects. Each element in `results` corresponds to an element in the test suite.

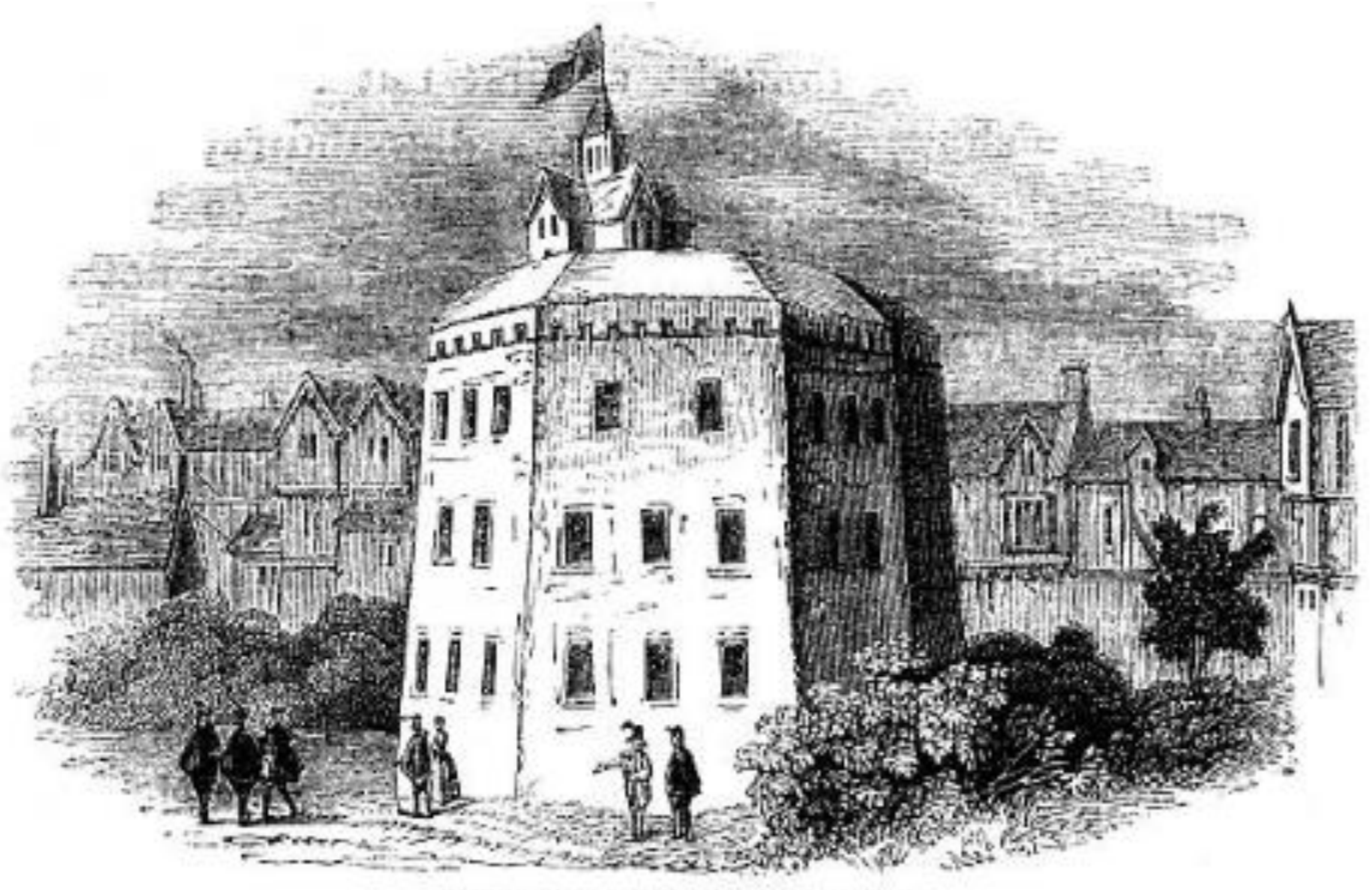
The performance test framework runs the tests using a variable number of measurements to reach a sample mean with a 0.05 relative margin of error within a 0.95 confidence level. It runs the tests four times to warm up the code, and then between 4 and 256 times to collect measurements that meet the statistical objectives. If the sample mean does not meet the 0.05 relative margin of error within a 0.95 confidence level after 256 test runs, the performance test framework stops running the test and displays a warning. In this case, the `matlab.perftest.TimeResult` object contains information for the 4 warm-up runs and 256 measurement runs.

The `runperf` function provides a simple way to run a collection of tests as a performance experiment.

`results = runperf(tests)` runs a specified set of tests.

`results = runperf(tests,Name,Value)` runs a set of tests with additional options specified by one or more `Name,Value` pair arguments.

In which
our story begins



[The Globe Theatre, Bankside.]

What's New in MATLAB (the really good bits)

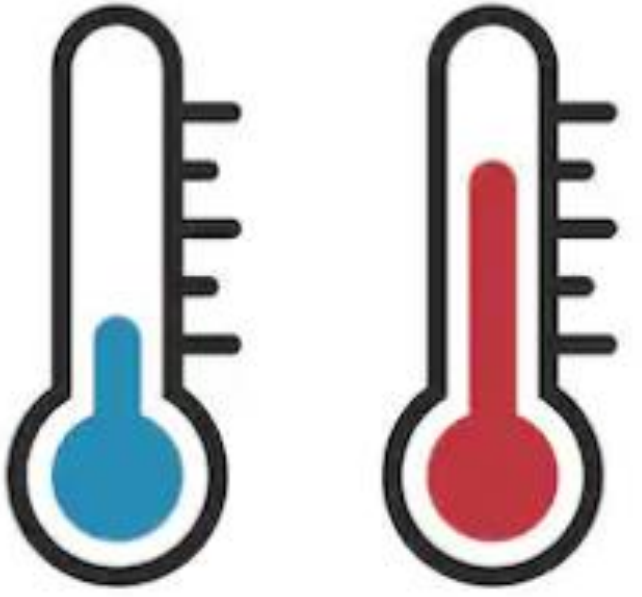
[The Globe Theatre, Bankside.]

Cast (in order of appearance)

- Projects
- Git Integration
- Live Tasks
- Function Argument Validation
- Live Controls
- AppDesigner Adaptive Layout
- Web Apps

Scene I.

Hot Stuff Thermostats, Ltd



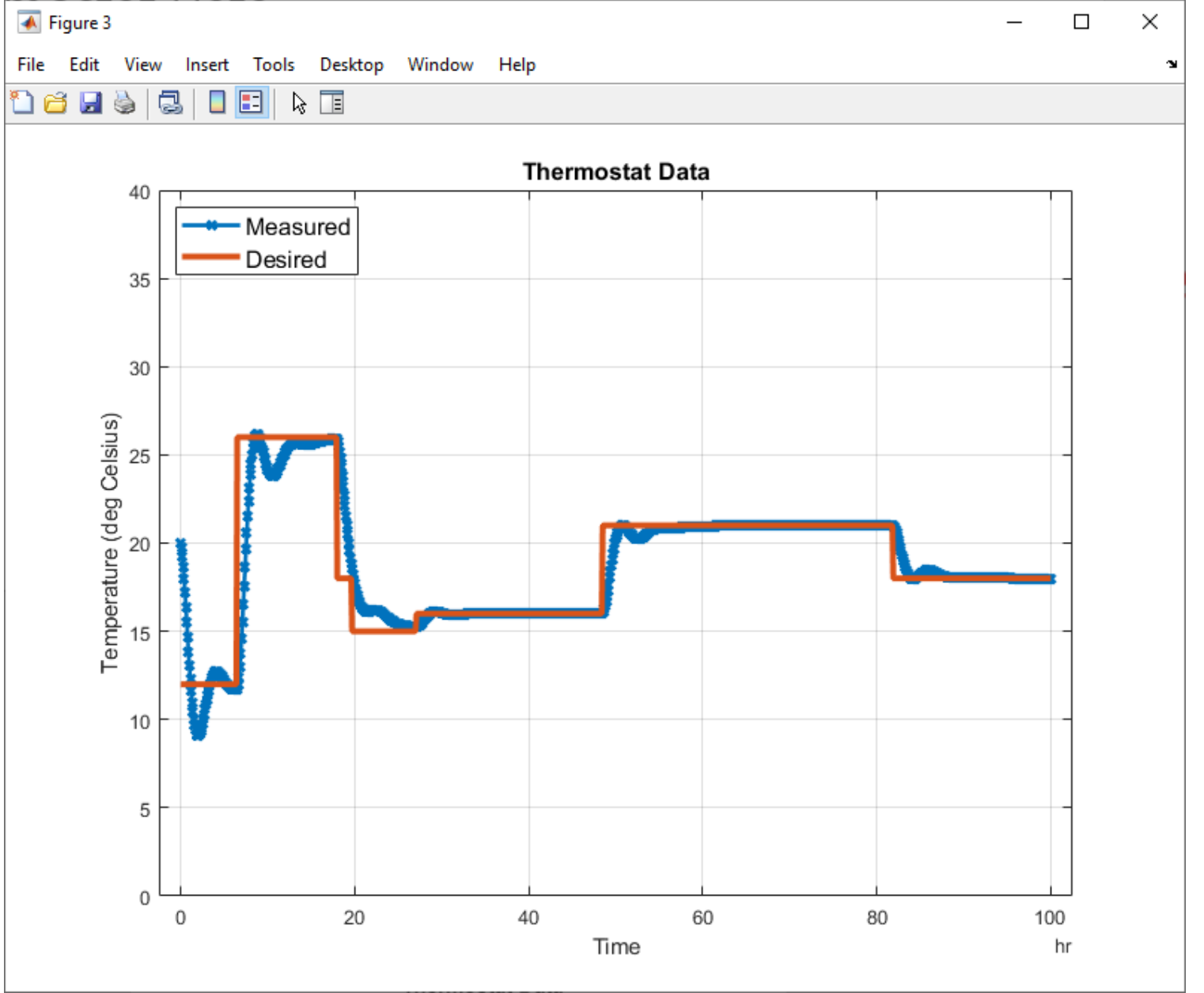
SpatCo

SpatCo

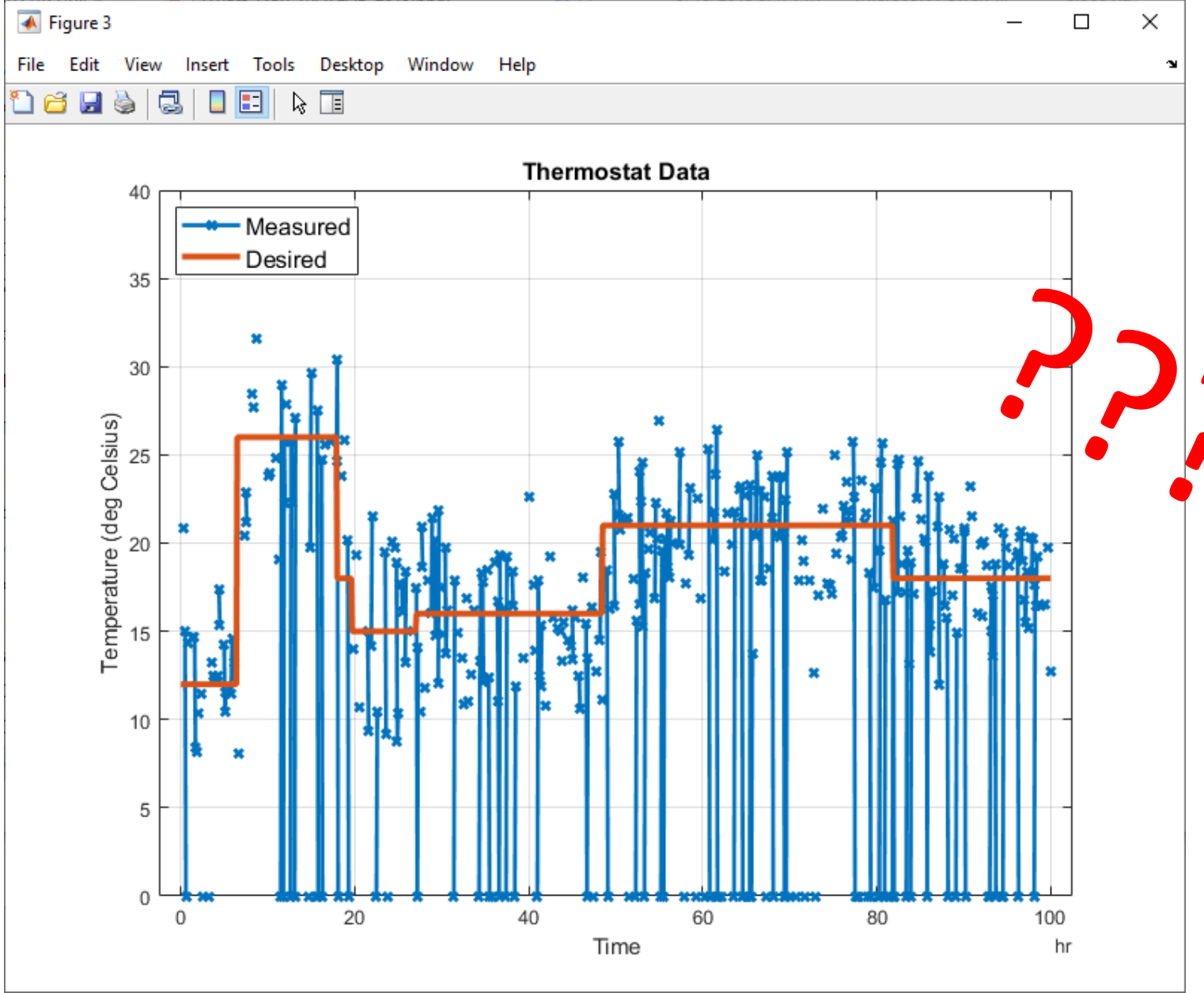
Thermostat Data (expected)

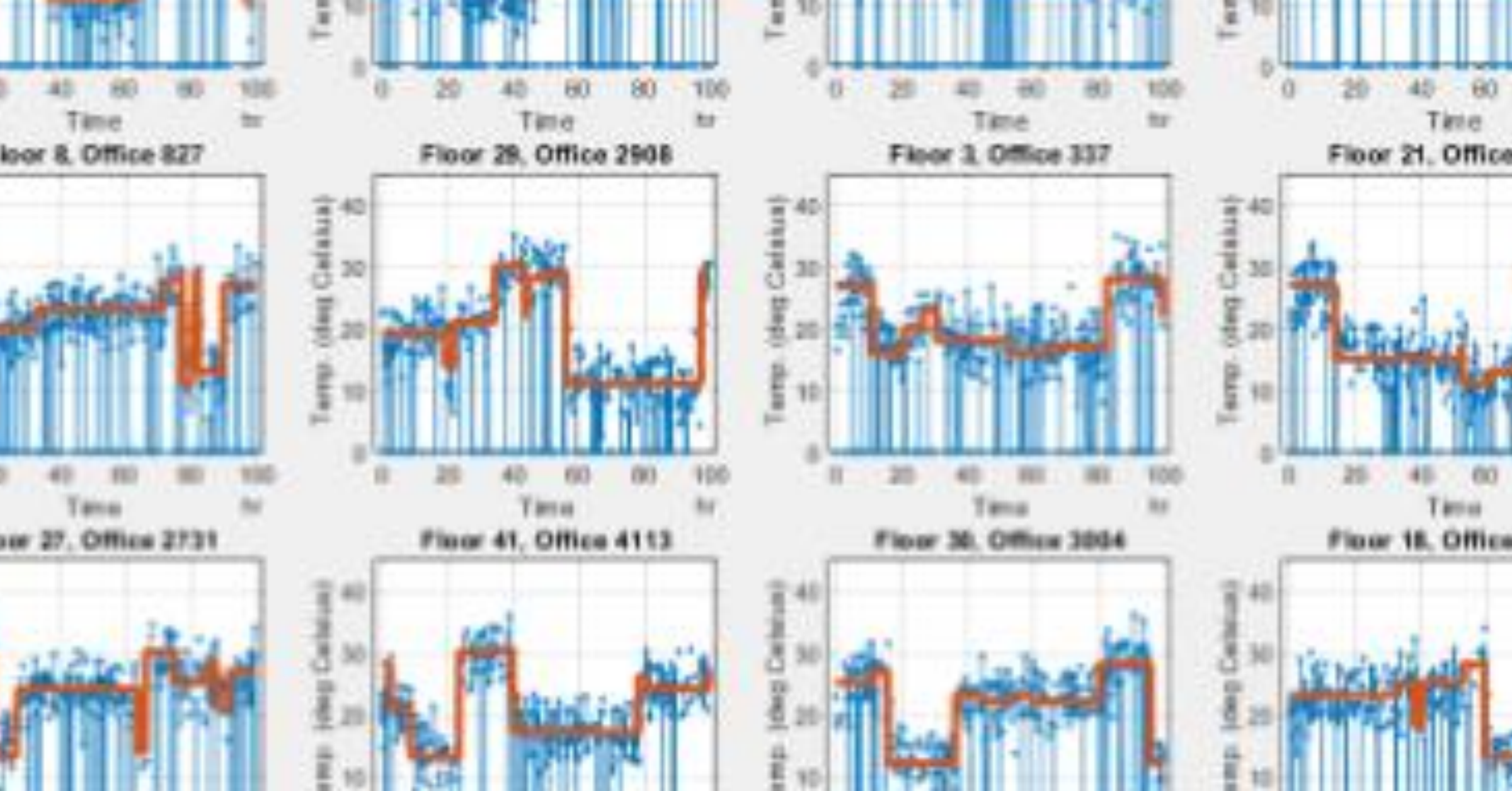
t_actual = 1001×1 timetable

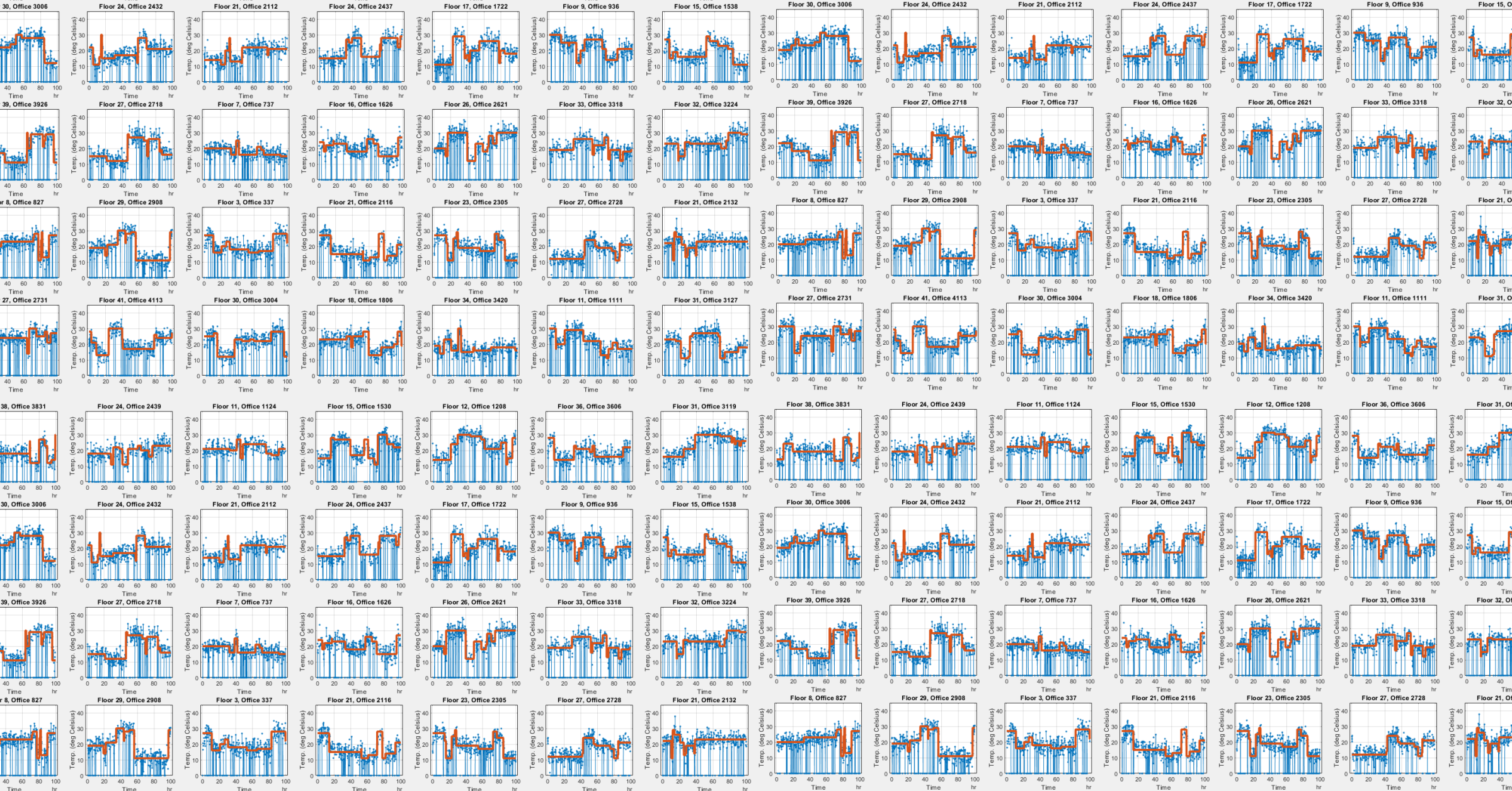
	Time	Temp
1	0 hr	20.0000
2	0.1 hr	19.8020
3	0.2 hr	19.6184
4	0.3 hr	19.4556
5	0.4 hr	19.3187
6	0.5 hr	19.2114
7	0.6 hr	19.1365
8	0.7 hr	19.0954
9	0.8 hr	19.0886



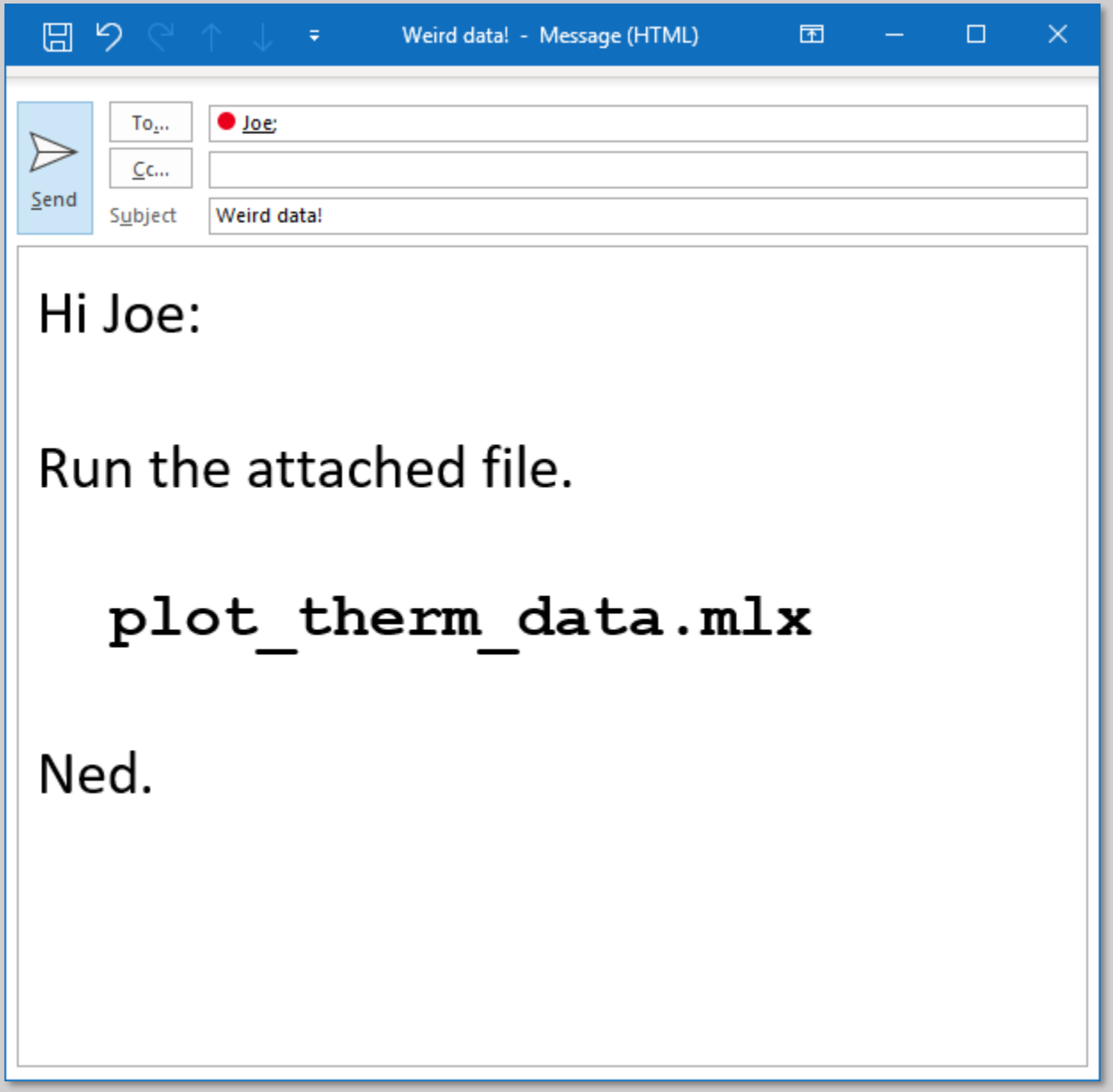
Thermostat Data (actual)




Floor 8, Office 827
Floor 28, Office 2908
Floor 3, Office 337
Floor 21, Office
Floor 27, Office 2731
Floor 41, Office 4113
Floor 30, Office 3004
Floor 18, Office
Temp. (deg Celsius)
Time
hr


Floor 30, Office 3006
Floor 24, Office 2432
Floor 21, Office 2112
Floor 24, Office 2437
Floor 17, Office 1722
Floor 9, Office 936
Floor 15, Office 1538
Floor 39, Office 3926
Floor 27, Office 2718
Floor 7, Office 737
Floor 16, Office 1626
Floor 26, Office 2621
Floor 33, Office 3318
Floor 32, Office 3224
Floor 8, Office 827
Floor 29, Office 2908
Floor 3, Office 337
Floor 21, Office 2116
Floor 23, Office 2305
Floor 27, Office 2728
Floor 21, Office 2132
Floor 27, Office 2731
Floor 41, Office 4113
Floor 30, Office 3004
Floor 18, Office 1806
Floor 34, Office 3420
Floor 11, Office 1111
Floor 31, Office 3127
Floor 38, Office 3831
Floor 24, Office 2439
Floor 11, Office 1124
Floor 15, Office 1530
Floor 12, Office 1208
Floor 36, Office 3606
Floor 31, Office 3119
Temp. (deg Celsius)
Time
hr

In which Ned learns about Projects


Weird data! - Message (HTML)
Send
To...
Joe;
Cc...
Subject
Weird data!
Hi Joe:
Run the attached file.
plot_therm_data.mlx
Ned.

SpatCo Thermostats

This data is a mess. What can I do?

```
load therm_data.mat
plot_therm_data(t_cmd, t_measured)

```

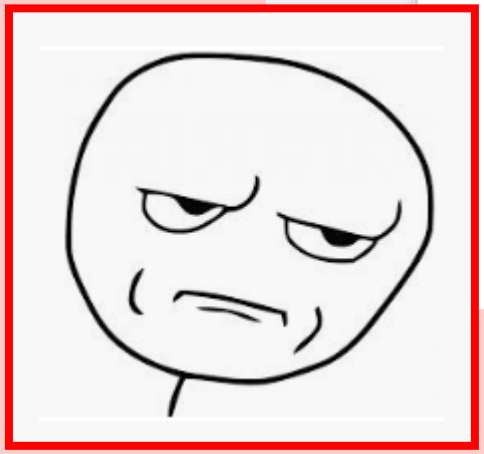
SpatCo Thermostats

This data is a mess. What can I do?

```
1  load therm_data.mat
```

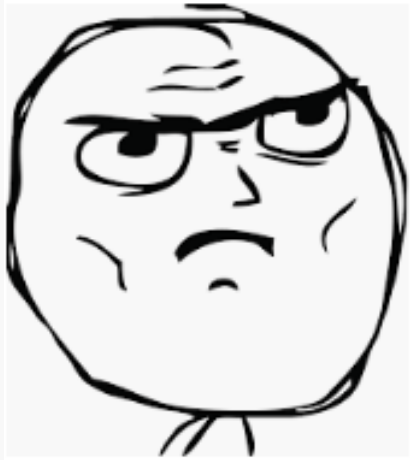
```
Error using load
Unable to read file 'therm_data.mat'. No such file.
```

```
plot_therm_data(t_cmd, t_measured)
```



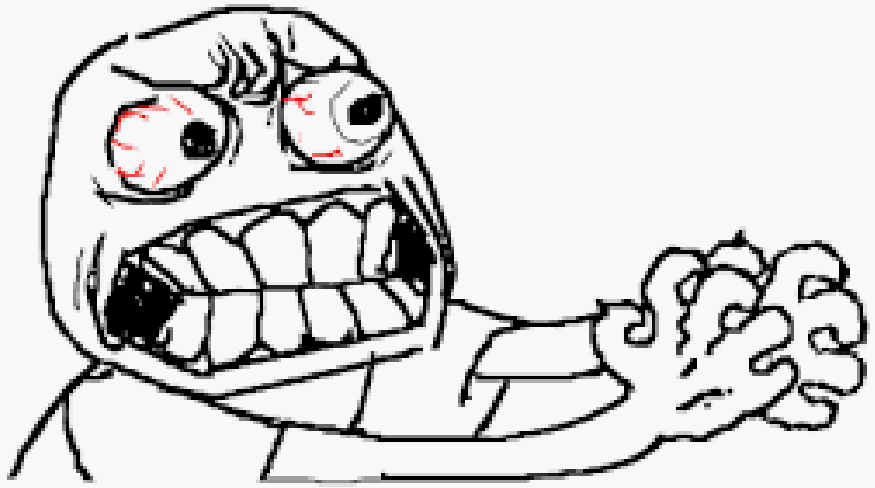
```
21  t = simout.yout{1}.Values.Time;
22  y = simout.yout{1}.Values.Data;
23
24  % Make timetables
25  t_measured = timetable(hours(t),y);
26  t_measured = retime(t_measured,newTime,'linear'
27  t_cmd = retime(t_cmd,newTime,'linear');
28
29  lot_therm_data(t_cmd, t_measured);
```

```
nrecognized function or variable
plot_therm_data'.
```

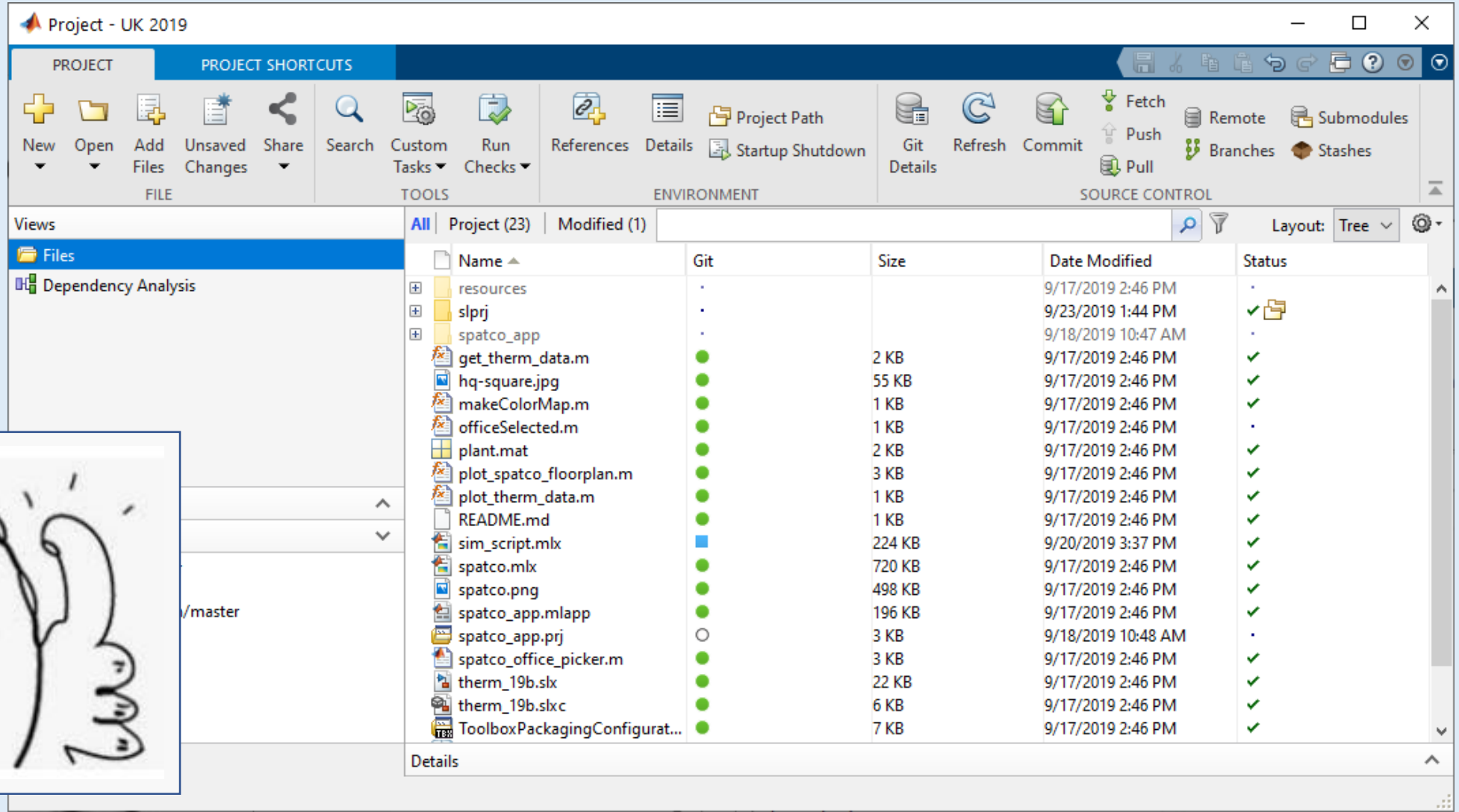


```
% Make timetables
t_measured = timetable(hours(t),y);
t_measured = retime(t_measured,newTime,'linear'
t_cmd = retime(t_cmd,newTime,'linear');

plot_therm_data(t_cmd, t_measured);
```

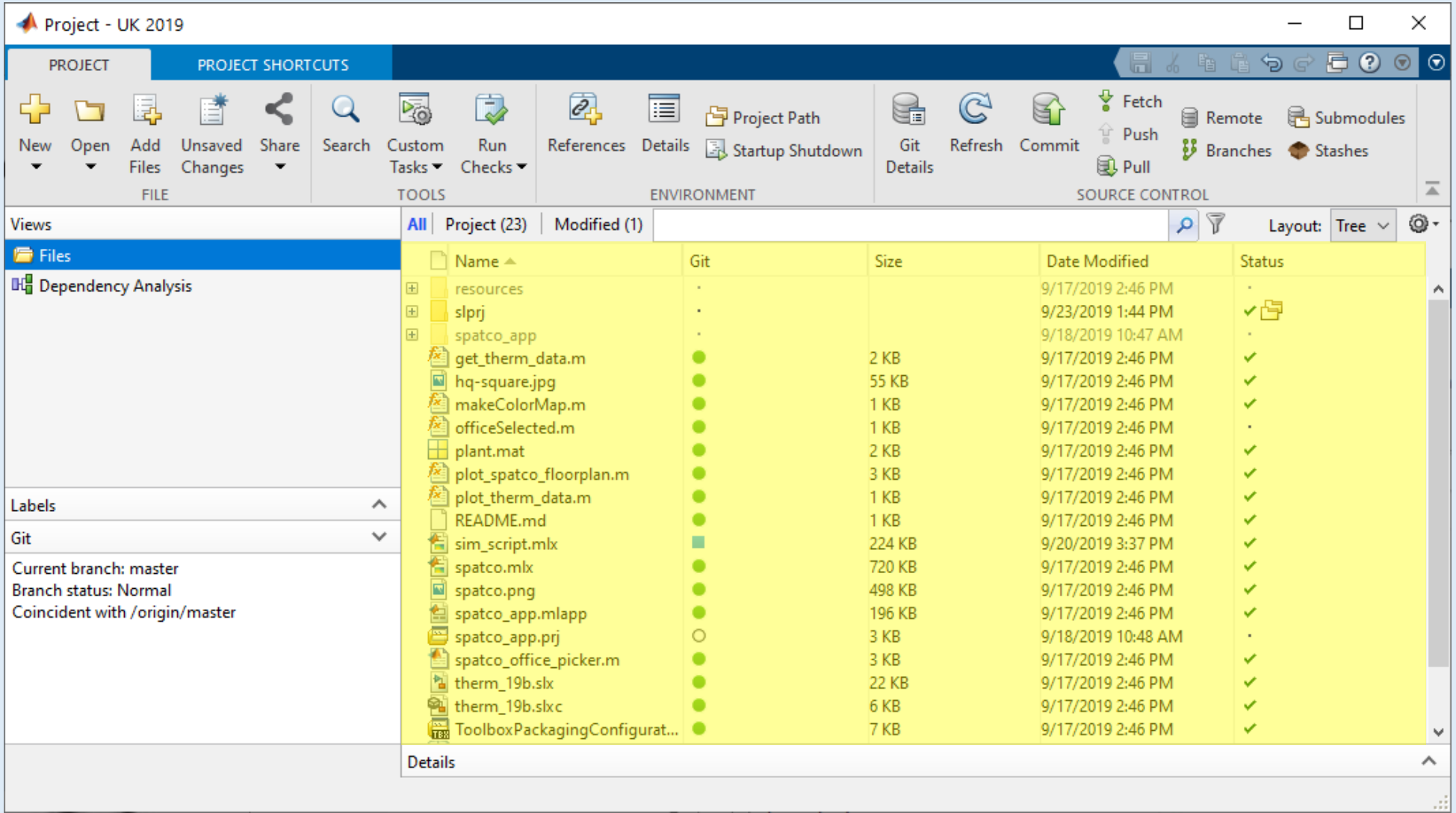
```
ugh input arguments.

n sim_script>plot_therm_data (line 47)
t(t_measured.Time,t_measured.y,'Marker','x',
```



MATLAB Projects



MATLAB Projects



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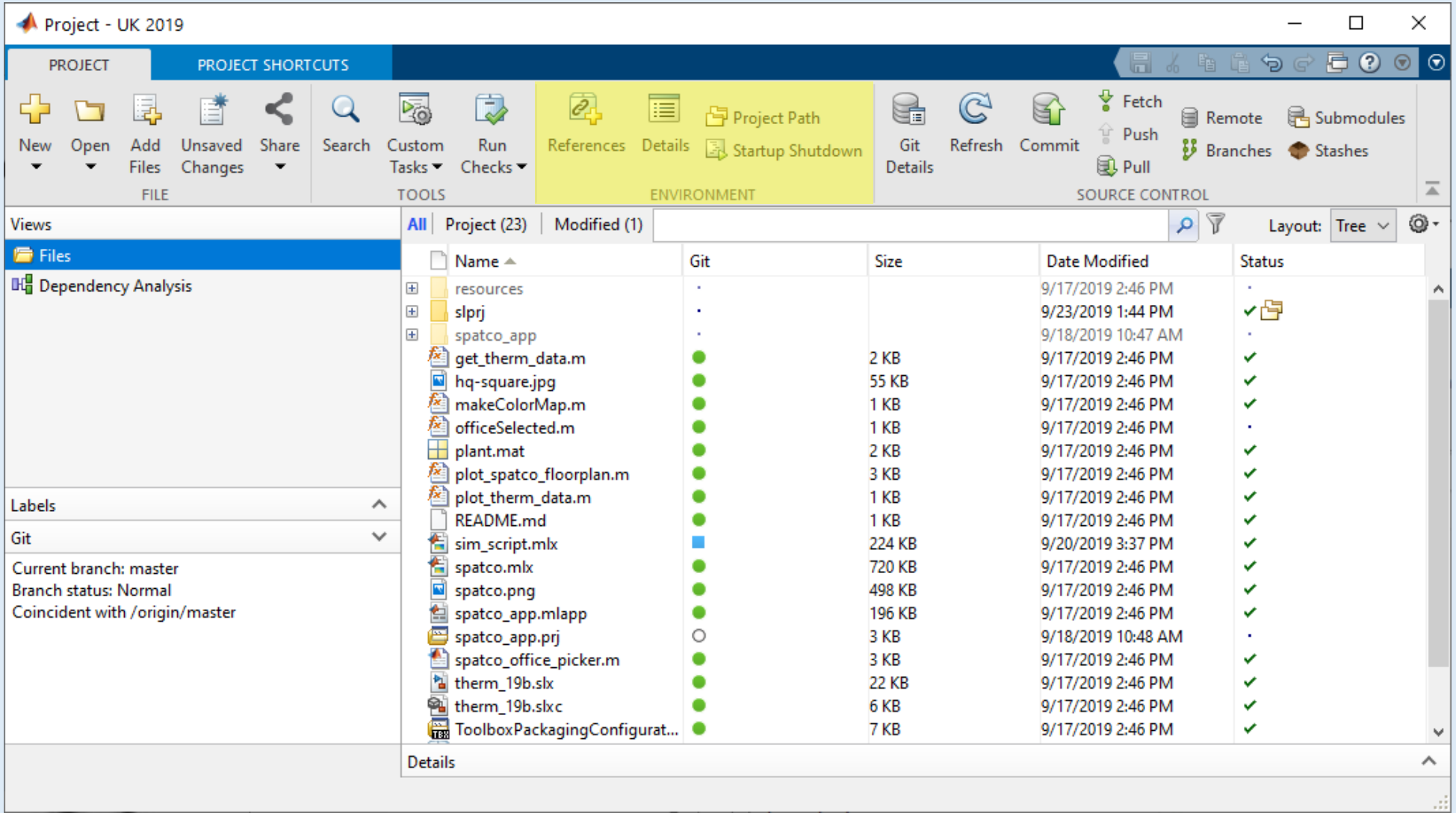

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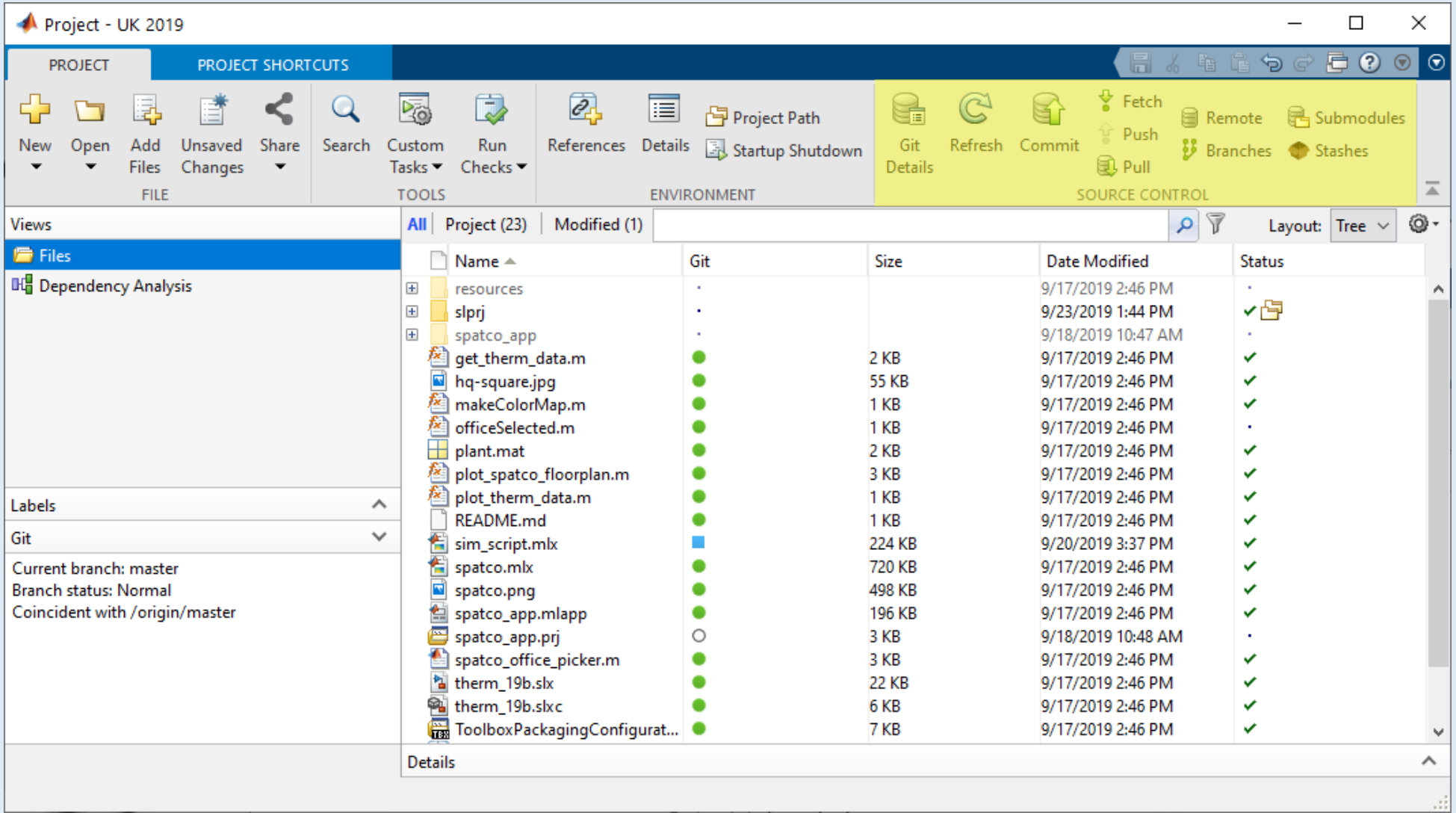

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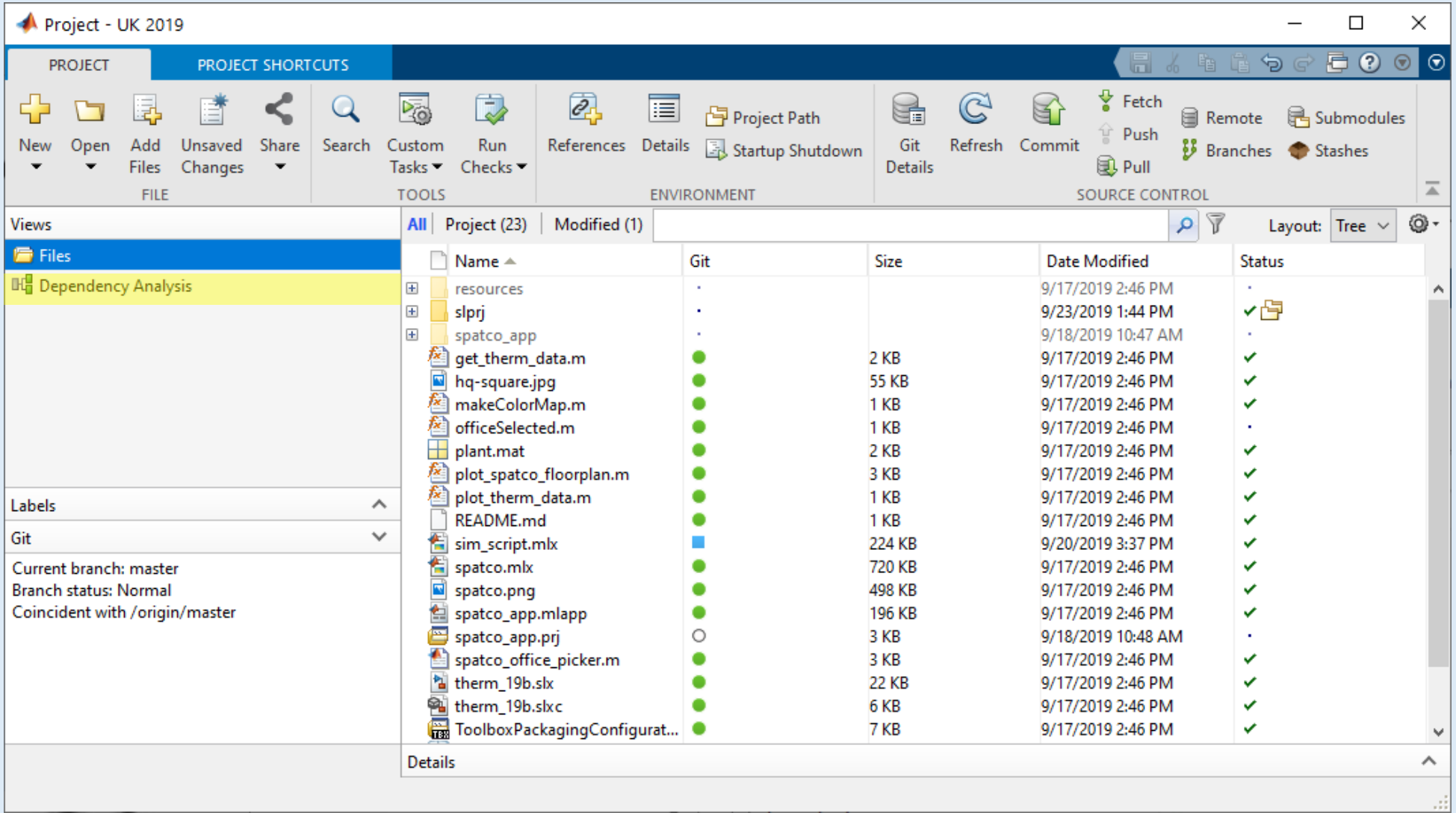


MATLAB R2019b

PLOTS APPS SHORTCUTS LIVE EDITOR INSERT VIEW

New Script | New Live Script | New | Open | Find Files | Compare — FILE

Import Data | Save Workspace | New Variable | Open Variable | Clear Workspace — VARIABLE

Favorites | Analyze Code | Run and Time | Clear Commar — CODE

\\mathworks\devel ▸ sandbox ▸ gulley ▸ share ▸

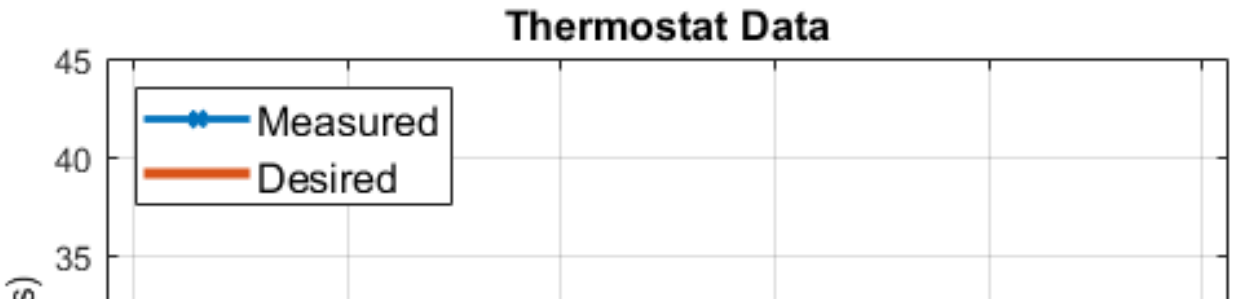
Live Editor - \\mathworks\devel\sandbox\gulley\share\uk2019\sim_script.mlx

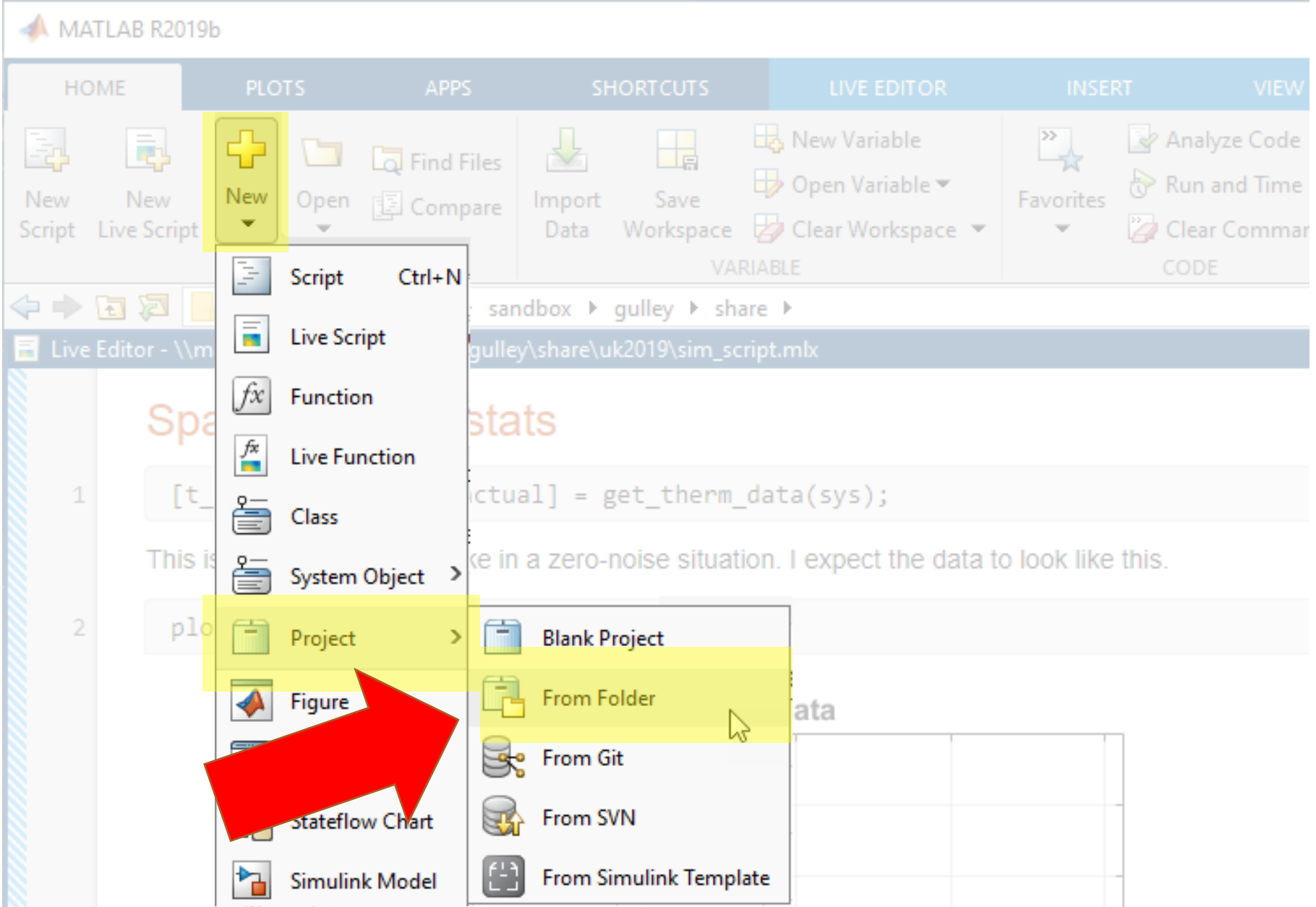
SpatCo Thermostats

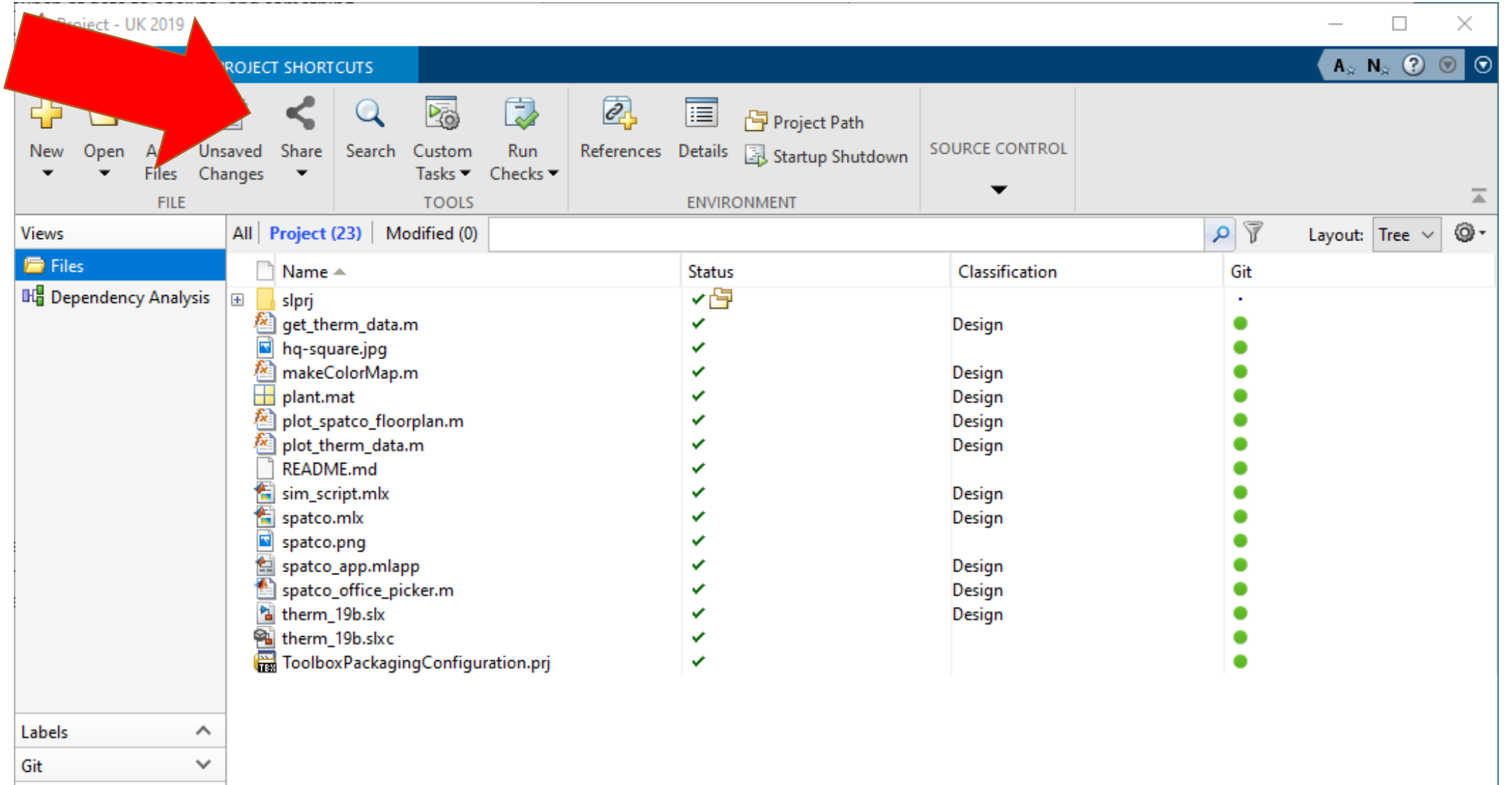
```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

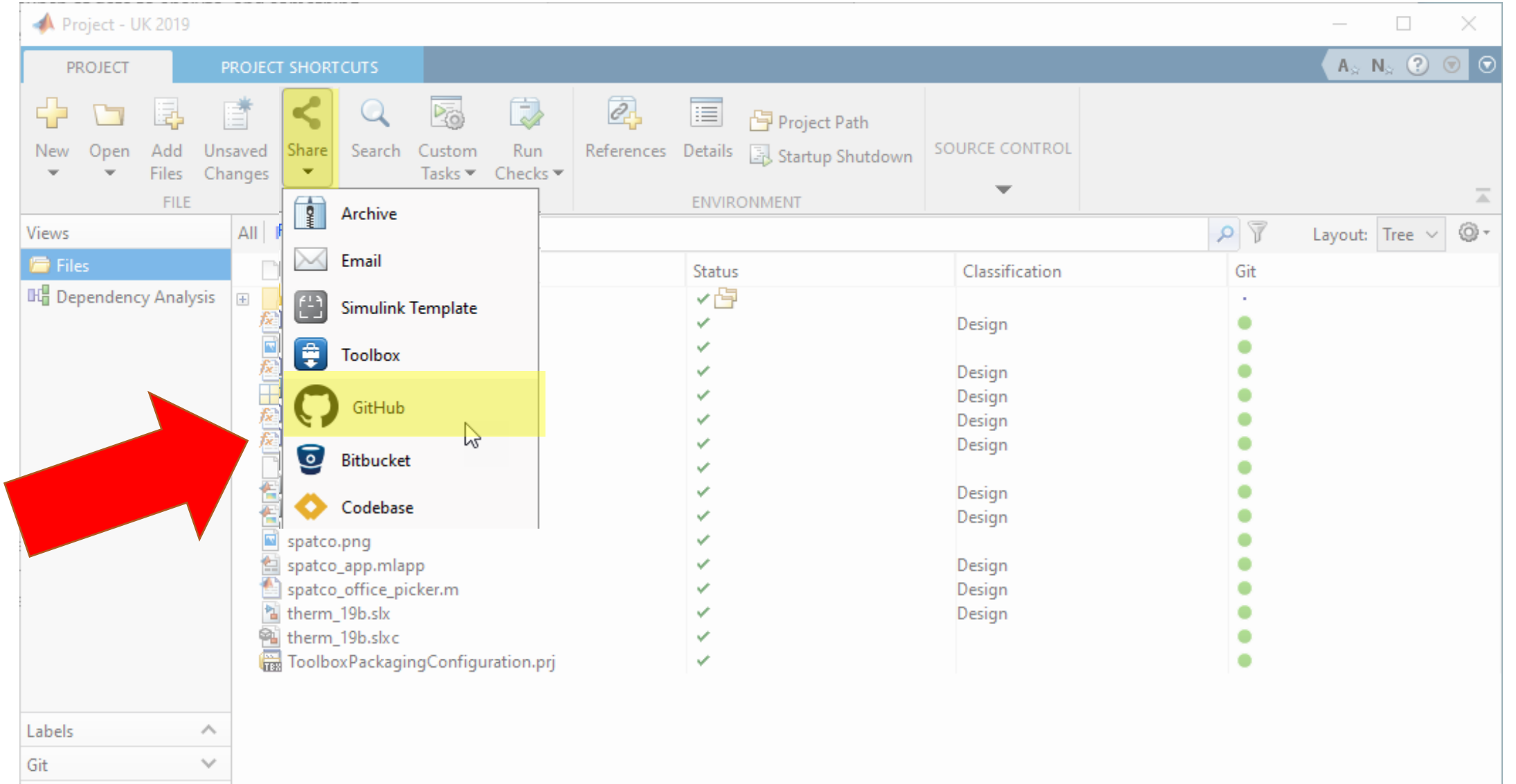
This is what it should look like in a zero-noise situation. I expect the data to look like this.

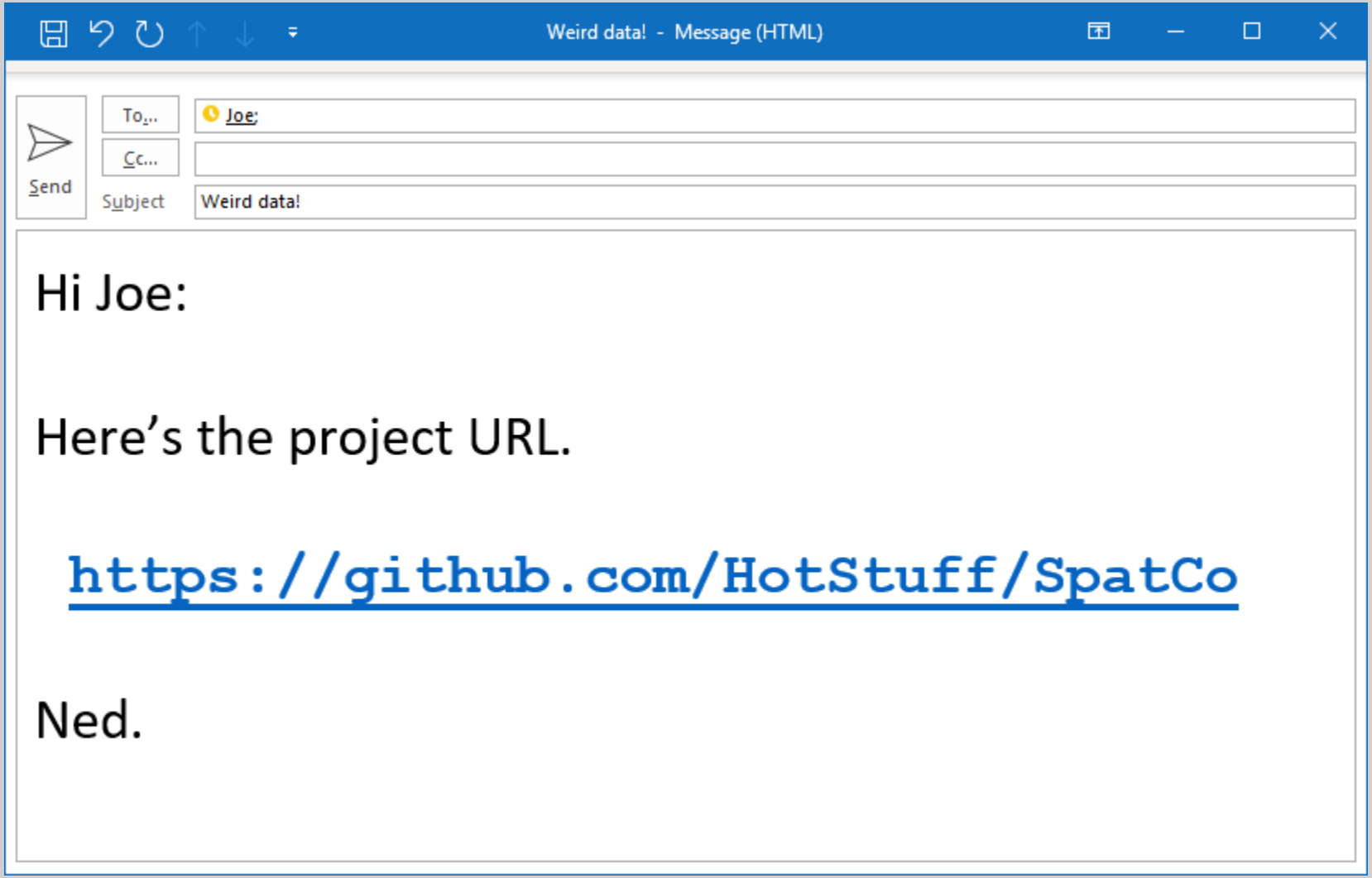
```
2  plot_therm_data(t_cmd, t_actual)
```



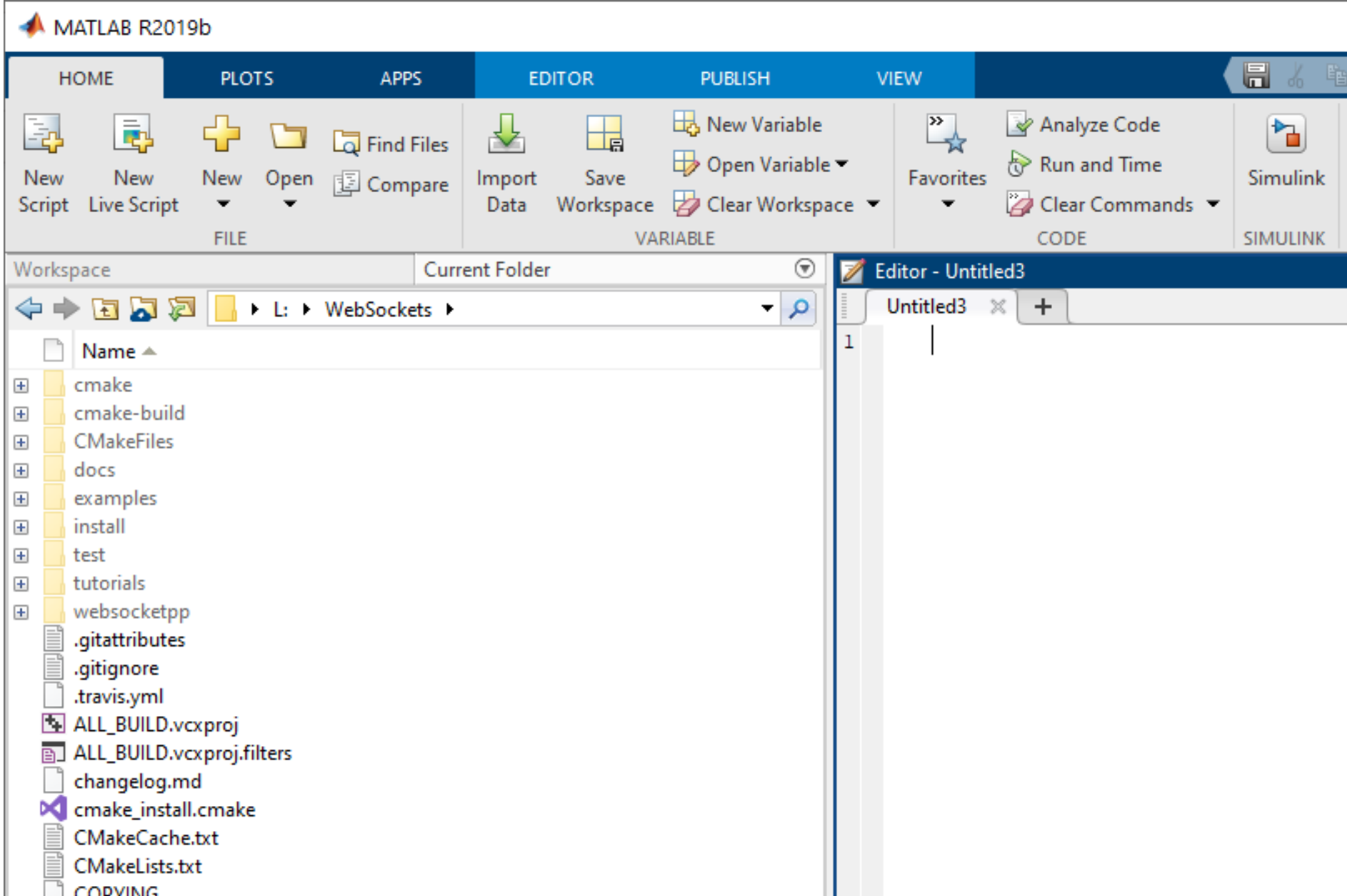

MATLAB R2019b
HOME
PLOTS
APPS
SHORTCUTS
LIVE EDITOR
INSERT
VIEW
New Script
New Live Script
New
Open
Find Files
Compare
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
VARIABLE
Favorites
Analyze Code
Run and Time
Clear Commar
CODE
sandbox
gulley
share
Live Editor - \\m
gulley\share\uk2019\sim_script.mlx
Spa
stats
1
[t_
ctual] = get_therm_data(sys);
This is
ke in a zero-noise situation. I expect the data to look like this.
2
plo
ata
Script Ctrl+N
Live Script
Function
Live Function
Class
System Object
Project
Figure
Stateflow Chart
Simulink Model
Blank Project
From Folder
From Git
From SVN
From Simulink Template

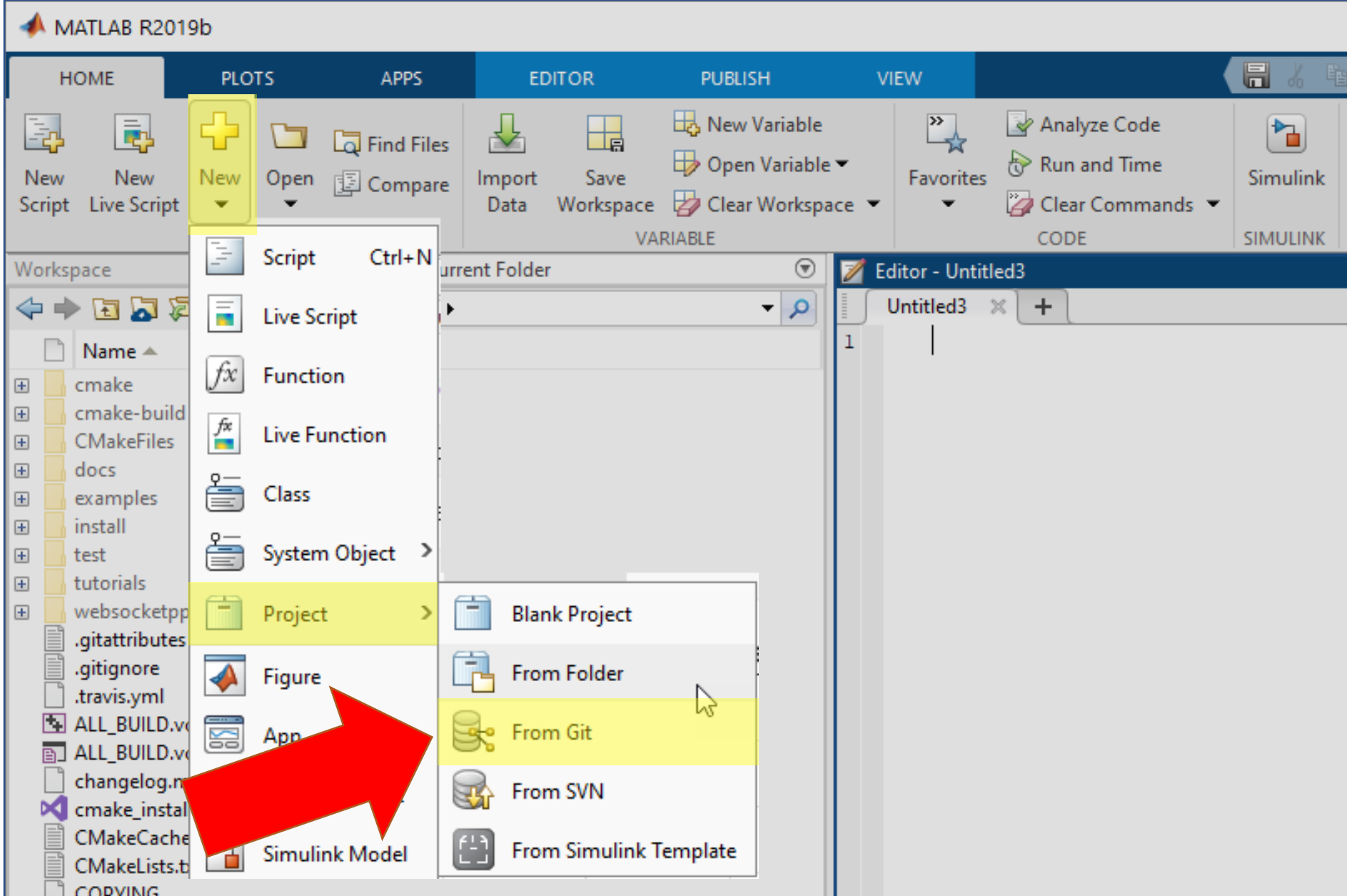

Project - UK 2019
PROJECT SHORTCUTS
New
Open
Files
Unsaved Changes
Share
Search
Custom Tasks
Run Checks
References
Details
Project Path
Startup Shutdown
SOURCE CONTROL
FILE
TOOLS
ENVIRONMENT
Views
Files
Dependency Analysis
All
Project (23)
Modified (0)
Layout:
Tree
Name
Status
Classification
Git
slprj
get_therm_data.m
Design
hq-square.jpg
makeColorMap.m
Design
plant.mat
Design
plot_spatco_floorplan.m
Design
plot_therm_data.m
Design
README.md
sim_script.mlx
Design
spatco.mlx
Design
spatco.png
spatco_app.mlapp
Design
spatco_office_picker.m
Design
therm_19b.slx
Design
therm_19b.slxc
ToolboxPackagingConfiguration.prj
Labels
Git


Project - UK 2019
PROJECT
PROJECT SHORTCUTS
New
Open
Add Files
Unsaved Changes
Share
Search
Custom Tasks
Run Checks
References
Details
Project Path
Startup Shutdown
SOURCE CONTROL
FILE
ENVIRONMENT
Archive
Email
Simulink Template
Toolbox
GitHub
Bitbucket
Codebase
Views
Files
Dependency Analysis
All
Layout:
Tree
Status
Classification
Git
Design
spatco.png
spatco_app.mlapp
spatco_office_picker.m
therm_19b.slx
therm_19b.slxc
ToolboxPackagingConfiguration.prj
Labels
Git


Weird data! - Message (HTML)
Send
To...
Joe;
Cc...
Subject
Weird data!
Hi Joe:
Here's the project URL.
https://github.com/HotStuff/SpatCo
Ned.

In which Joe receives a Project from Ned


MATLAB R2019b
HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
New Script
New Live Script
New
Open
Find Files
Compare
FILE
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
VARIABLE
Favorites
Analyze Code
Run and Time
Clear Commands
CODE
Simulink
SIMULINK
Workspace
Current Folder
L: ▸ WebSockets ▸
Name
cmake
cmake-build
CMakeFiles
docs
examples
install
test
tutorials
websocketpp
.gitattributes
.gitignore
.travis.yml
ALL_BUILD.vcxproj
ALL_BUILD.vcxproj.filters
changelog.md
cmake_install.cmake
CMakeCache.txt
CMakeLists.txt
Editor - Untitled3
Untitled3
1


MATLAB R2019b
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websocketpp
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.gitignore
.travis.yml
ALL_BUILD.v
ALL_BUILD.v
changelog.n
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Function
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Figure
App
Simulink Model
Blank Project
From Folder
From Git
From SVN
From Simulink Template
Editor - Untitled3
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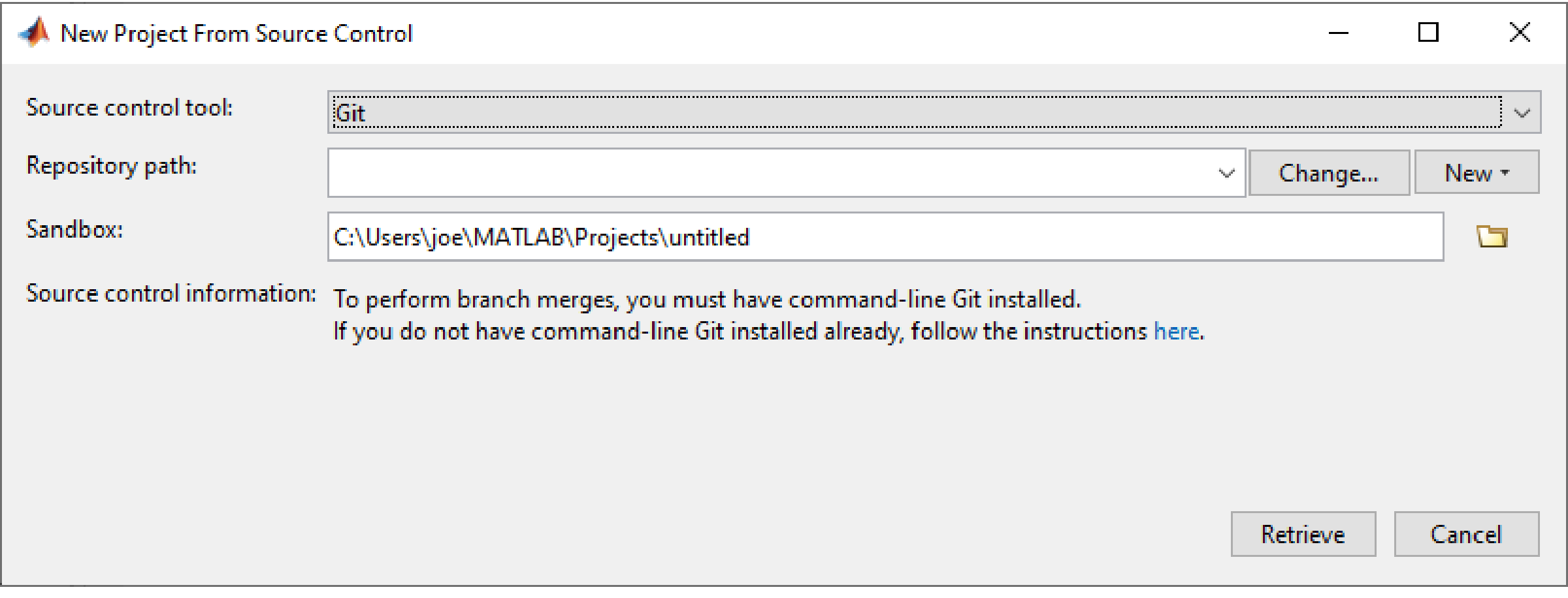
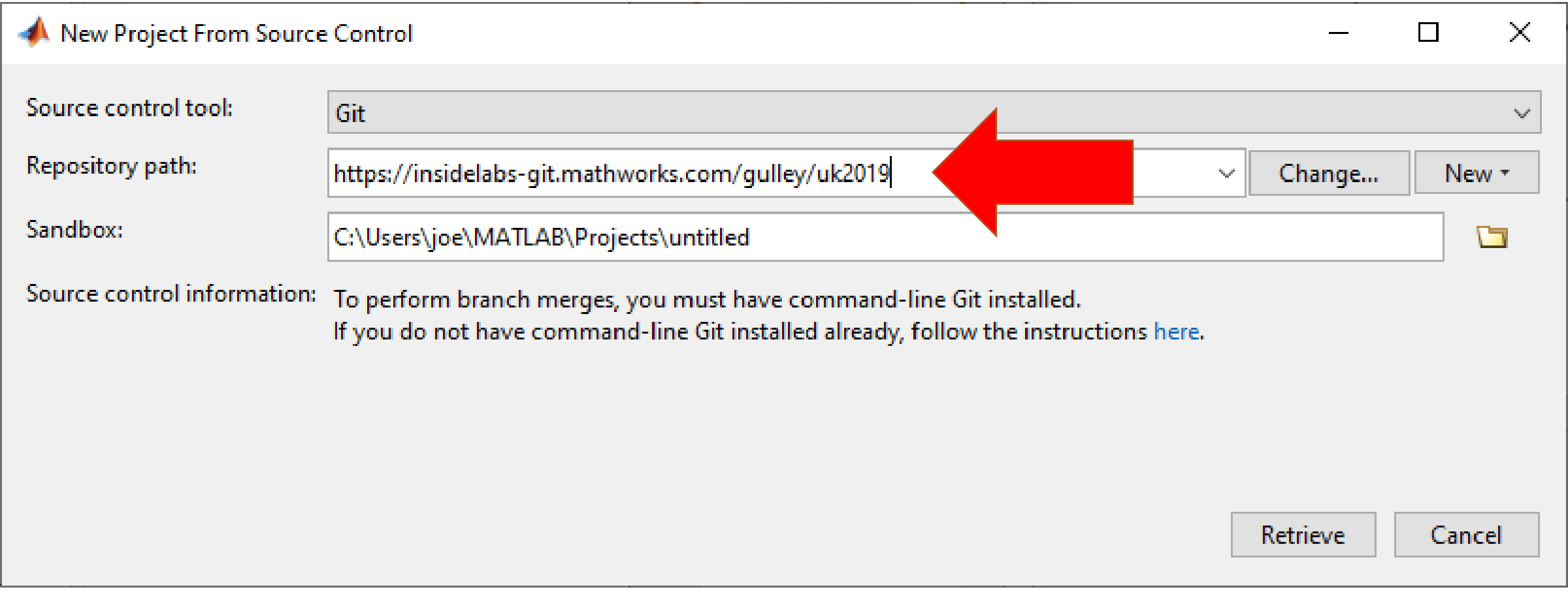

New Project From Source Control
Source control tool:
Git
Repository path:
Change...
New
Sandbox:
C:\Users\joe\MATLAB\Projects\untitled
Source control information:
To perform branch merges, you must have command-line Git installed.
If you do not have command-line Git installed already, follow the instructions here.
Retrieve
Cancel


New Project From Source Control
Source control tool:
Git
Repository path:
https://insidelabs-git.mathworks.com/gulley/uk2019
Change...
New
Sandbox:
C:\Users\joe\MATLAB\Projects\untitled
Source control information:
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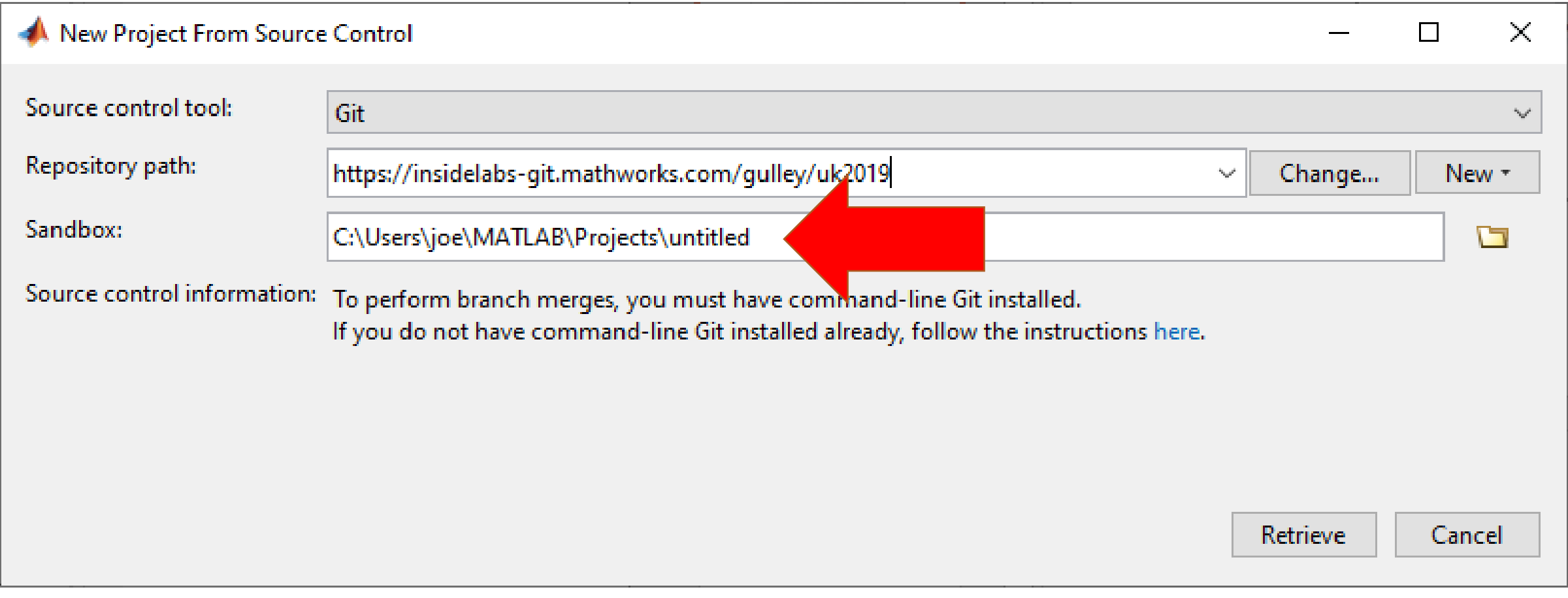
New Project From Source Control
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Git
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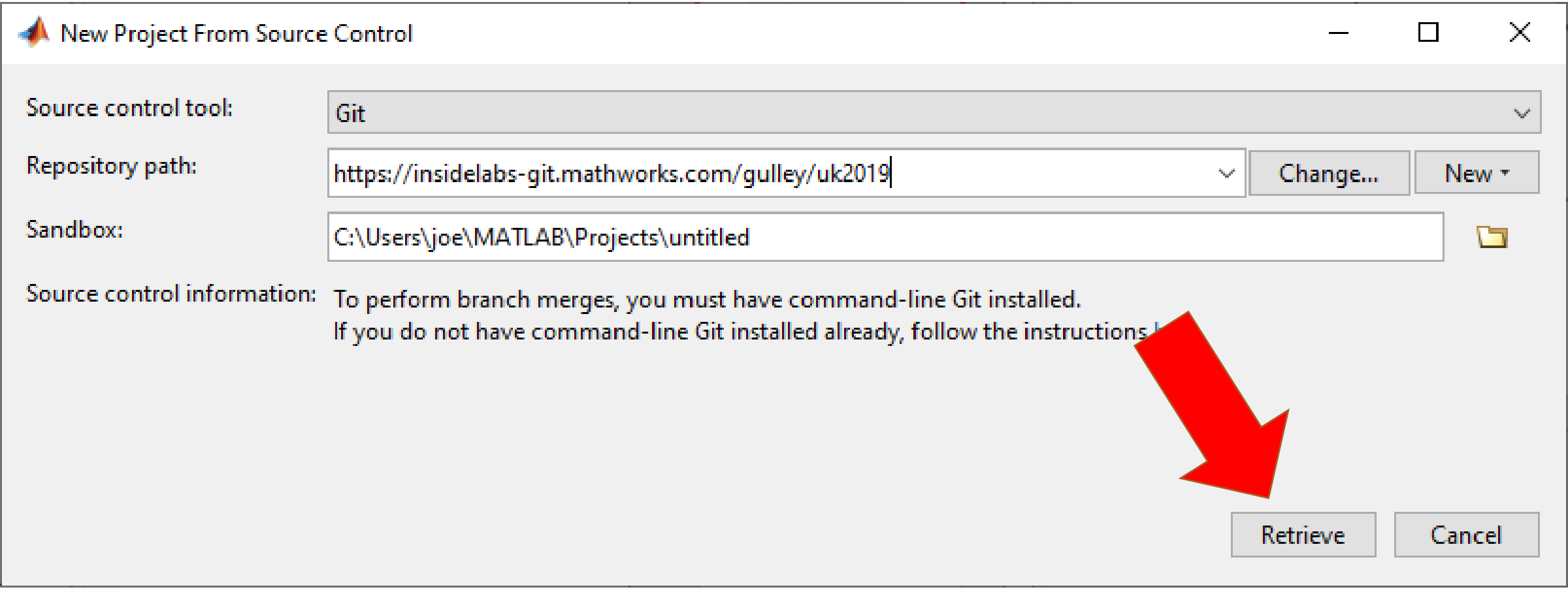
New Project From Source Control
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Retrieve
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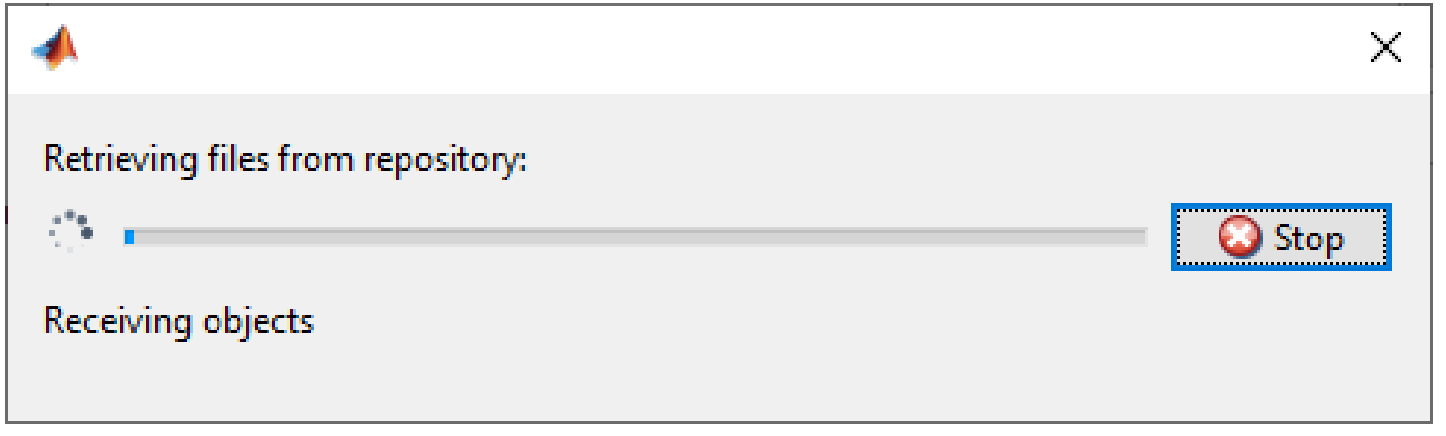
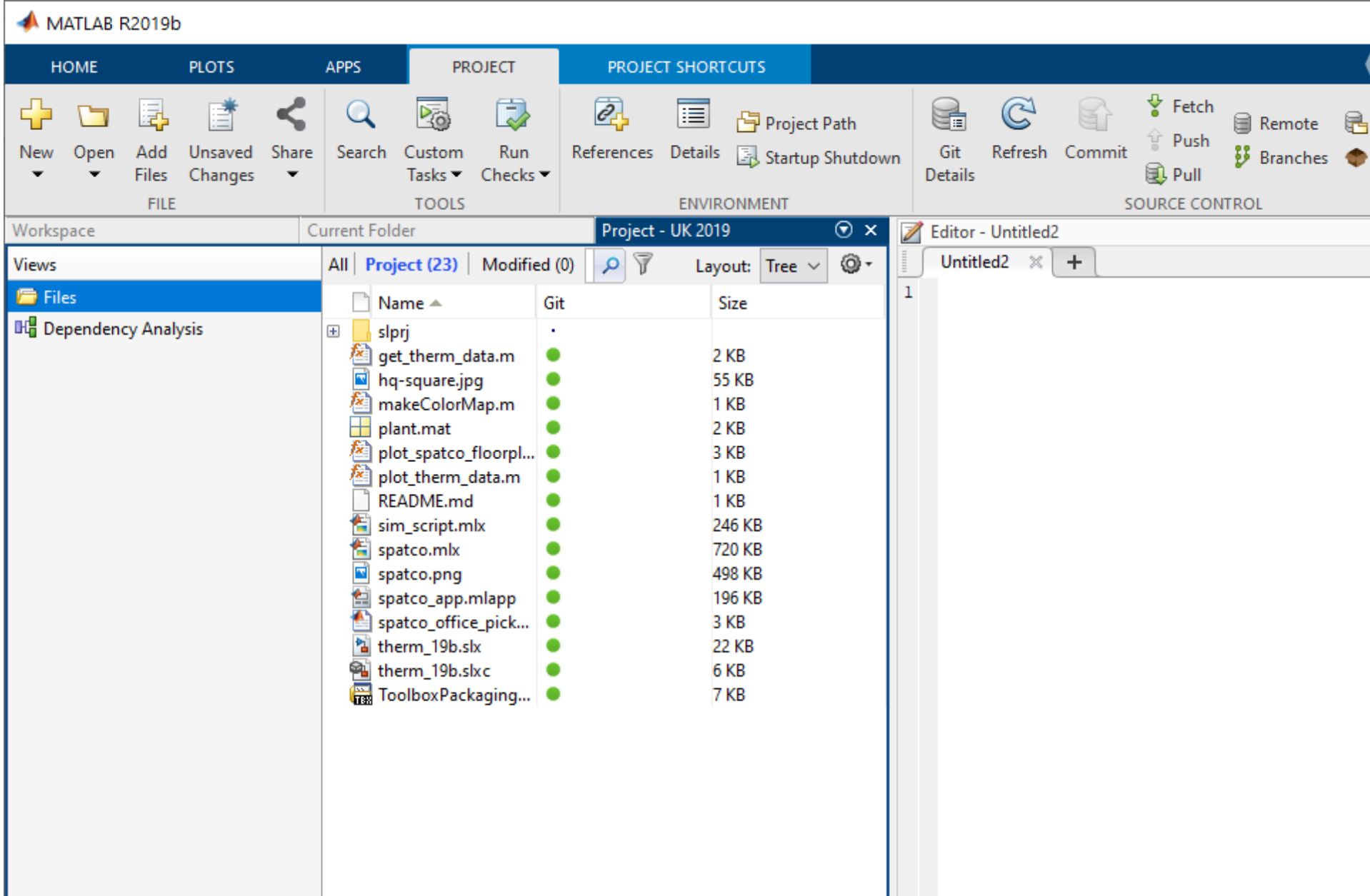

Retrieving files from repository:
Stop
Receiving objects


MATLAB R2019b
HOME
PLOTS
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PROJECT
PROJECT SHORTCUTS
New
Open
Add Files
Unsaved Changes
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Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
SOURCE CONTROL
Workspace
Current Folder
Project - UK 2019
Editor - Untitled2
Untitled2
Views
Files
Dependency Analysis
All
Project (23)
Modified (0)
Layout:
Tree
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Size
slprj
get_therm_data.m 2 KB
hq-square.jpg 55 KB
makeColorMap.m 1 KB
plant.mat 2 KB
plot_spatco_floorpl... 3 KB
plot_therm_data.m 1 KB
README.md 1 KB
sim_script.mlx 246 KB
spatco.mlx 720 KB
spatco.png 498 KB
spatco_app.mlapp 196 KB
spatco_office_pick... 3 KB
therm_19b.slx 22 KB
therm_19b.slxc 6 KB
ToolboxPackaging... 7 KB
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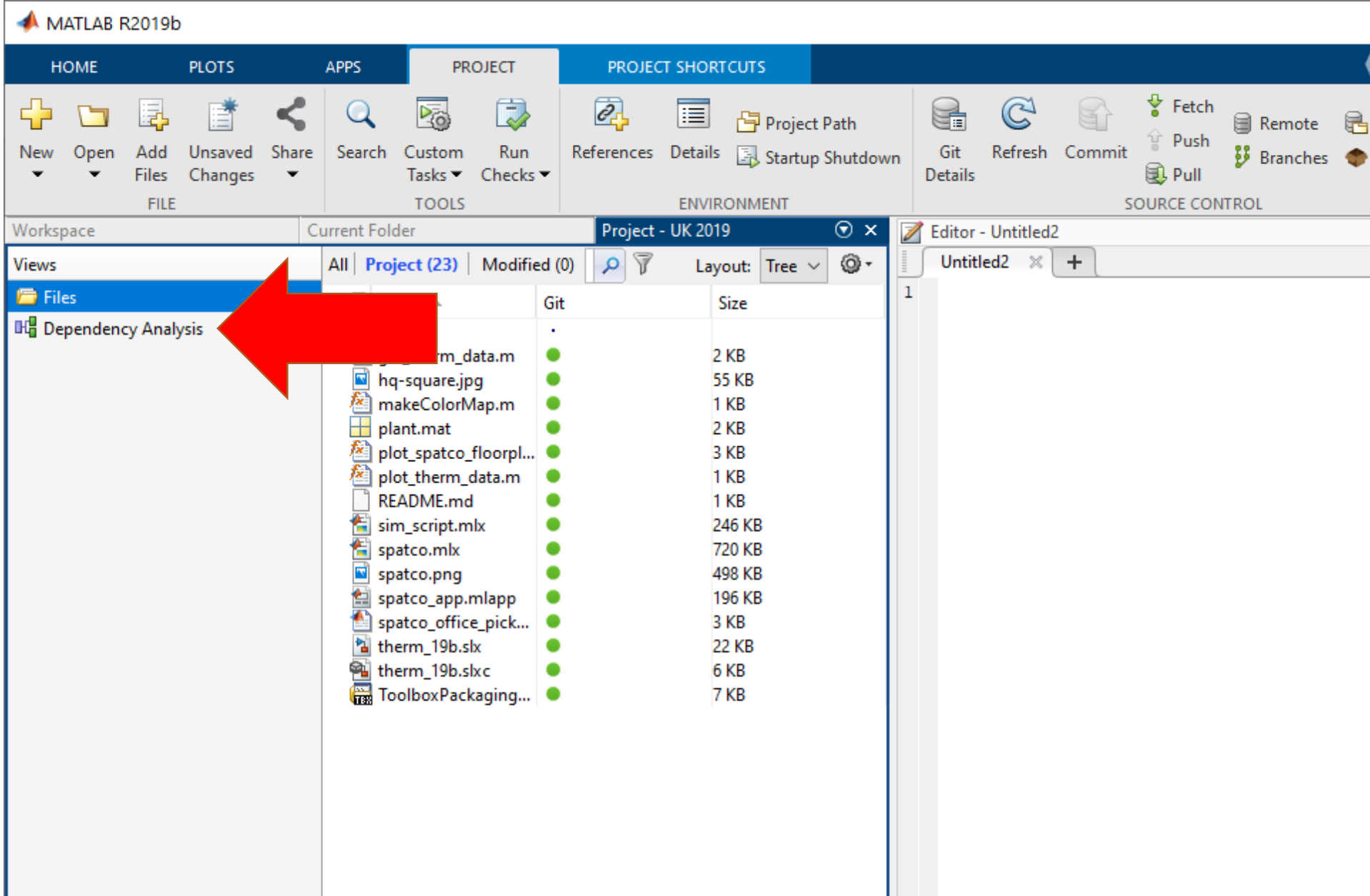
MATLAB R2019b
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TOOLS
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Details
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Project - UK 2019
Editor - Untitled2
Untitled2
Views
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Dependency Analysis
All
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Modified (0)
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hq-square.jpg
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makeColorMap.m
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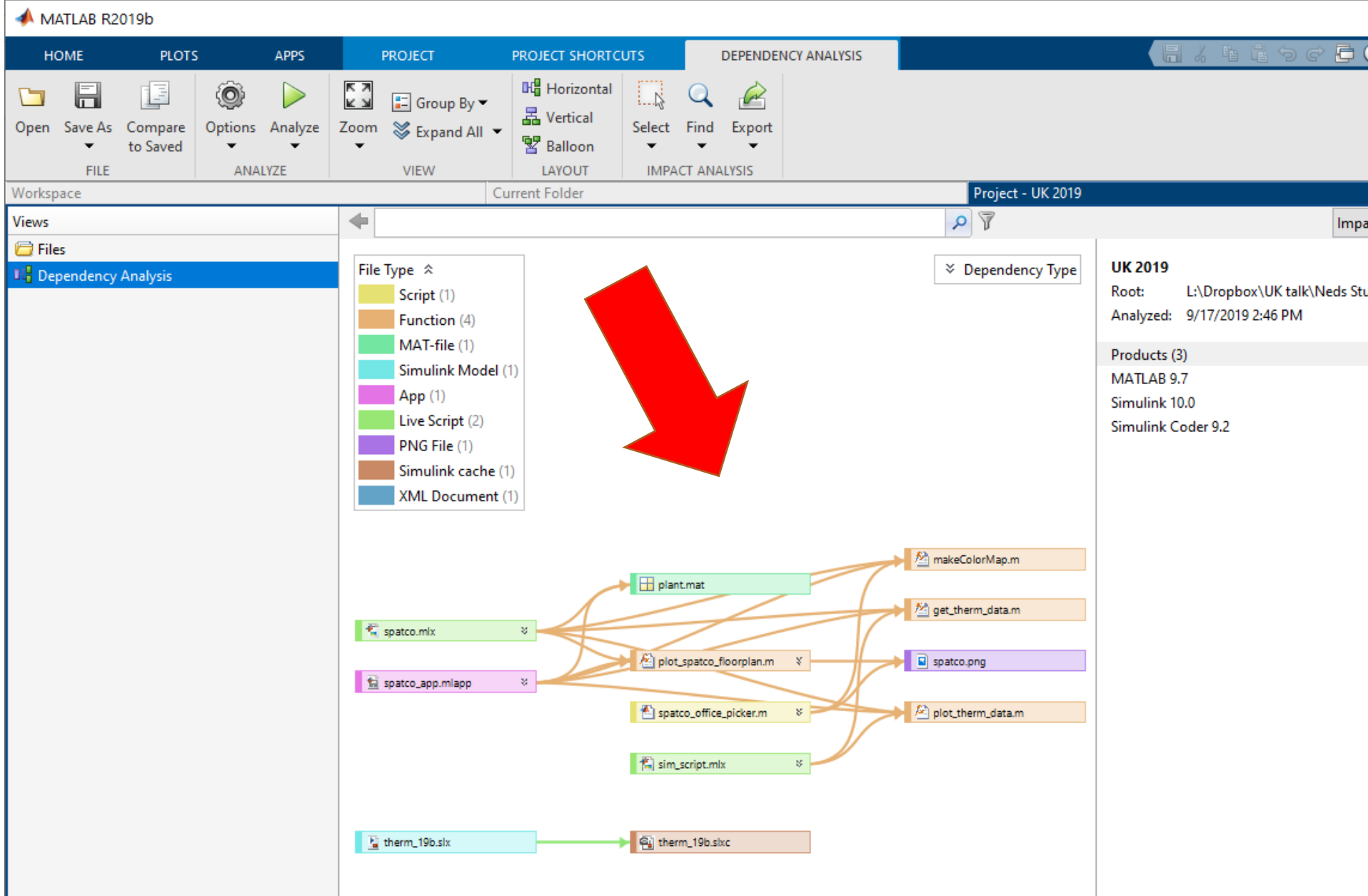
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Zoom
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Workspace
Current Folder
Project - UK 2019
Views
Files
Dependency Analysis
File Type
Script (1)
Function (4)
MAT-file (1)
Simulink Model (1)
App (1)
Live Script (2)
PNG File (1)
Simulink cache (1)
XML Document (1)
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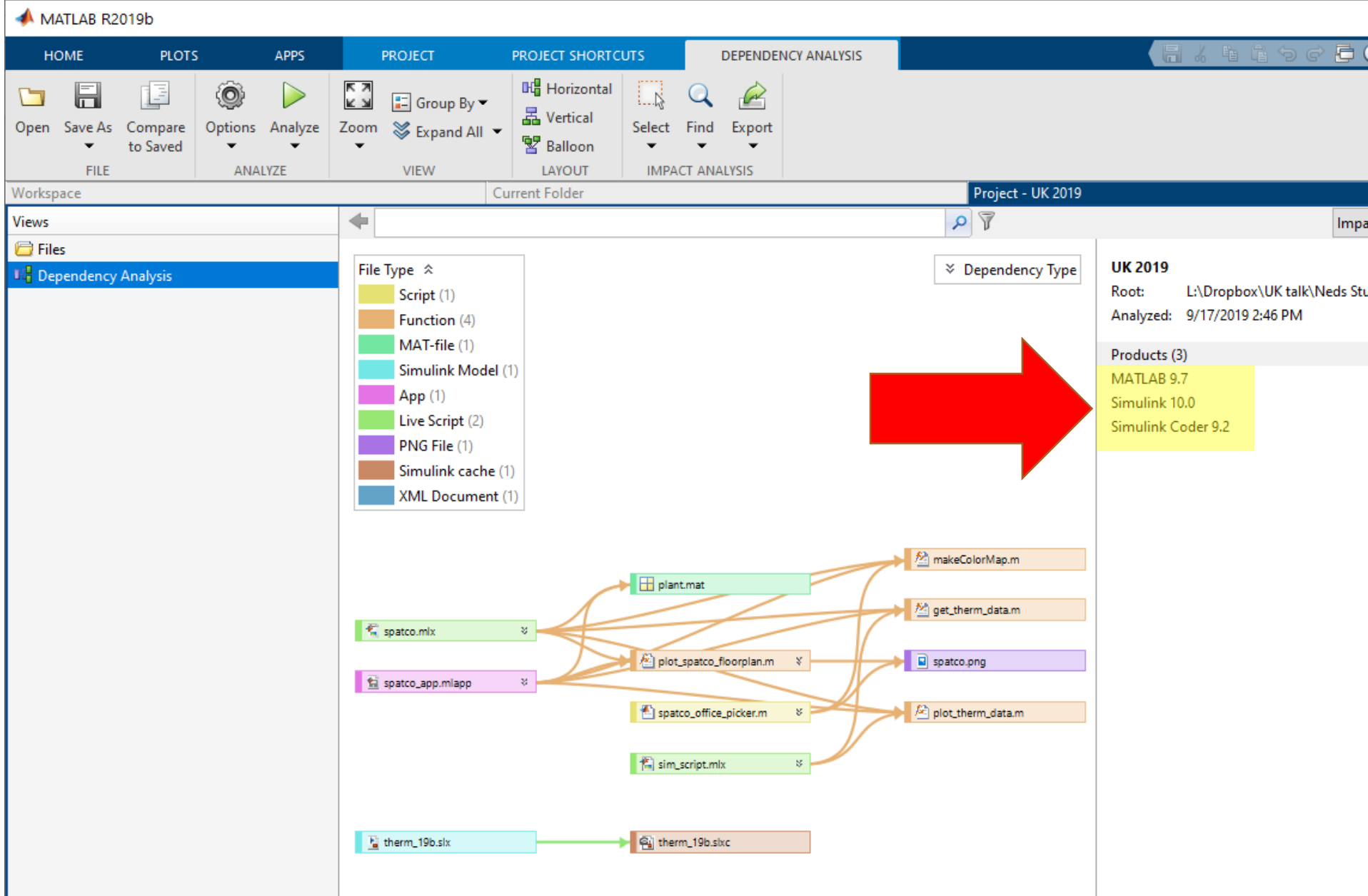
Products (3)
MATLAB 9.7
Simulink 10.0
Simulink Coder 9.2
plant.mat
spatco.mlx
spatco_app.mlapp
plot_spatco_floorplan.m
spatco_office_picker.m
sim_script.mlx
makeColorMap.m
get_therm_data.m
spatco.png
plot_therm_data.m
therm_19b.slx
therm_19b.slxc


MATLAB R2019b
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Zoom
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Horizontal
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Find
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makeColorMap.m
get_therm_data.m
spatco.png
plot_therm_data.m
therm_19b.slx
therm_19b.slxc

MATLAB R2019b

HOME | PLOTS | APPS | PROJECT | PROJECT SHORTCUTS

Search Documentation | Joe

New | Open | Add Files | Unsaved Changes | Share — FILE
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

Workspace | Current Folder | Project - UK 2019

Views
- Files
- Dependency Analysis

All | Project (23) | Modified (0) | Layout:

Name	Git	Size
slprj		
get_therm_data.m		2 KB
hq-square.jpg		55 KB
makeColorMap.m		1 KB
plant.mat		2 KB
plot_spatco_floor...		3 KB
plot_therm_data.m		1 KB
README.md		1 KB
sim_script.mlx		246 KB
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spatco.png		498 KB
spatco_app.mlapp		196 KB
spatco_office_pick...		3 KB
therm_19b.slx		22 KB
therm_19b.slxc		6 KB
ToolboxPackagin...		7 KB

Live Editor - L:\Dropbox\UK talk\Neds Stuff\sim_script.mlx

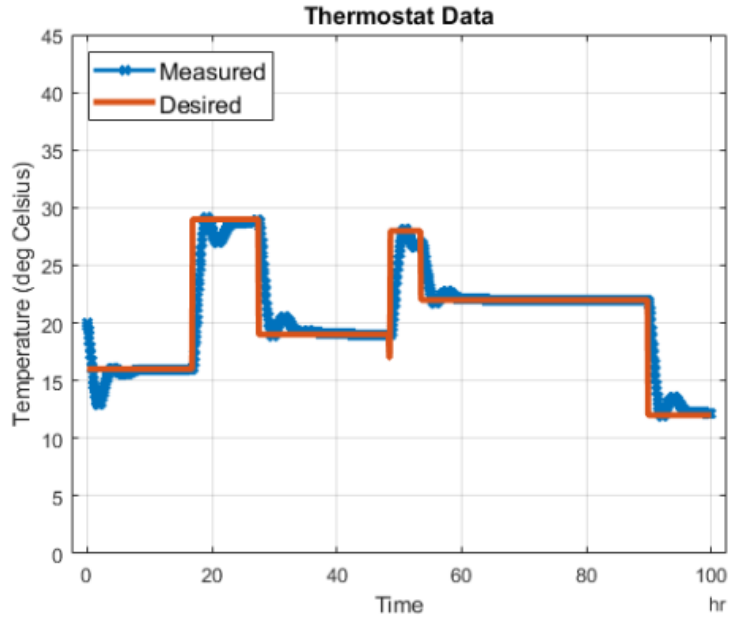
sim_script.mlx

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

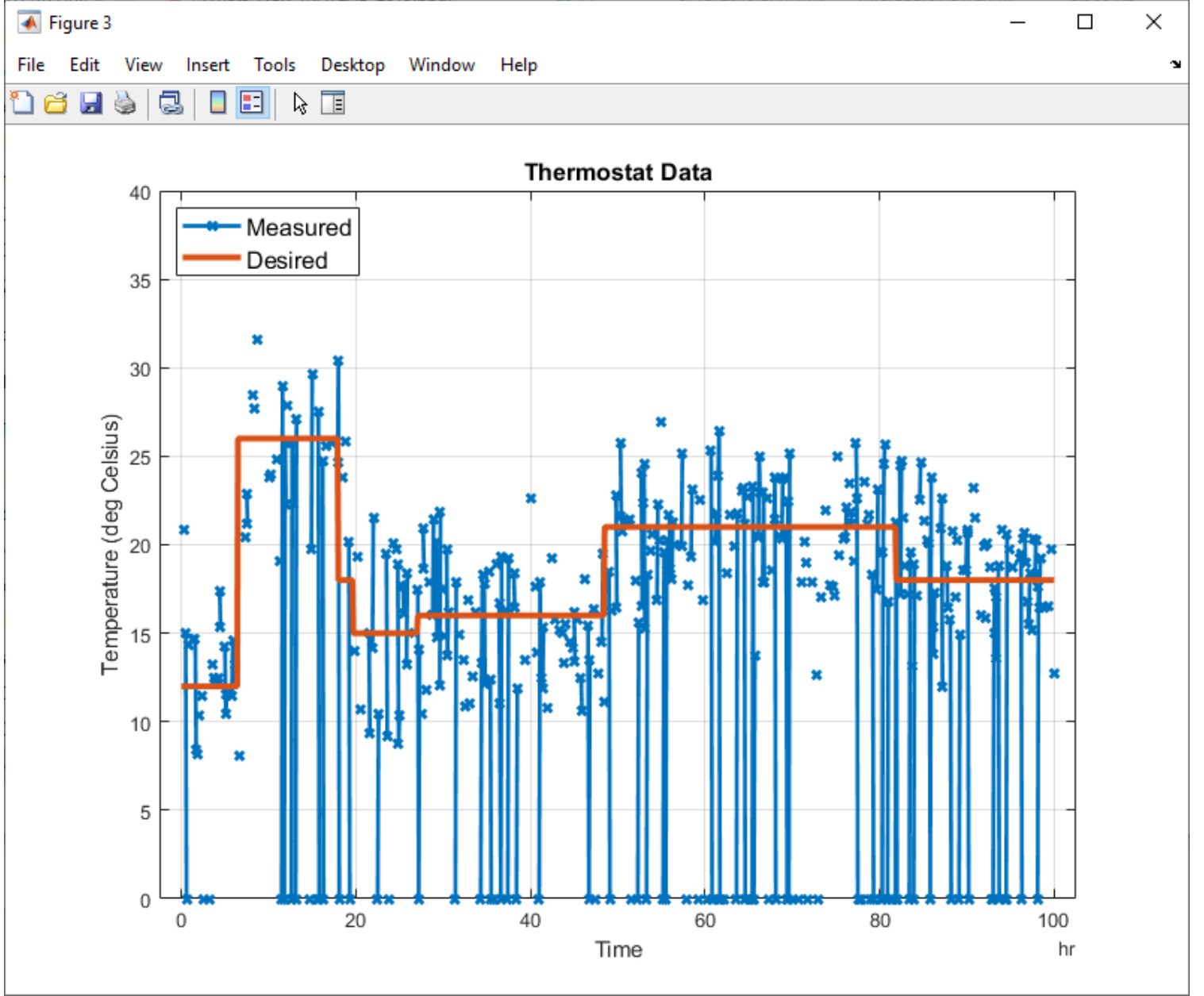
```
2  plot_therm_data(t_cmd, t_actual)
```



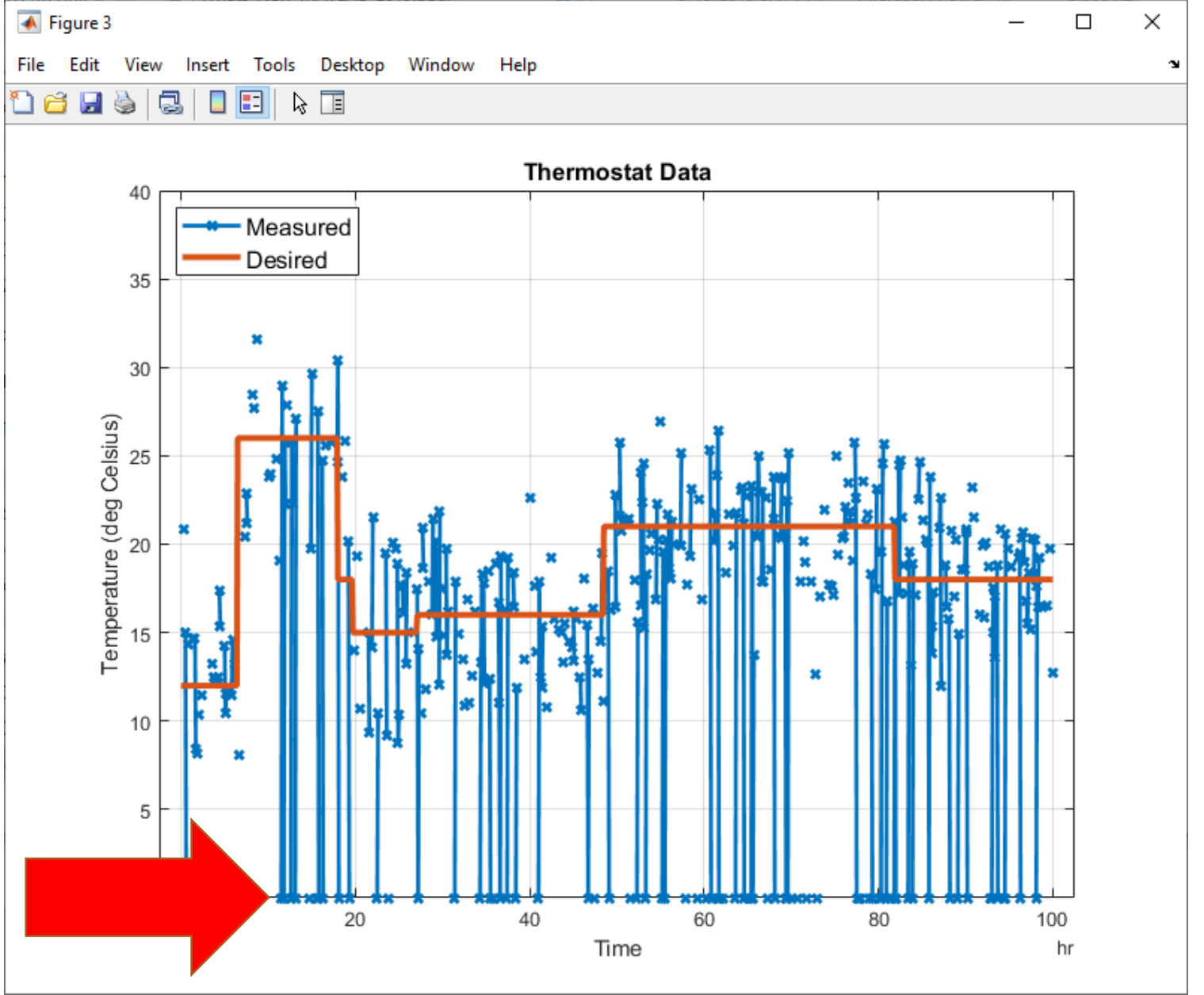
But this is what it actually looks like. Instead, it's a mess, as shown below.

In which Joe uses Live Tasks

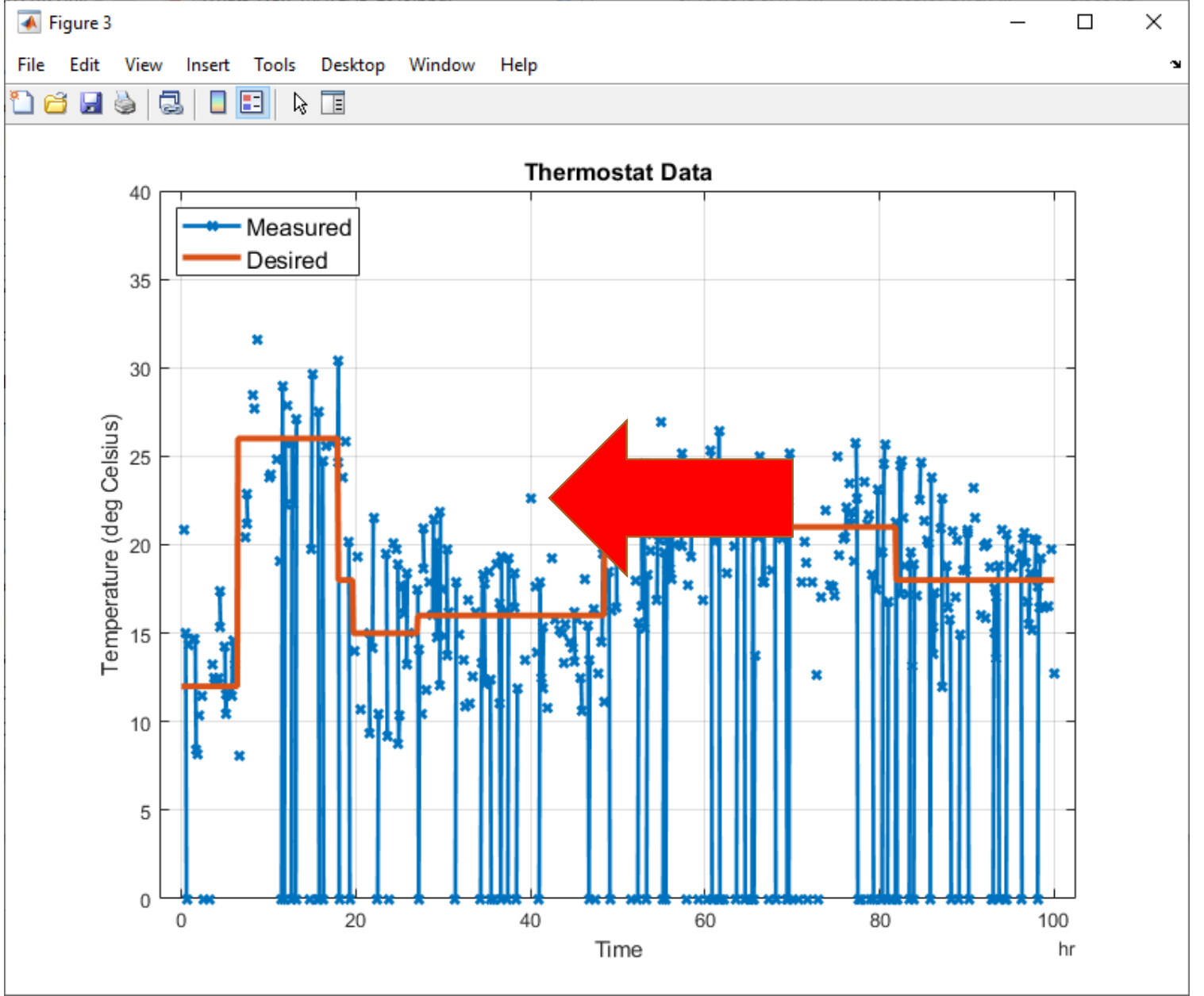
Thermostat Data (actual)



Thermostat Data (actual)

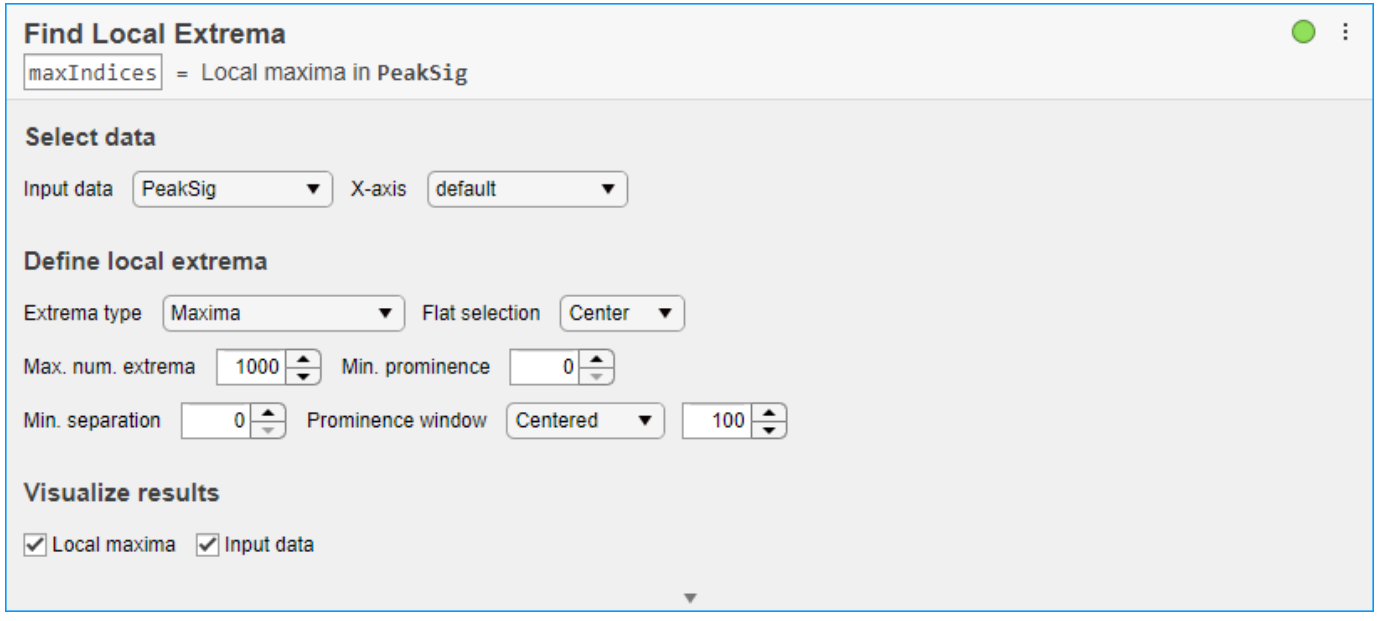


Thermostat Data (actual)

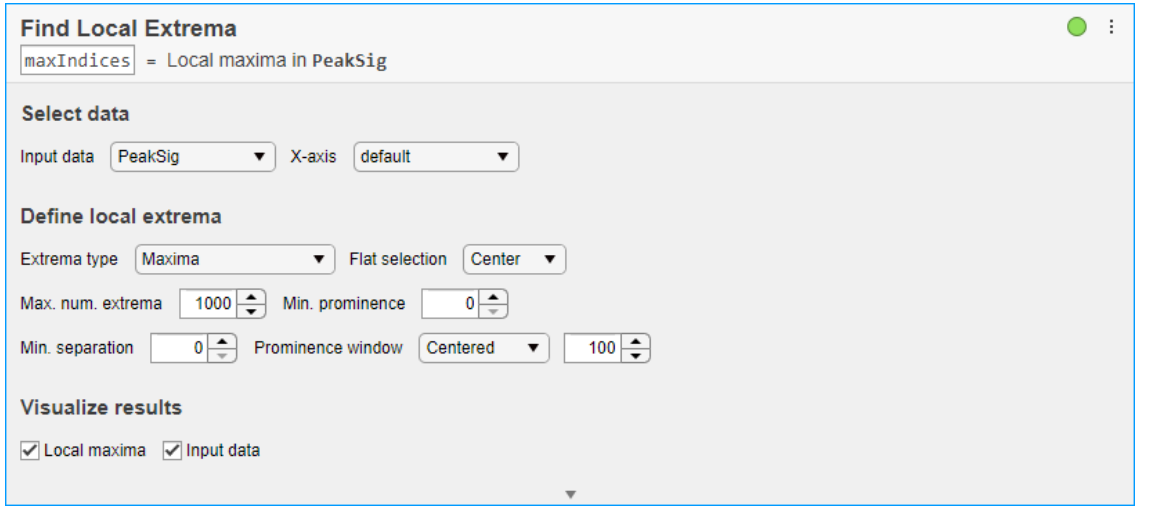


Live Tasks

Live Tasks


Find Local Extrema
maxIndices = Local maxima in PeakSig
Select data
Input data
PeakSig
X-axis
default
Define local extrema
Extrema type
Maxima
Flat selection
Center
Max. num. extrema
1000
Min. prominence
0
Min. separation
0
Prominence window
Centered
100
Visualize results
Local maxima
Input data

Live Tasks




```
% Find local maxima
maxIndices = islocalmax(PeakSig);

% Visualize results
clf
plot(PeakSig,'Color',[109 185 226]/255,'DisplayName','Input data')
hold on

% Plot local maxima
plot(find(maxIndices),PeakSig(maxIndices),'^','Color',[217 83 25]/255,...
    'MarkerFaceColor',[217 83 25]/255,'DisplayName','Local maxima')
title(['Number of extrema: ' num2str(nnz(maxIndices))])
hold off
legend
```

```
function [t_cmd,t_measured,t_actual] = get_therm_data(sys)

    % Set up the simulation

    tFinal = 100;

    simin = Simulink.SimulationInput('therm_19b');
    simin = simin.setModelParameter('StartTime','0','StopTime',num2str(tFinal));
    %     simin = simin.setModelParameter('therm_19b\StateSpace\A',sys.A)

    % Pick some random times to change the commanded temperature

    t = sort(tFinal*rand(10,1));
    t(1) = 0;
    cmd = randi(20,size(t)) + 10;
    t_cmd = timetable(hours(t),cmd);

    dt = 0.1;
    newTime = hours(0:dt:tFinal)';

    t_cmd = retime(t_cmd,newTime,'previous');
    % Run the simulation

    simin = simin.setExternalInput([hours(t_cmd.Time), t_cmd.cmd]);

    simout = sim(simin);
```

```
% Find local maxima
maxIndices = islocalmax(PeakSig);

% Visualize results
clf
plot(PeakSig,'Color',[109 185 226]/255,'DisplayName','Input data')
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plot(find(maxIndices),PeakSig(maxIndices),'^','Color',[217 83 25]/255,...
    'MarkerFaceColor',[217 83 25]/255,'DisplayName','Local maxima')
title(['Number of extrema: ' num2str(nnz(maxIndices))])
hold off
legend
```

```
    ybad = t_actual.y;

    % noise
    ybad = ybad + 3*randn(size(ybad));

    % drop-outs
    ixbad = rand(size(ybad))>0.8;
    ybad(ixbad) = 0;

    % missing
    ixbad = rand(size(ybad))>0.4;
    ybad(ixbad) = NaN;

    t_measured.y = ybad;
```

Find Local Extrema

`maxIndices` = Local maxima in **PeakSig**

Select data

Input data: PeakSig | X-axis: default

Define local extrema

Extrema type: Maxima | Flat selection: Center

Max. num. extrema: 1000 | Min. prominence: 0

Min. separation: 0 | Prominence window: Centered 100

Visualize results

☑ Local maxima ☑ Input data

Live Tasks

```
function [t_cmd,t_measured,t_actual] = get_therm_data(sys)

    % Set up the simulation

    tFinal = 100;

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    %     simin = simin.setModelParameter('therm_19b\StateSpace\A',sys.A)

    % Pick some random times to change the commanded temperature

    t = sort(tFinal*rand(10,1));
    t(1) = 0;
    cmd = randi(20,size(t)) + 10;
    t_cmd = timetable(hours(t),cmd);

    dt = 0.1;
    newTime = hours(0:dt:tFinal)';

    t_cmd = retime(t_cmd,newTime,'previous');
    % Run the simulation

    simin = simin.setExternalInput([hours(t_cmd.Time), t_cmd.cmd]);

    simout = sim(simin);
```

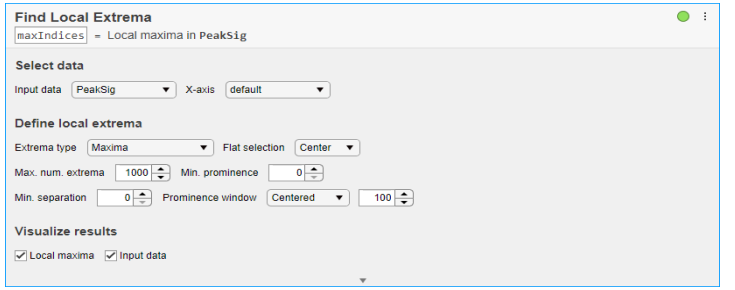


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    ybad = t_actual.y;

    % noise
    ybad = ybad + 3*randn(size(ybad));

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    ixbad = rand(size(ybad))>0.8;
    ybad(ixbad) = 0;

    % missing
    ixbad = rand(size(ybad))>0.4;
    ybad(ixbad) = NaN;

    t_measured.y = ybad;
```

Live Editor - L:\Dropbox\UK talk\Neds Stuff\sim_script.mlx

LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE

Go To | Find — NAVIGATE

Text | Normal | B I U M — TEXT

Code | Task | Control | Refactor — CODE

Section Break | Run Section | Run and Advance | Run to End — SECTION

Run | Step | Stop — RUN

sim_script.mlx

SpatCo Thermostats

```
[t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

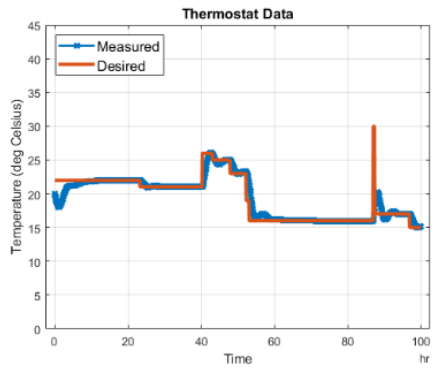
This is what it should look like in a zero-noise situation. I expect the data to look like this.

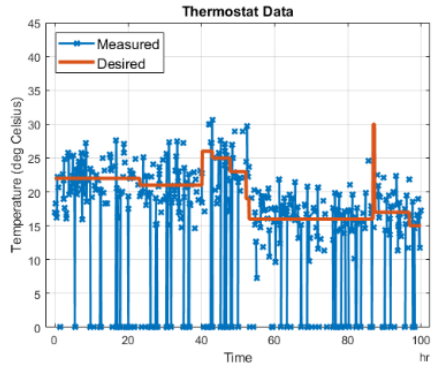
```
plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.





script | Ln 4 | Col 1

Live Editor - L:\Dropbox\UK talk\Neds Stuff\sim_script.mlx

LIVE EDITOR | INSERT

New | Open | Save | Find Files | Compare | Print — FILE

Find — NAVIGATE

Code | Task | Control | Refactor — CODE

Section Break | Run Section | Run and Advance | Run to End — SECTION

Run | Step | Stop — RUN

sim_script.mlx

SpatCo Thermostats

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```

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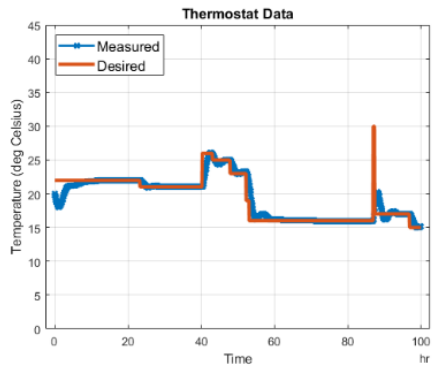
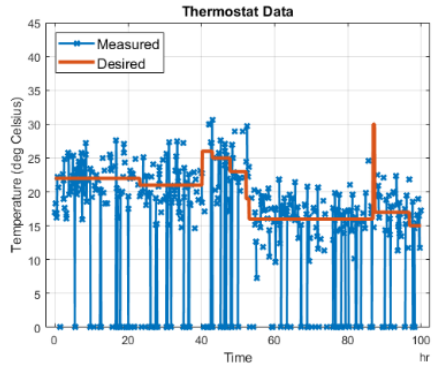
```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

```
4
```





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Live Editor - L:\Dropbox\UK talk\Neds Stuff\sim_script.mlx

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sim_script.mlx

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```
4
```

DATA PREPROCESSING

Clean Missing Data | Clean Outlier Data | Find Change Points | Find Local Extrema | Join Tables | Remove Trends | Smooth Data

CONTROL SYSTEM DESIGN AND

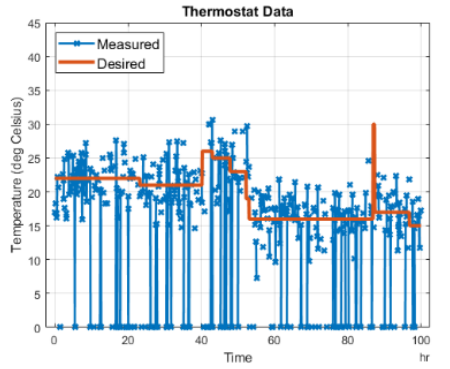
Convert Model Rate | Reduce Model Order

PREDICTIVE MAINTENANCE

Estimate Approximat... | Estimate Correlation ... | Estimate Lyapunov E... | Rec... Phase...

SYSTEM IDENTIFICATION

Estimate Process Model | Estimate State-Space...



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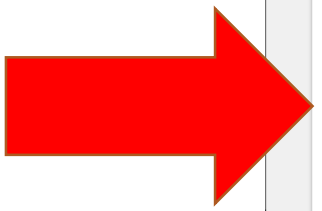

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Clean Outlier Data

Find, fill, or remove outliers

Select data

Input data: select | X-axis: default

Specify cleaning method

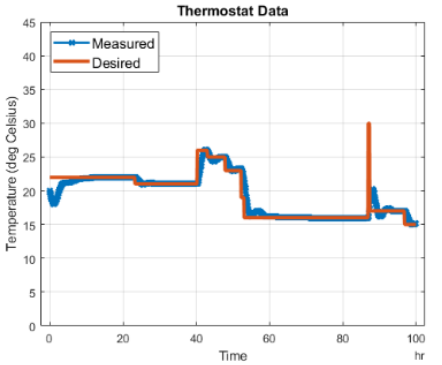
Cleaning method: Fill outliers

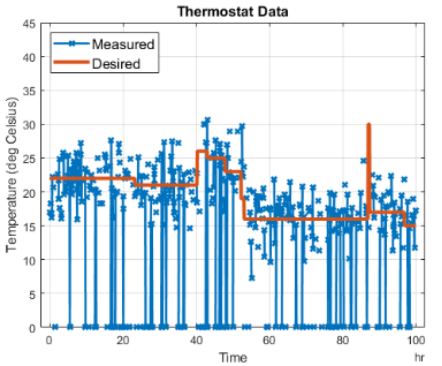
Define outliers

Detection method: Median | Threshold factor: 3

Visualize results

☑ Filled outliers ☑ Cleaned data ☑ Input data ☑ Outliers ☑ Outlier thresholds ☐ Outlier center





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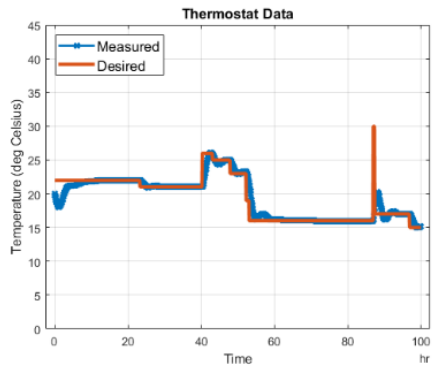

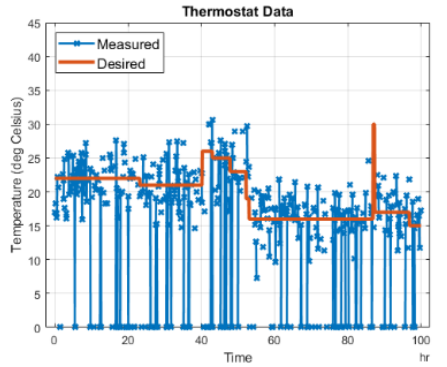

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Select data

Input data: select | X-axis: default

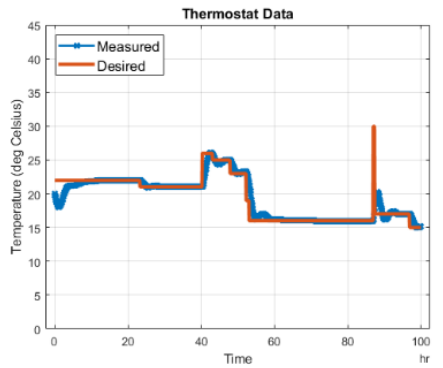
select
t_actual
t_cmd
t_measured

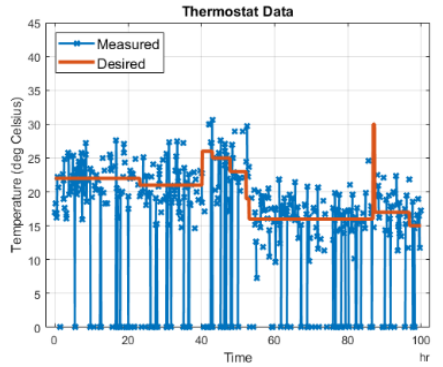
Define outliers

Detection method: Median | hold factor: 3

Visualize results

Filled outliers | Cleaned data | Input data | Outliers | Outlier thresholds | Outlier center





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Select data

Input data: t_measured | .y — X-axis: t_measured | .Time

Specify cleaning method

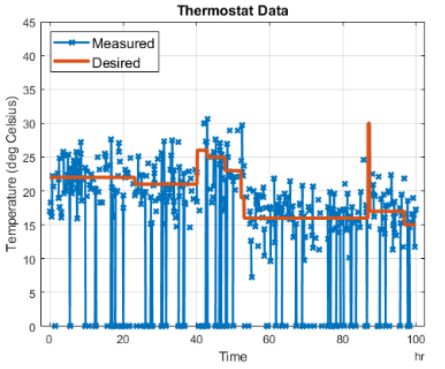
Cleaning method: Fill outliers | Linear interpolation

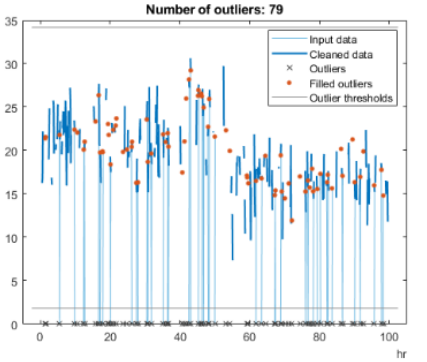
Define outliers

Detection method: Median — Threshold factor: 3

Visualize results

☑ Filled outliers ☑ Cleaned data ☑ Input data ☑ Outliers ☑ Outlier thresholds ☐ Outlier center





script

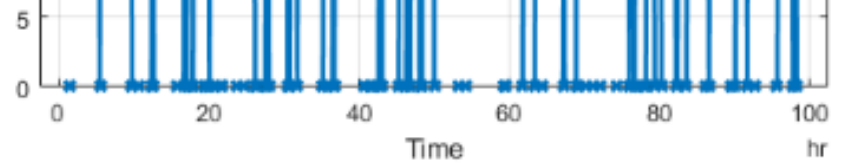
linear interpolation method

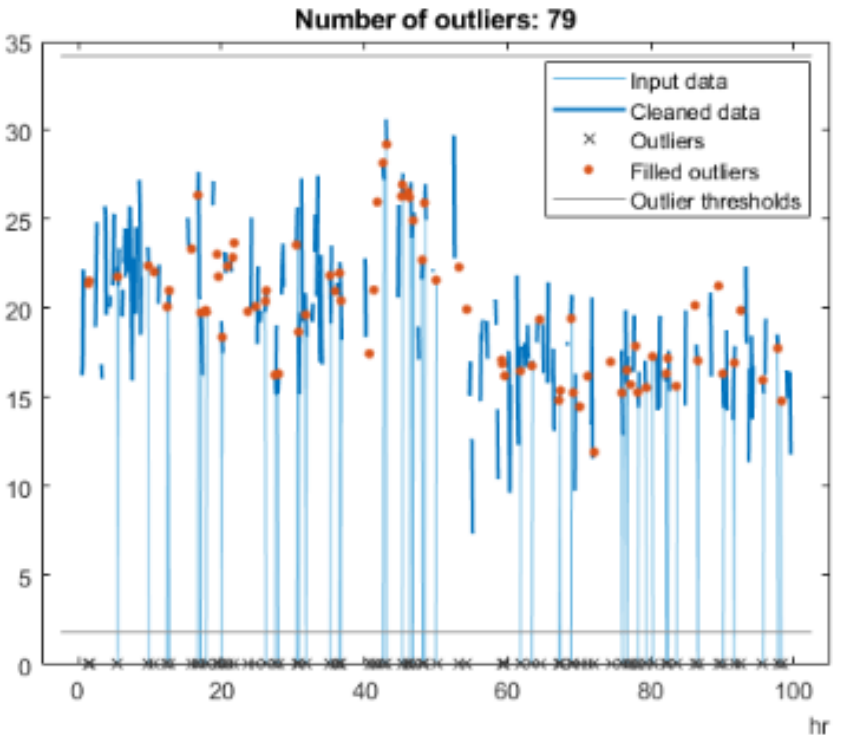
t_measured

.Time

Outlier thresholds

Outlier center





linear interpolation method

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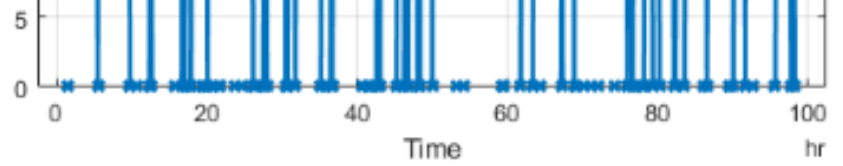
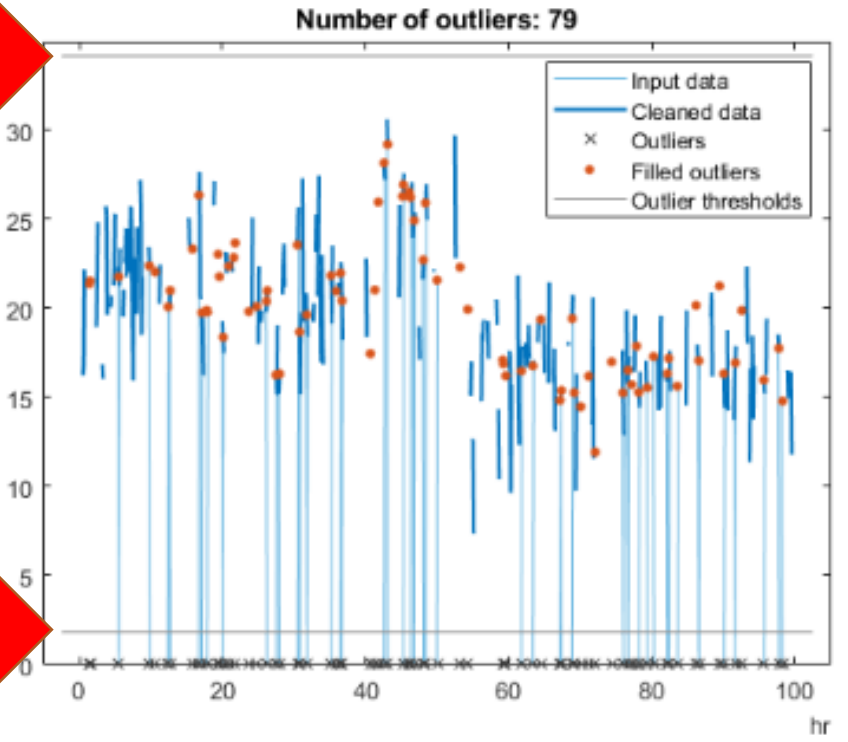
Outlier thresholds

Outlier center



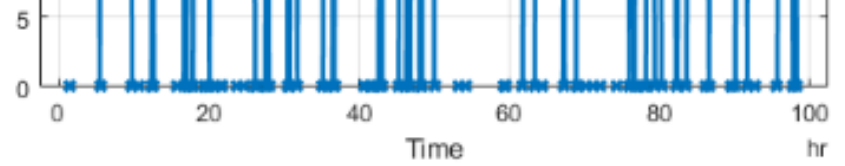


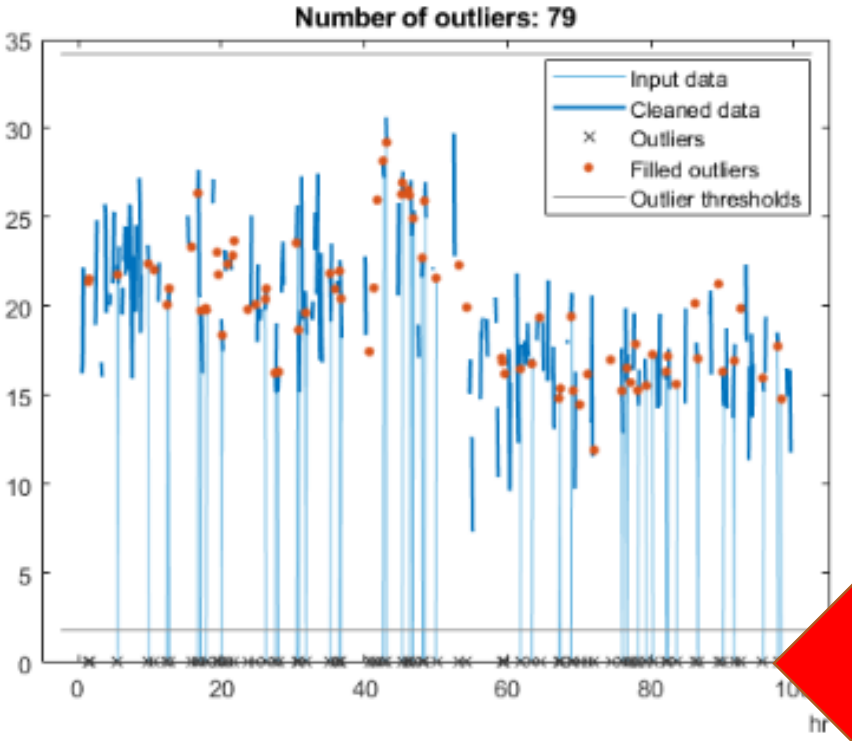
linear interpolation method

t_measured ▼ .Time ▼

3

Outlier thresholds ☐ Outlier center





linear interpolation method

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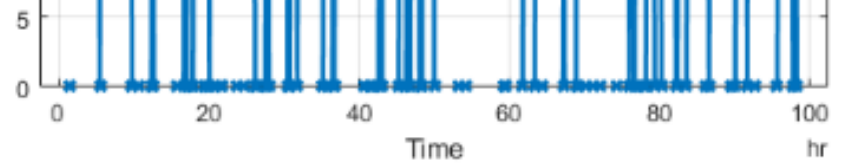

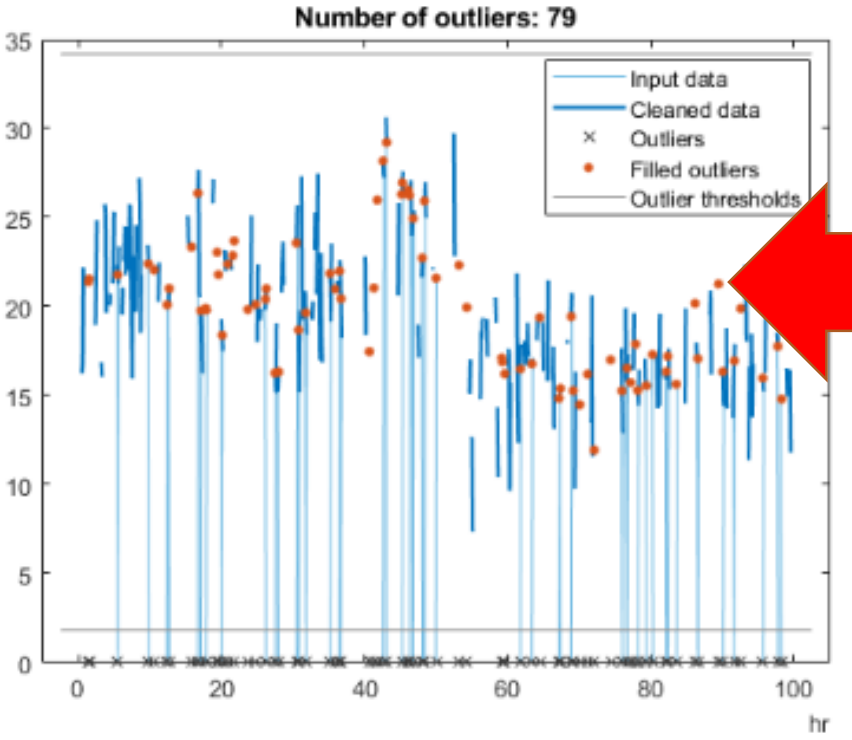

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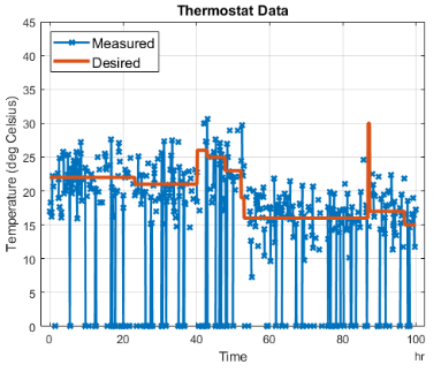

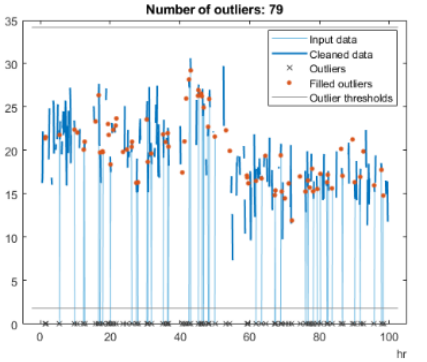

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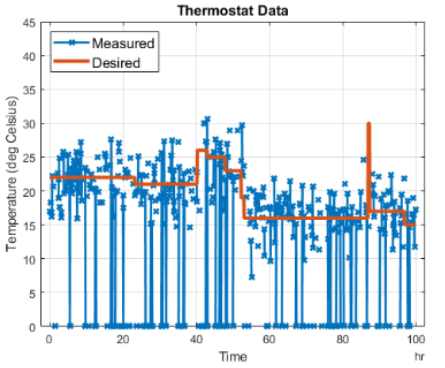
Define outliers

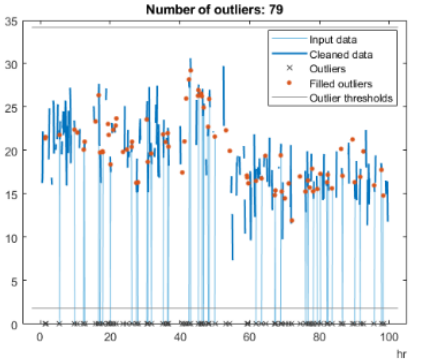
Detection method: Median — Threshold factor: 3

Median
Mean
Quartiles
Grubbs
Generalized extreme studentized deviate (GESD)
Moving median
Moving mean

Visualize result

☑ Filled outliers — ☐ Outlier center





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Define outliers

Detection method: Moving median | Threshold factor: 2.5

Moving window: Centered | 1 | Units: Days

Visualize results

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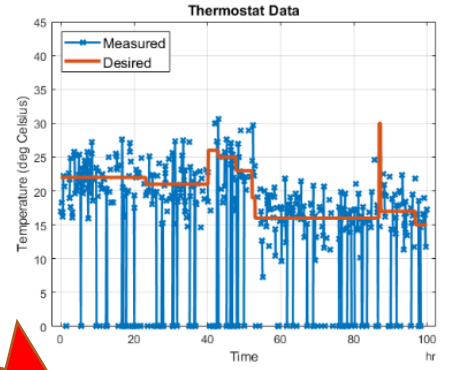

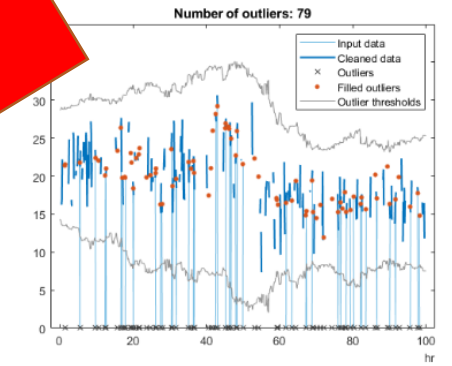

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Define outliers

Detection method: Moving median — Threshold factor: 2.5

Moving window: Centered — 1 — Units: Days

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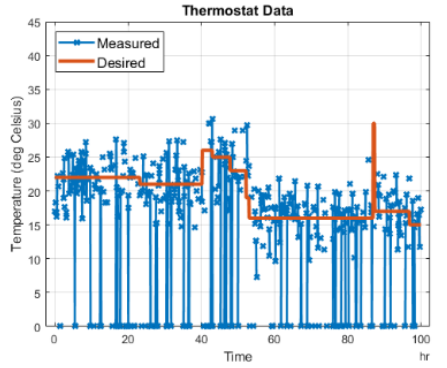

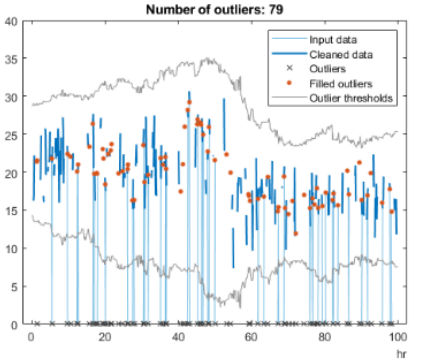

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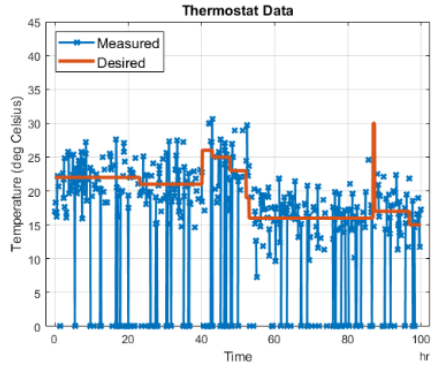
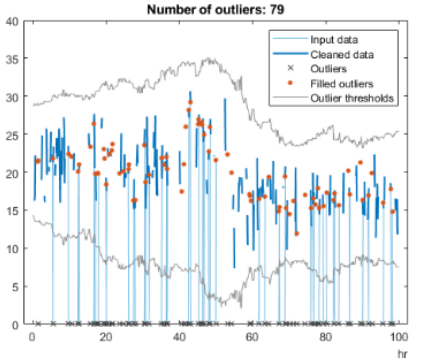
Moving window: Centered — 1 — Units: Days

Visualize results

☑ Filled outliers ☑ Cleaned data ☑ Input data ☑ Outliers ☑ Outlier thresholds ☐ Outlier center

```
% Fill outliers
[cleanedData2,outlierIndices,thresholdLow,thresholdHigh] = ...
    filloutliers(t_measured.y,'linear','movmedian',days(1),...
    'ThresholdFactor',2.5,'SamplePoints',t_measured.Time);

% Visualize results
clf
plot(t_measured.Time,t_measured.y,'Color',[109 185 226]/255,...
    'DisplayName','Input data')
hold on
plot(t_measured.Time,cleanedData2,'Color',[0 114 189]/255,'LineWidth',1.5,...
    'DisplayName','Cleaned data')

% Plot outliers
plot(t_measured.Time(outlierIndices),t_measured.y(outlierIndices),'x',...
    'Color',[64 64 64]/255,'DisplayName','Outliers')
title(['Number of outliers: ' num2str(nnz(outlierIndices))])

% Plot filled outliers
plot(t_measured.Time(outlierIndices),cleanedData2(outlierIndices),'.',...
    'MarkerSize',12,'Color',[217 83 25]/255,'DisplayName','Filled outliers')

% Plot outlier thresholds
plot([t_measured.Time(:); missing; t_measured.Time(:)],...
    [thresholdHigh(:); missing; thresholdLow(:)],'Color',[145 145 145]/255,...
```





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Select data

Input data: t_measured | .y — X-axis: t_measured | .Time

Specify cleaning method

Cleaning method: Fill outliers | Linear interpolation

Define outliers

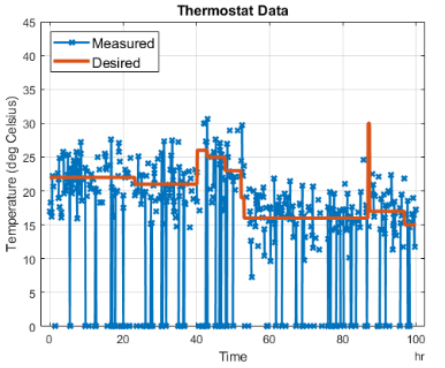
Detection method: Moving median — Threshold factor: 2.5

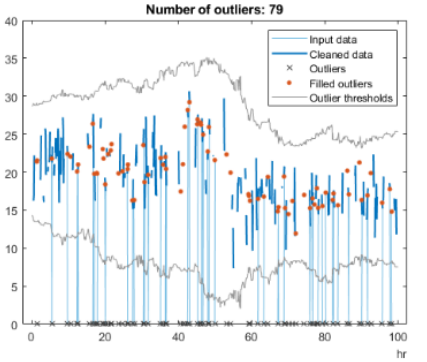
Moving window: Centered | 1 | Units: Days

Visualize results

☑ Filled outliers ☑ Cleaned data ☑ Input data ☑ Outliers ☑ Outlier thresholds ☐ Outlier center

```
% Fill outliers
[cleanedData2,outlierIndices,thresholdLow,thresholdHigh] = ...
    filloutliers(t_measured.y,'linear','movmedian',days(1),...
    'ThresholdFactor',2.5,'SamplePoints',t_measured.Time);

% Visualize results
clf
plot(t_measured.Time,t_measured.y,'Color',[109 185 226]/255,...
    'DisplayName','Input data')
hold on
plot(t_measured.Time,cleanedData2,'Color',[0 114 189]/255,'LineWidth',1.5,...
    'DisplayName','Cleaned data')

% Plot outliers
plot(t_measured.Time(outlierIndices),t_measured.y(outlierIndices),'x',...
    'Color',[64 64 64]/255,'DisplayName','Outliers')
title(['Number of outliers: ' num2str(nnz(outlierIndices))])

% Plot filled outliers
plot(t_measured.Time(outlierIndices),cleanedData2(outlierIndices),'.',...
    'MarkerSize',12,'Color',[217 83 25]/255,'DisplayName','Filled outliers')

% Plot outlier thresholds
plot([t_measured.Time(:); missing; t_measured.Time(:)],...
    [thresholdHigh(:); missing; thresholdLow(:)],'Color',[145 145 145]/255,...
```





script

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Section Break | Run Section | Run and Advance | Run to End — SECTION
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sim_script.mlx *

Clean Outlier Data

`cleanedData2` = Filled outliers in `t_measured.y` using the linear interpolation method

Select data

Input data: t_measured | .y — X-axis: t_measured | .Time

Specify cleaning method

Cleaning method: Fill outliers | Linear interpolation

Define outliers

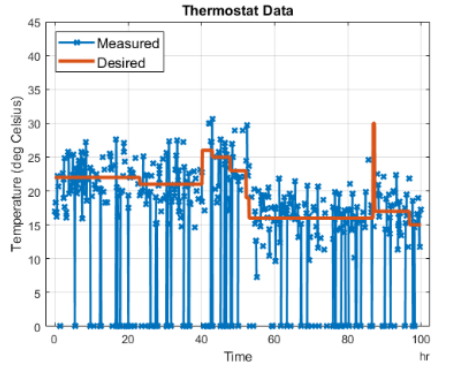
Detection method: Moving median — Threshold factor: 2.5

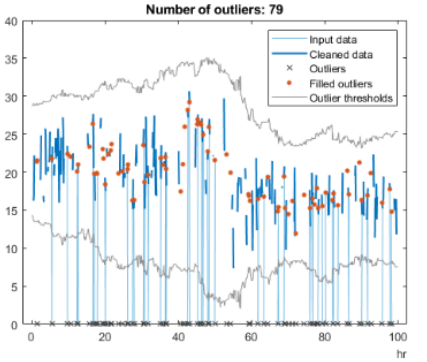
Moving window: Centered | 1 — Units: Days

Visualize results

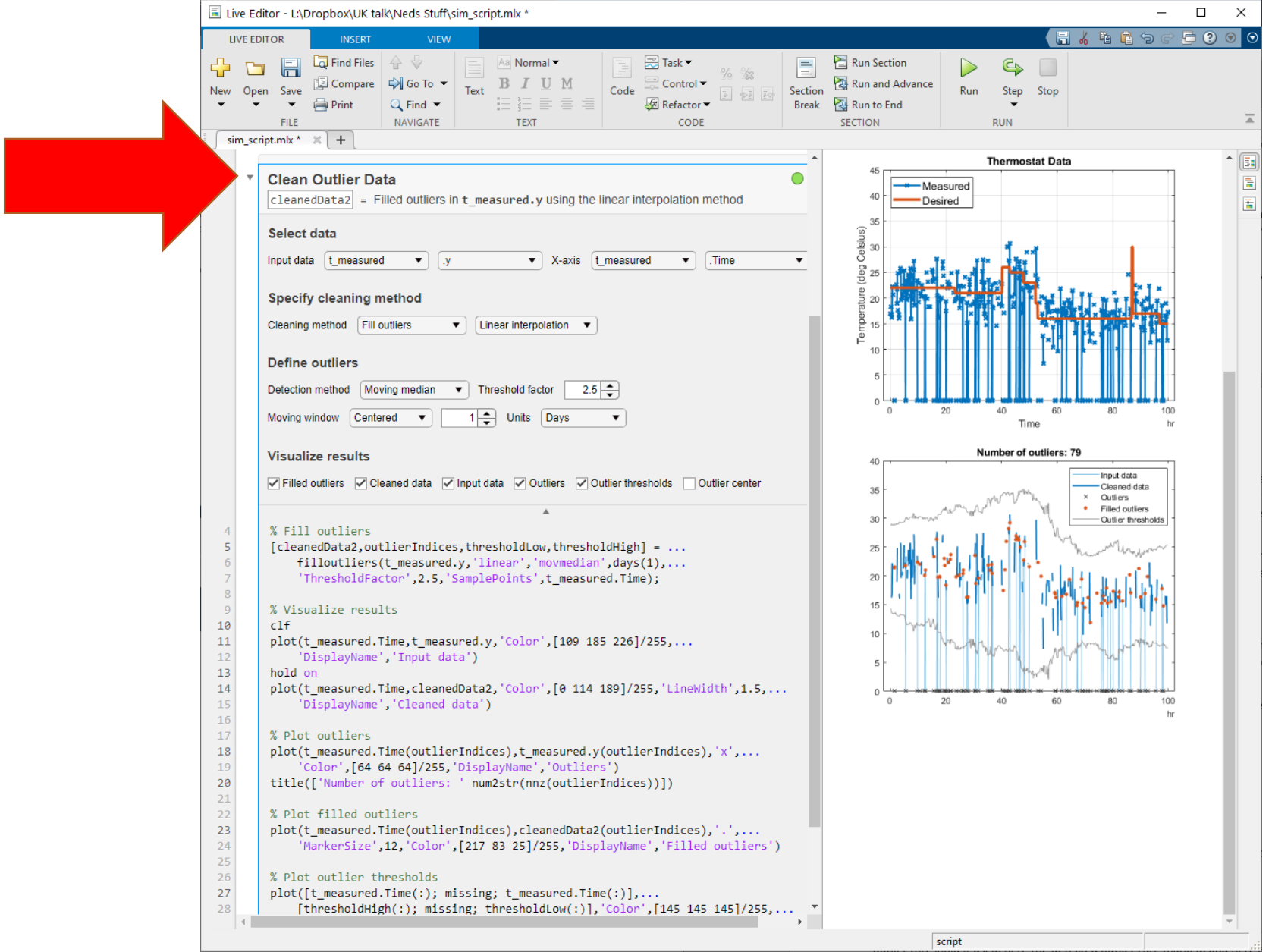
☑ Filled outliers ☑ Cleaned data ☑ Input data ☑ Outliers ☑ Outlier thresholds ☐ Outlier center

```
% Fill outliers
[cleanedData2,outlierIndices,thresholdLow,thresholdHigh] = ...
    filloutliers(t_measured.y,'linear','movmedian',days(1),...
    'ThresholdFactor',2.5,'SamplePoints',t_measured.Time);

% Visualize results
clf
plot(t_measured.Time,t_measured.y,'Color',[109 185 226]/255,...
    'DisplayName','Input data')
hold on
plot(t_measured.Time,cleanedData2,'Color',[0 114 189]/255,'LineWidth',1.5,...
    'DisplayName','Cleaned data')

% Plot outliers
plot(t_measured.Time(outlierIndices),t_measured.y(outlierIndices),'x',...
    'Color',[64 64 64]/255,'DisplayName','Outliers')
title(['Number of outliers: ' num2str(nnz(outlierIndices))])

% Plot filled outliers
plot(t_measured.Time(outlierIndices),cleanedData2(outlierIndices),'.',...
    'MarkerSize',12,'Color',[217 83 25]/255,'DisplayName','Filled outliers')

% Plot outlier thresholds
plot([t_measured.Time(:); missing; t_measured.Time(:)],...
    [thresholdHigh(:); missing; thresholdLow(:)],'Color',[145 145 145]/255,...
```





script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Task
Control
Refactor
CODE
Section Break
Run Section
Run and Advance
Run to End
SECTION
Run
Step
Stop
RUN
sim_script.mlx *
Clean Outlier Data
cleanedData2 = Filled outliers in t_measured.y using the linear interpolation method
Select data
Input data t_measured .y X-axis t_measured .Time
Specify cleaning method
Cleaning method Fill outliers Linear interpolation
Define outliers
Detection method Moving median Threshold factor 2.5
Moving window Centered 1 Units Days
Visualize results
Filled outliers Cleaned data Input data Outliers Outlier thresholds Outlier center
% Fill outliers
[cleanedData2,outlierIndices,thresholdLow,thresholdHigh] = ...
filloutliers(t_measured.y,'linear','movmedian',days(1),...
'ThresholdFactor',2.5,'SamplePoints',t_measured.Time);
% Visualize results
clf
plot(t_measured.Time,t_measured.y,'Color',[109 185 226]/255,...
'DisplayName','Input data')
hold on
plot(t_measured.Time,cleanedData2,'Color',[0 114 189]/255,'LineWidth',1.5,...
'DisplayName','Cleaned data')
% Plot outliers
plot(t_measured.Time(outlierIndices),t_measured.y(outlierIndices),'x',...
'Color',[64 64 64]/255,'DisplayName','Outliers')
title(['Number of outliers: ' num2str(nnz(outlierIndices))])
% Plot filled outliers
plot(t_measured.Time(outlierIndices),cleanedData2(outlierIndices),'.',...
'MarkerSize',12,'Color',[217 83 25]/255,'DisplayName','Filled outliers')
% Plot outlier thresholds
plot([t_measured.Time(:); missing; t_measured.Time(:)],...
[thresholdHigh(:); missing; thresholdLow(:)],'Color',[145 145 145]/255,...
Thermostat Data
Measured
Desired
Temperature (deg Celsius)
Time
hr
Number of outliers: 79
Input data
Cleaned data
Outliers
Filled outliers
Outlier thresholds
script

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Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

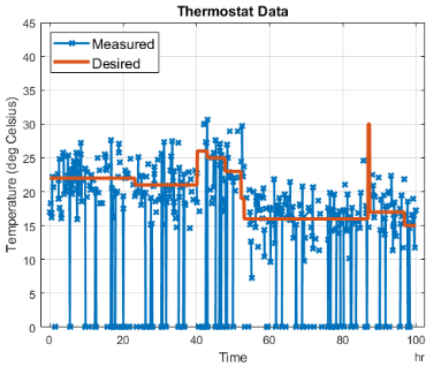
```
2  plot_therm_data(t_cmd, t_actual)
```

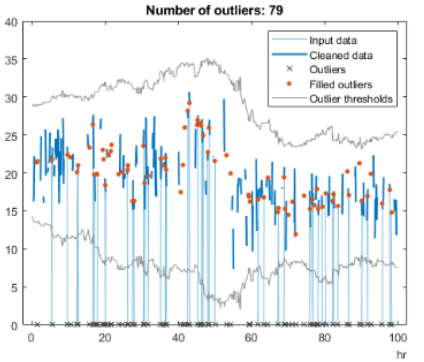
But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

```
   cleanedData2 = Filled outliers in t_measured.y using the linear interpolation method
34
```





script | Ln 34 Col 1

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Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2  plot_therm_data(t_cmd, t_actual)
```

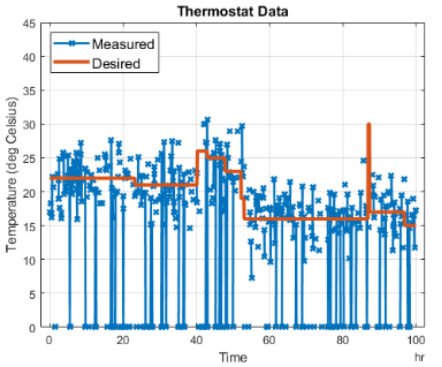
But this is what it actually looks like. Instead, it's a mess, as shown below.

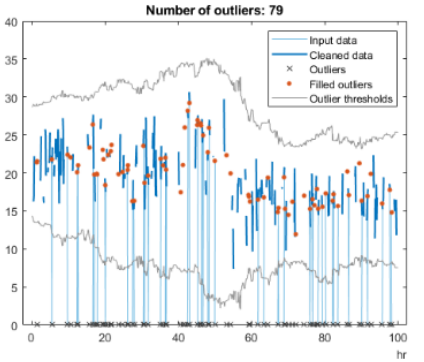
```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

```
   cleanedData2 = Filled outliers in t_measured.y using the linear interpolation method
34 mis
```

missing	Create missing values
mislocked	Determine if function or script is locked in m...
misdata	Reconstruct missing input and output data
Clean Missing Data	Find, fill, or remove missing data





script | Ln 34 Col 1

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Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

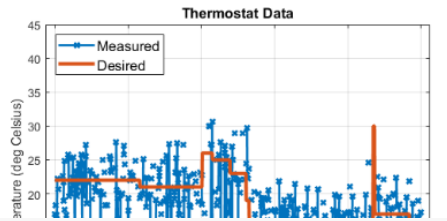
SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

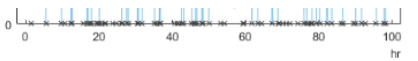
```
2  plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.




```
mis
```

- missing — Create missing values
- mislocked — Determine if function or script is locked in m...
- misdata — Reconstruct missing input and output data
- Clean Missing Data — Find, fill, or remove missing data



script | Ln 34 Col 1

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sim_script.mlx *

SpatCo Thermostats

```
1 [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2 plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3 plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

`cleanedData` = Filled outliers in `t_measured.y` using the linear interpolation method

Clean Missing Data

Find, fill, or remove missing data

Select data

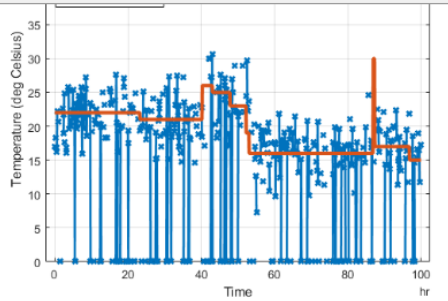
Input data: select | X-axis: default

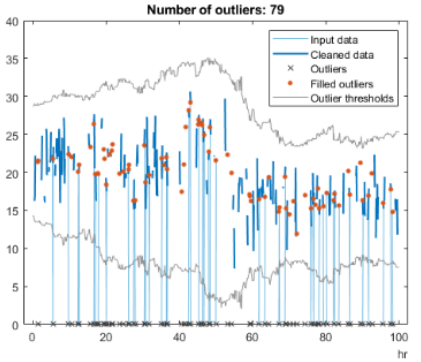
Specify method

Cleaning method: Fill missing

Visualize results

Cleaned data | Filled missing entries





script

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SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2  plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

`cleanedData` = Filled outliers in `t_measured.y` using the linear interpolation method

Clean Missing Data

`cleanedData2` = Filled missing data in `cleanedData` using the linear interpolation method

Select data

Input data: cleanedData | X-axis: default

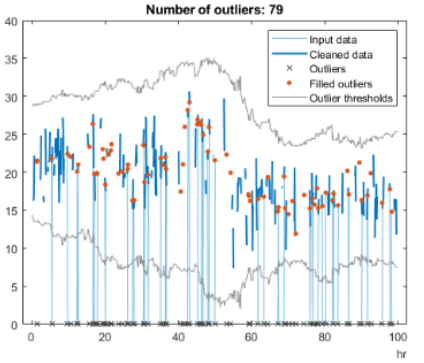
Specify method

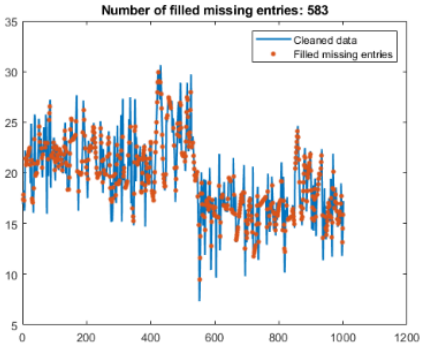
Cleaning method: Fill missing | Linear interpolation

Visualize results

☑ Cleaned data ☑ Filled missing entries

```
51
```





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Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2  plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

`cleanedData` = Filled outliers in **`t_measured.y`** using the linear interpolation method

`cleanedData2` = Filled missing data in **`cleanedData`** using the linear interpolation method

Smooth Data

`smoothedData` = Smoothed noisy data in **`cleanedData2`** using the moving mean method

Select data

Input data: cleanedData2 | X-axis: default

Specify method and parameters

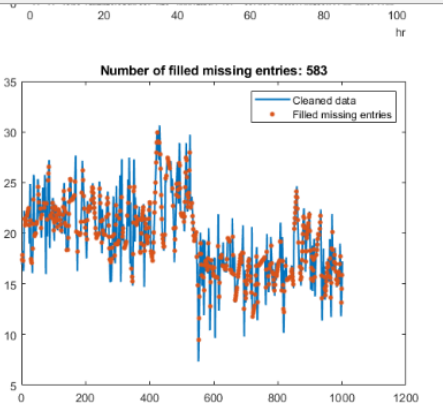
Smoothing method: Moving mean

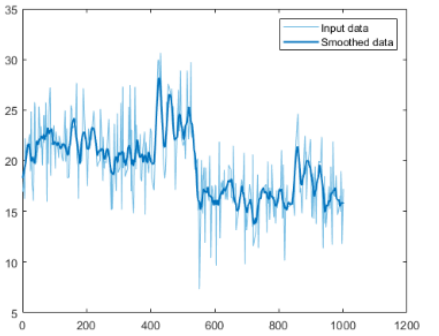
Smoothing factor: 0.35

Visualize results

☑ Smoothed data ☑ Input data

```
62
```





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Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2  plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3  plot_therm_data(t_cmd, t_measured)
```

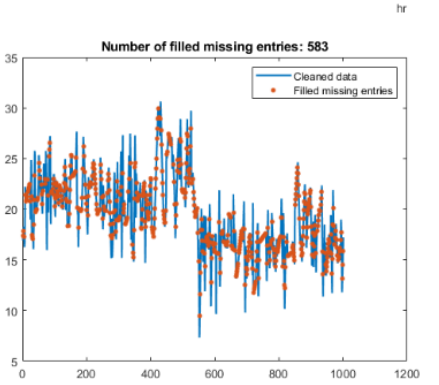
I need help trying to recapture what true temperature profile is.

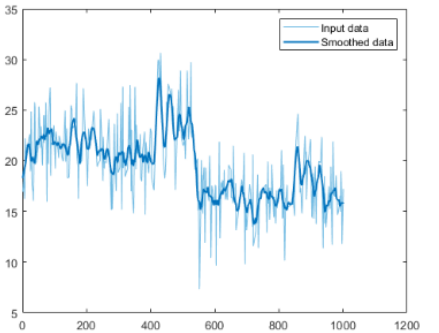
▸ `cleanedData` = Filled outliers in `t_measured.y` using the linear interpolation method

▸ `cleanedData2` = Filled missing data in `cleanedData` using the linear interpolation method

▸ `smoothedData` = Smoothed noisy data in `cleanedData2` using the moving mean method

62





script | Ln 62 Col 1

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Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

sim_script.mlx *

SpatCo Thermostats

```
1  [t_cmd,t_measured,t_actual] = get_therm_data(sys);
```

This is what it should look like in a zero-noise situation. I expect the data to look like this.

```
2  plot_therm_data(t_cmd, t_actual)
```

But this is what it actually looks like. Instead, it's a mess, as shown below.

```
3  plot_therm_data(t_cmd, t_measured)
```

I need help trying to recapture what true temperature profile is.

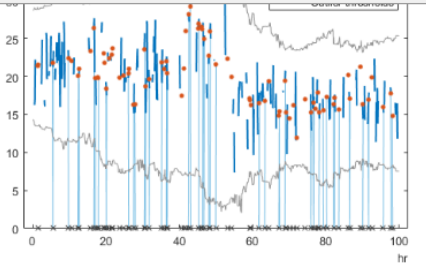
Ned, I've added these three data cleaning steps. Why don't you take a look at them and see if you think they are appropriate?

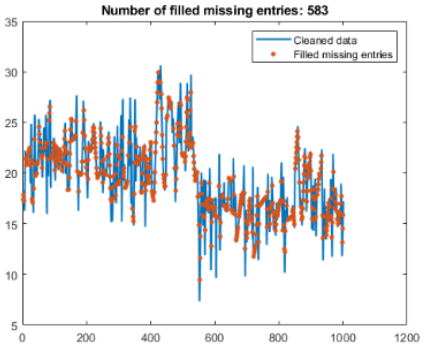
▸ `cleanedData` = Filled outliers in `t_measured.y` using the linear interpolation method

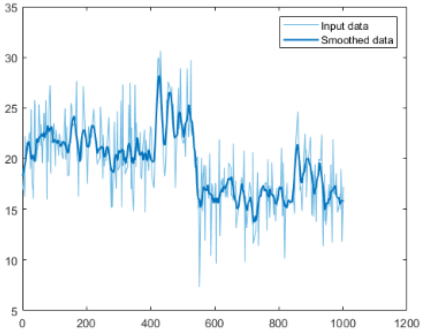
▸ `cleanedData2` = Filled missing data in `cleanedData` using the linear interpolation method

▸ `smoothedData` = Smoothed noisy data in `cleanedData2` using the moving mean method

62







script | Ln 62 Col 1

In which Joe validates function arguments

Argument Validation

```
function showTempData( fileName, maxDataPoints )



    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
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    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
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    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
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    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
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        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

MATLAB Validation Functions

MATLAB defines functions for use in property validation. These functions support common use patterns for validation and provide descriptive error messages. This table lists the MATLAB validation functions, their meanings, and the MATLAB functions used by the validation functions.

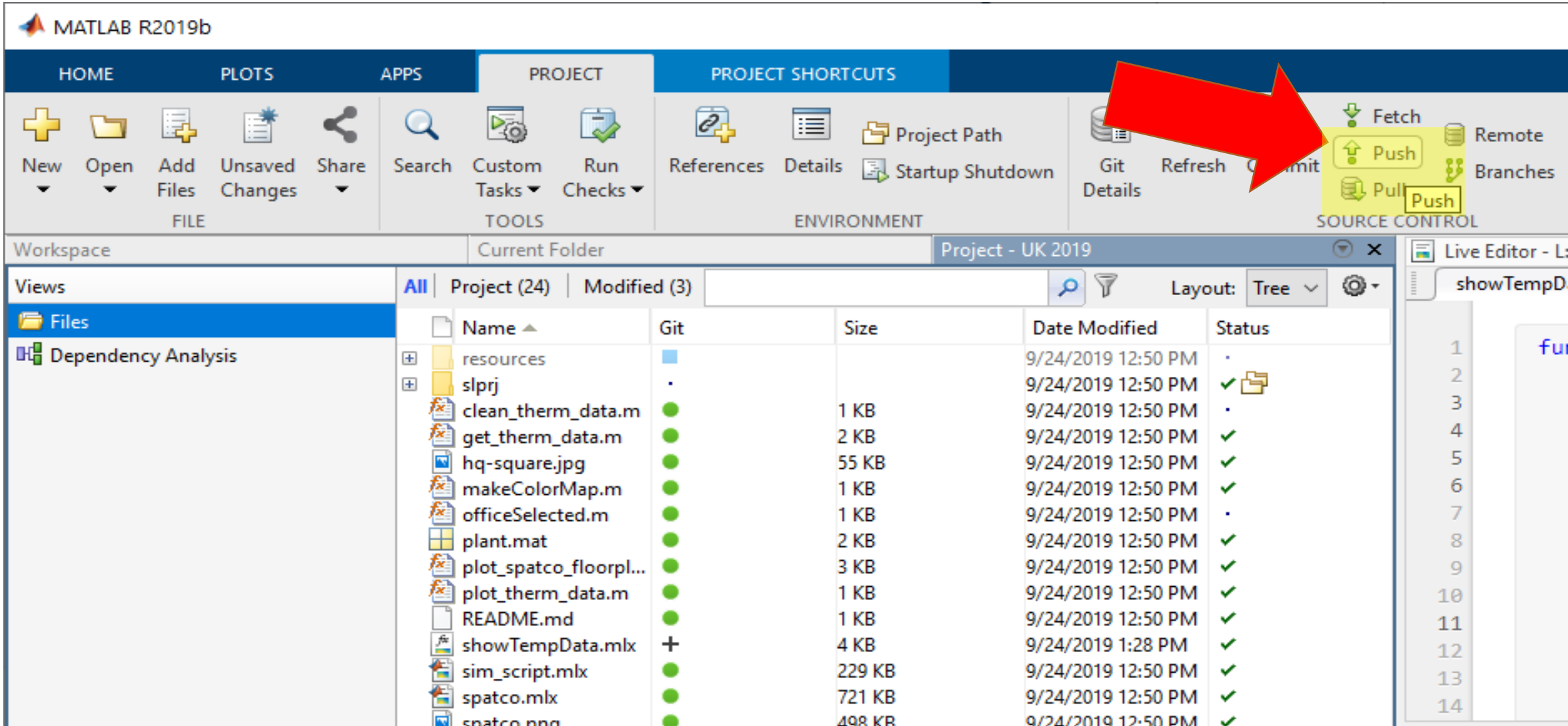
Name	Meaning	Functions Called on Inputs
`mustBePositive(value)`	`value > 0`	`gt`, `isreal`, `isnumeric`, `islogical`
`mustBeNonpositive(value)`	`value <= 0`	`ge`, `isreal`, `isnumeric`, `islogical`
`mustBeFinite(value)`	`value` has no `NaN` and no `Inf` elements.	`isfinite`
`mustBeNonNan(value)`	`value` has no `NaN` elements.	`isnan`
`mustBeNonnegative(value)`	`value >= 0`	`ge`, `isreal`, `isnumeric`, `islogical`
`mustBeNegative(value)`	`value < 0`	`lt`, `isreal`, `isnumeric`, `islogical`
`mustBeNonzero(value)`	`value ~= 0`	`eq`, `isnumeric`, `islogical`
`mustBeGreaterThan(value,c)`	`value > c`	`gt`, `isscalar`, `isreal`, `isnumeric`, `islogical`
`mustBeLessThan(value,c)`	`value < c`	`lt`, `isreal`, `isnumeric`, `islogical`
`mustBeGreaterThanOrEqual(value,c)`	`value >= c`	`ge`, `isreal`, `isnumeric`, `islogical`
`mustBeLessThanOrEqual(value,c)`	`value <= c`	`le`, `isreal`, `isnumeric`, `islogical`
`mustBeNonempty(value)`	`value` is not empty.	`isempty`
`mustBeNonsparse(value)`	`value` has no sparse elements.	`issparse`
`mustBeNumeric(value)`	`value` is numeric.	`isnumeric`
`mustBeNumericOrLogical(value)`	`value` is numeric or logical.	`isnumeric`, `islogical`
`mustBeReal(value)`	`value` has no imaginary part.	`isreal`
`mustBeInteger(value)`	`value == floor(value)`	`isreal`, `isfinite`, `floor`, `isnumeric`, `islogical`
`mustBeMember(value,S)`	`value` is an exact match for a member of `S`.	`ismember`

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```

Argument Validation

```
function showTempData( fileName, maxDataPoints )

    arguments
        fileName (1,1) string
        maxDataPoints (1,1) double { mustBePositive } = 10000
    end

    % blah
    % blah
```


MATLAB R2019b
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
New
Open
Add Files
Unsaved Changes
Share
FILE
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Fetch
Push
Pull
Remote
Branches
Push
SOURCE CONTROL
Workspace
Current Folder
Project - UK 2019
Live Editor - L
showTempD
Views
Files
Dependency Analysis
All
Project (24)
Modified (3)
Layout:
Tree
Name
Git
Size
Date Modified
Status
resources
9/24/2019 12:50 PM
slprj
9/24/2019 12:50 PM
clean_therm_data.m
1 KB
9/24/2019 12:50 PM
get_therm_data.m
2 KB
9/24/2019 12:50 PM
hq-square.jpg
55 KB
9/24/2019 12:50 PM
makeColorMap.m
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officeSelected.m
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plant.mat
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README.md
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showTempData.mlx
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9/24/2019 1:28 PM
sim_script.mlx
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spatco.mlx
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spatco.png
498 KB
9/24/2019 12:50 PM
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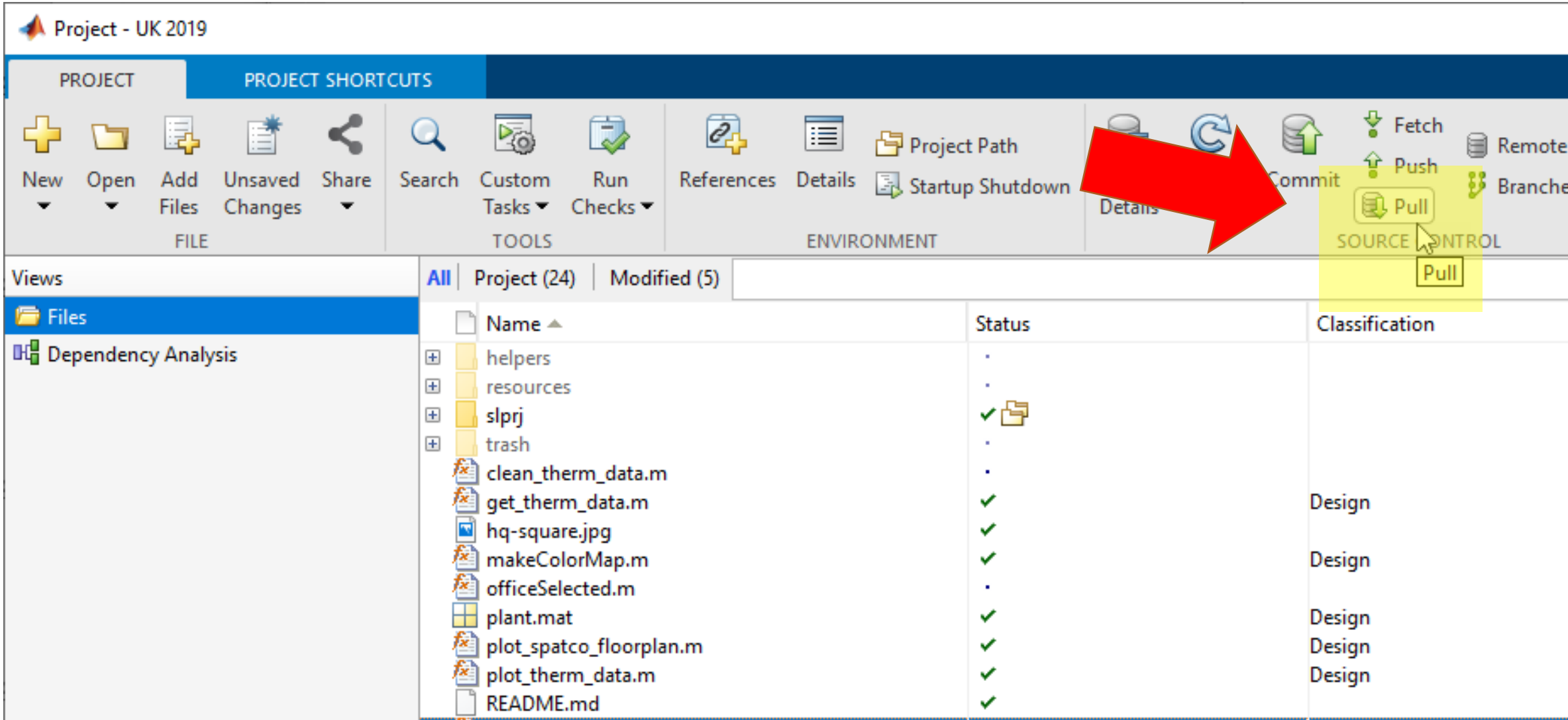
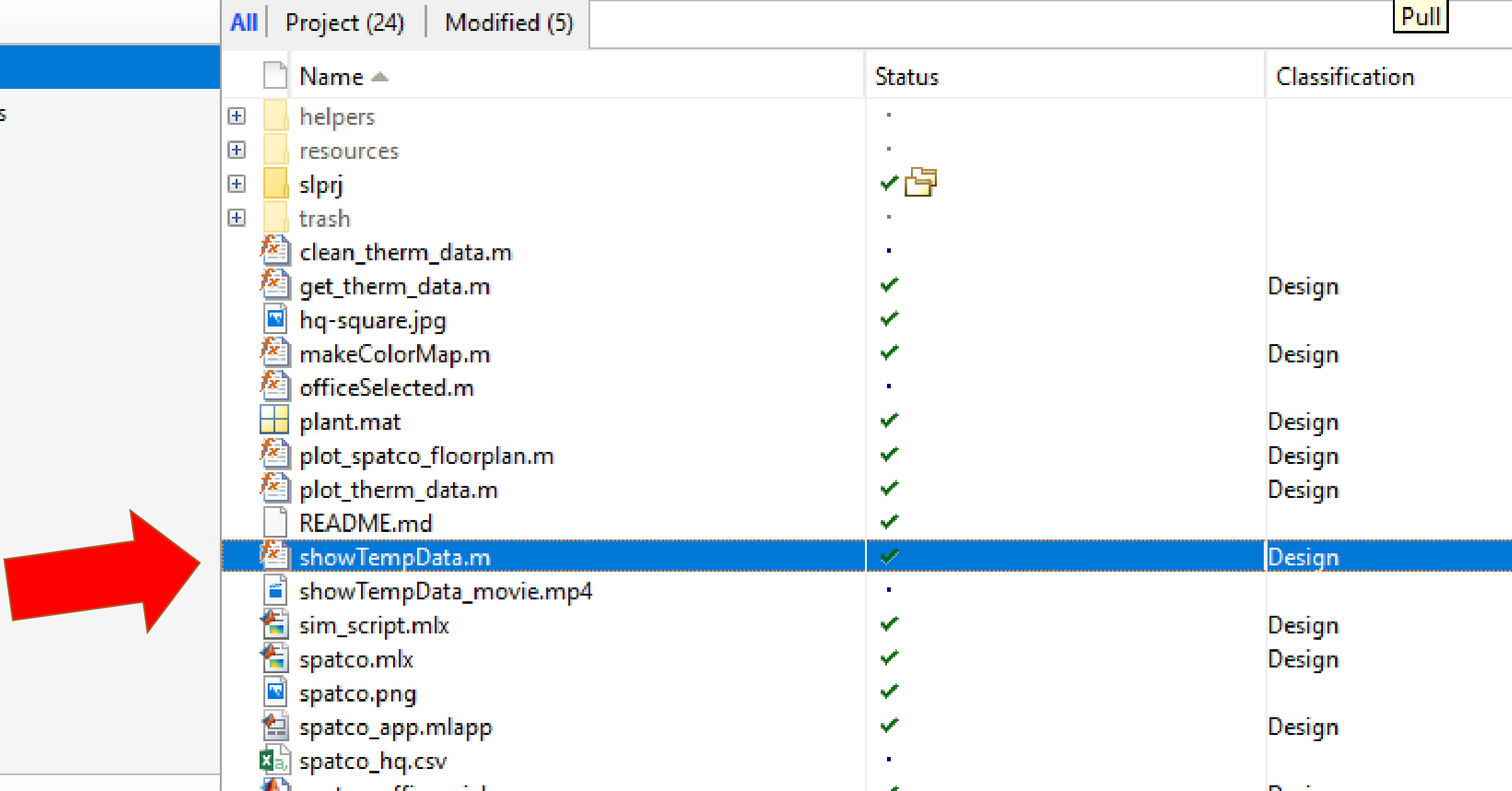
In which Ned calls a function


Project - UK 2019
PROJECT
PROJECT SHORTCUTS
New
Open
Add Files
Unsaved Changes
Share
FILE
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Details
Commit
Fetch
Push
Pull
Remote
Branche
SOURCE CONTROL
Pull
Views
Files
Dependency Analysis
All
Project (24)
Modified (5)
Name
Status
Classification
helpers
resources
slprj
trash
clean_therm_data.m
get_therm_data.m
Design
hq-square.jpg
makeColorMap.m
Design
officeSelected.m
plant.mat
Design
plot_spatco_floorplan.m
Design
plot_therm_data.m
Design
README.md


All
Project (24)
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resources
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get_therm_data.m
Design
hq-square.jpg
makeColorMap.m
Design
officeSelected.m
plant.mat
Design
plot_spatco_floorplan.m
Design
plot_therm_data.m
Design
README.md
showTempData.m
Design
showTempData_movie.mp4
sim_script.mlx
Design
spatco.mlx
Design
spatco.png
spatco_app.mlapp
Design
spatco_hq.csv

SpatCo Headquarters Data

```
1  showTempData
```

SpatCo Headquarters Data

```
1  showTempData
```

```
Error using showTempData
Invalid input argument list. Not enough input
arguments.
Function requires 1 input(s).
```

SpatCo Headquarters Data

```
1  showTempData()
```

```
showTempData(filename,maxDataPoints)
```

Enter a value for **filename**

SpatCo Headquarters Data

```
1  showTempData("spatco_hq.csv",)
```

showTempData(filename,maxDataPoints)

Enter a value for **maxDataPoints** (Optional)

SpatCo Headquarters Data

```
1  showTempData("spatco_hq.csv",-1)
```

SpatCo Headquarters Data

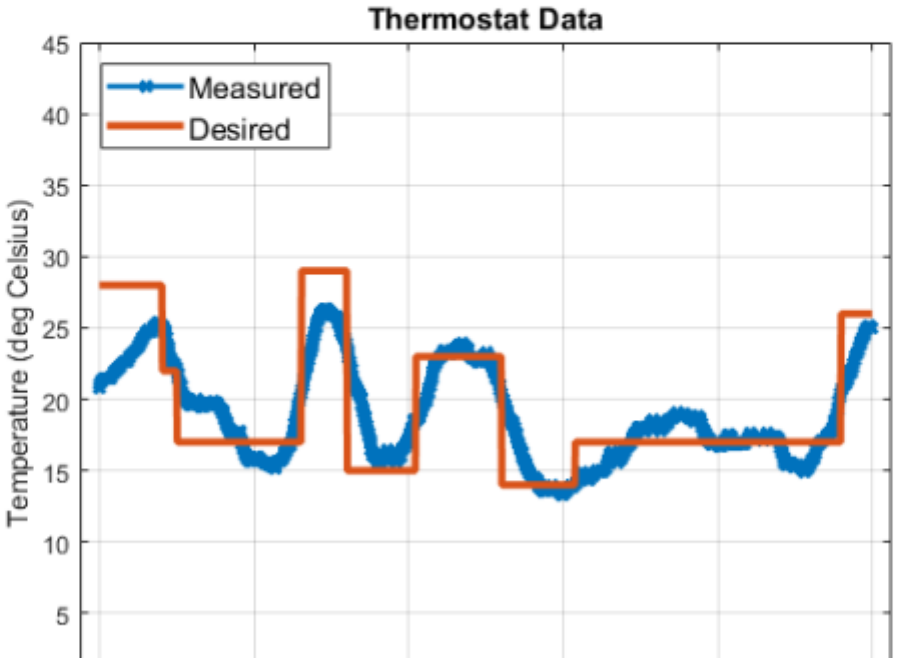
```
1  showTempData("spatco_hq.csv",-1)
```

Error using **showTempData**
Invalid input argument at position 2. Value must be positive.

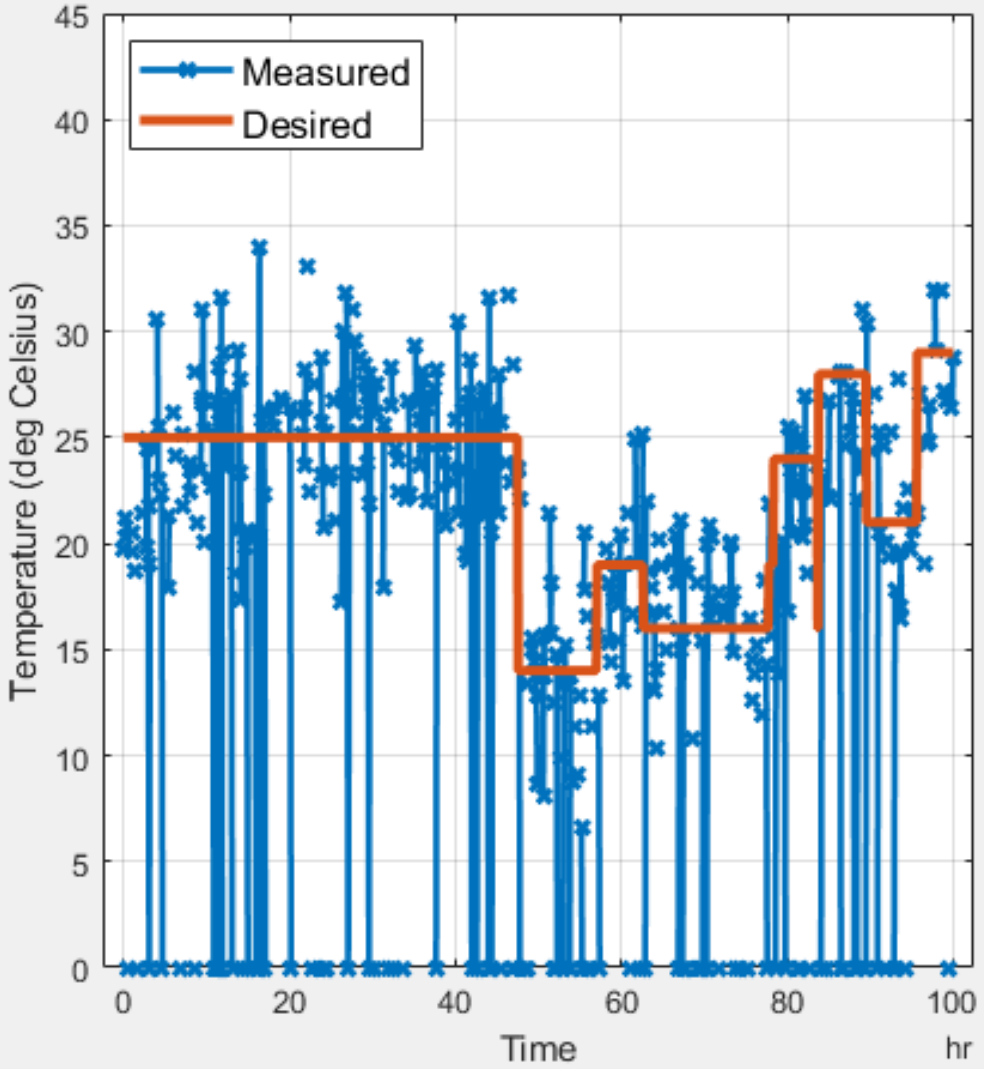
SpatCo Headquarters Data

```
1  showTempData("spatco_hq.csv",10000)
```

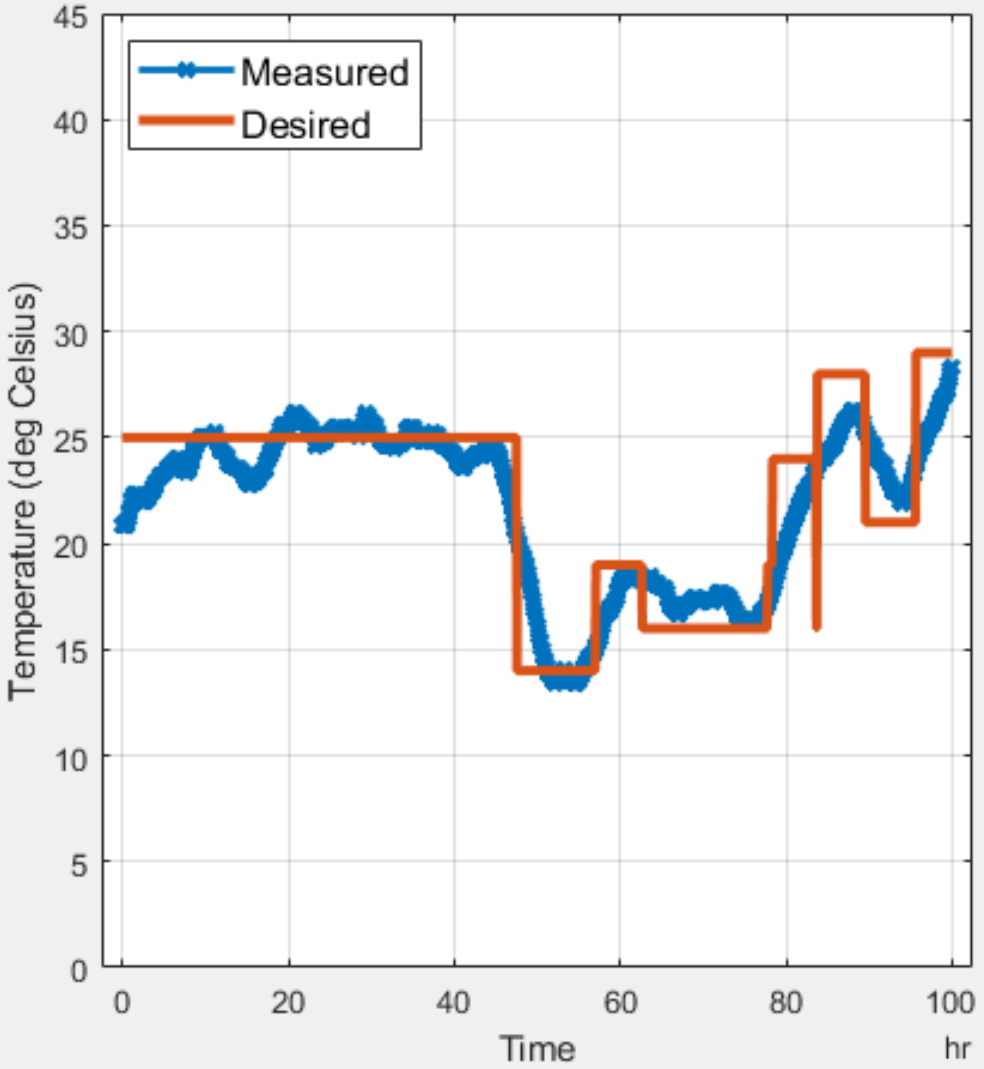
```
Loading 10000 data points from spatco_hq.csv
```



Before

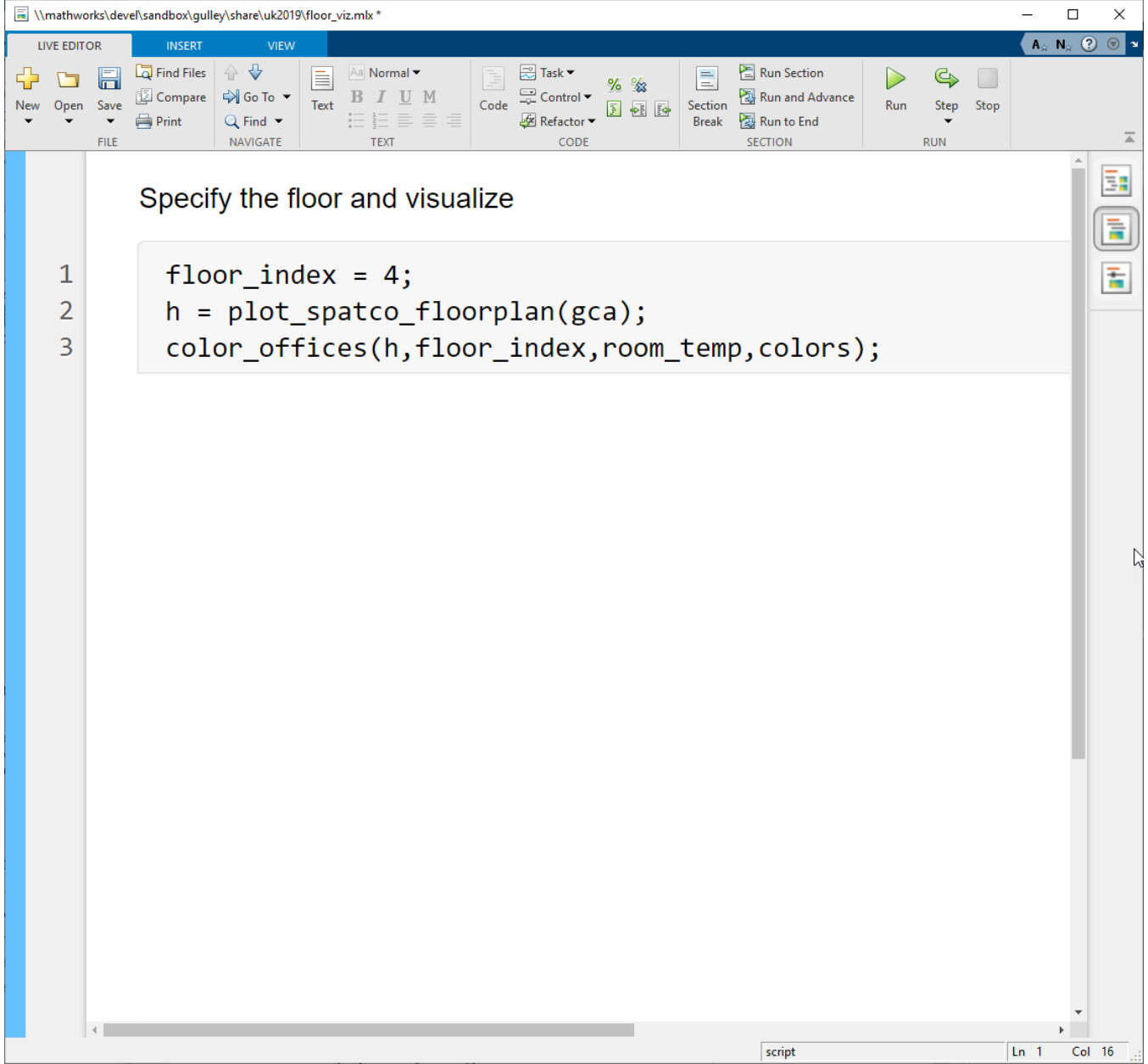


After



In which Ned uses Live Controls

SpatCo
Worldwide Headquarters


\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
LIVE EDITOR
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Code
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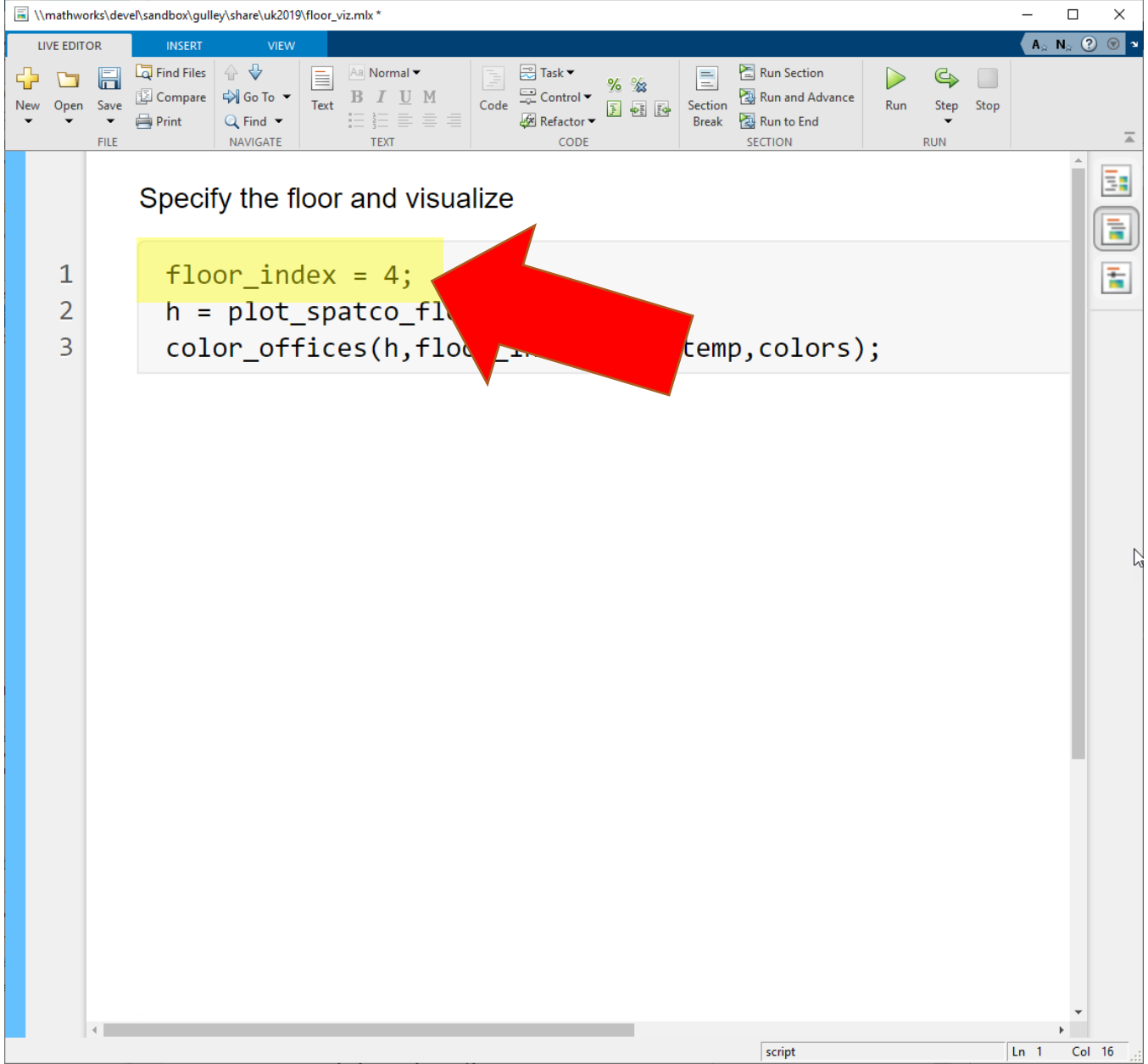
CODE
Section Break
Run Section
Run and Advance
Run to End
SECTION
Run
Step
Stop
RUN
Specify the floor and visualize
1 floor_index = 4;
2 h = plot_spatco_floorplan(gca);
3 color_offices(h,floor_index,room_temp,colors);
script
Ln 1
Col 16


\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
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NAVIGATE
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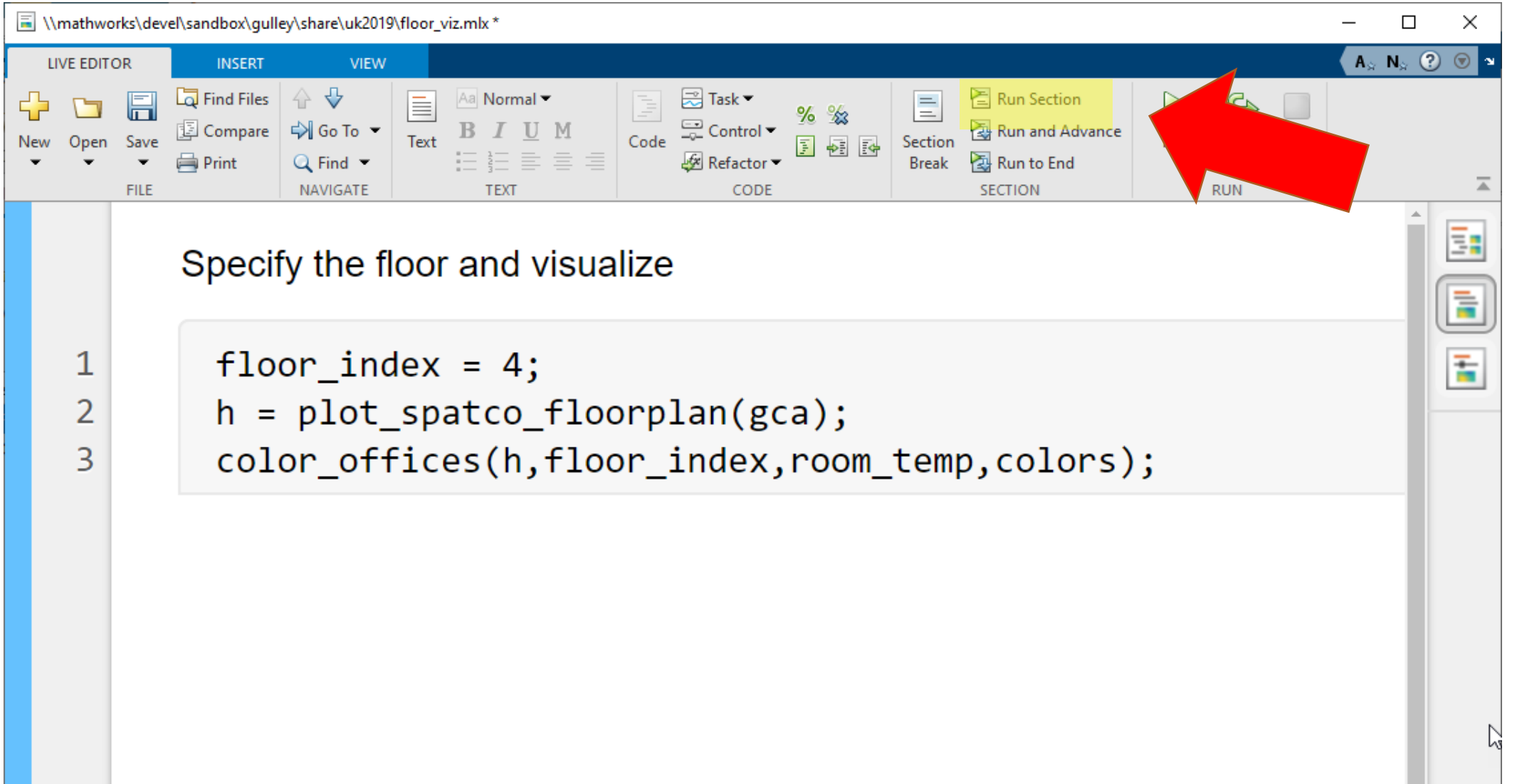
Task
Control
Refactor
CODE
Section Break
Run Section
Run and Advance
Run to End
SECTION
Run
Step
Stop
RUN
Specify the floor and visualize
1 floor_index = 4;
2 h = plot_spatco_fl
3 color_offices(h,flo temp,colors);
script
Ln 1
Col 16


\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
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Control
Refactor
CODE
Section Break
Run Section
Run and Advance
Run to End
SECTION
RUN
Specify the floor and visualize
1 floor_index = 4;
2 h = plot_spatco_floorplan(gca);
3 color_offices(h,floor_index,room_temp,colors);

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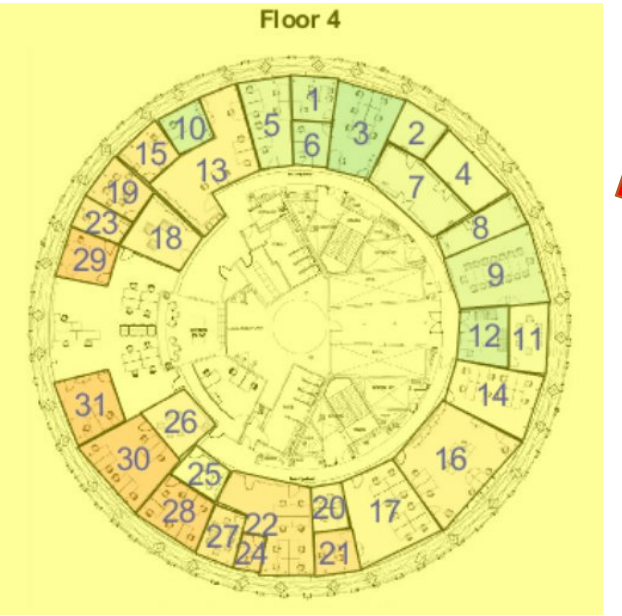
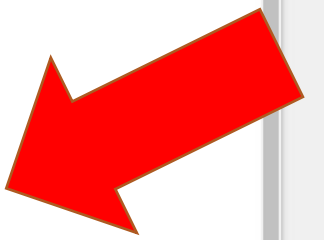
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

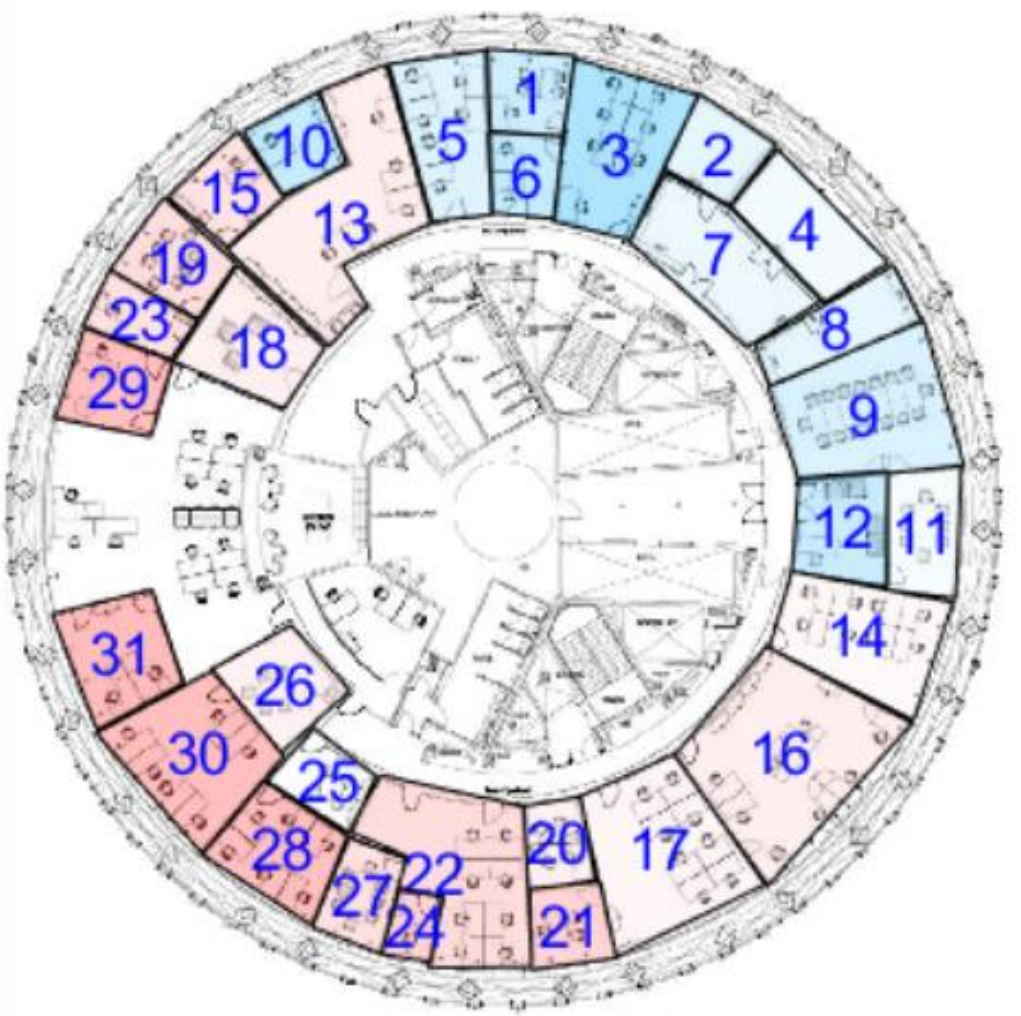
```
floor_index = 4;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```





script | Ln 1 | Col 16

Floor 4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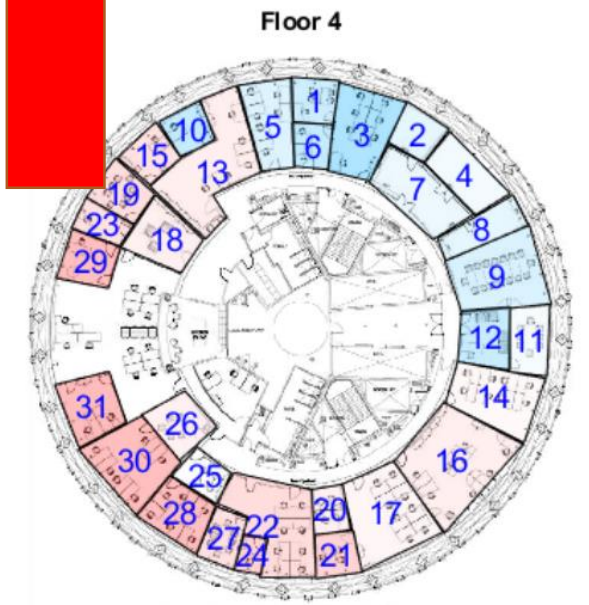
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
1  floor_index = ;
2  h = plot_spat_floorplan(gca);
3  color_offic_floor_index,room_temp,colors);
```



color_offices | Ln 1 | Col 15

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LIVE EDITOR | INSERT | VIEW

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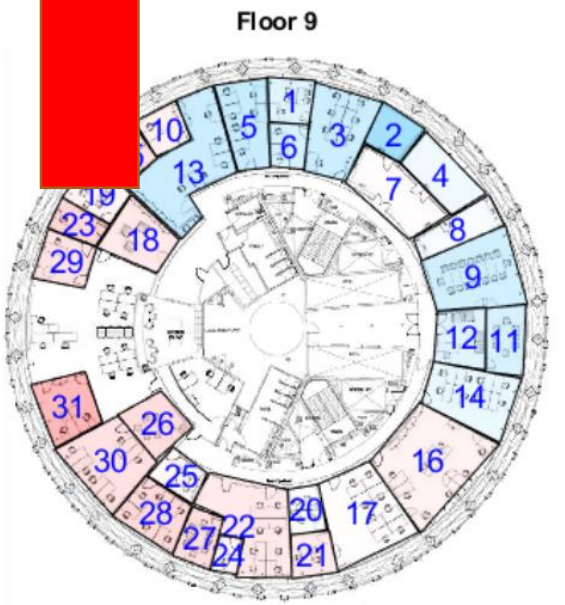
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
1  floor_index = 9;
2  h = plot_spatco_floorplan(gca);
3  color_offices(floor_index,room_temp,colors);
```



script | Ln 1 | Col 16

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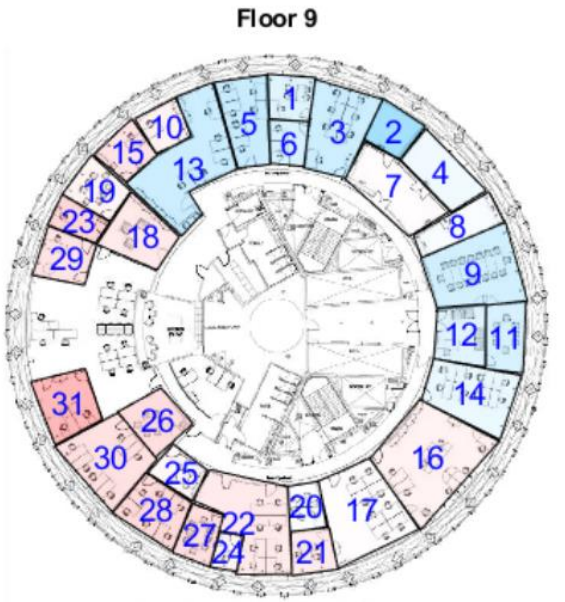
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Step | Stop

Specify the floor and visualize

```
1  floor_index = 9;
2  h = plot_spatco_floorplan(gca);
3  color_offices(h,floor_index,room_temp,colors);
```



script | Ln 1 | Col 16

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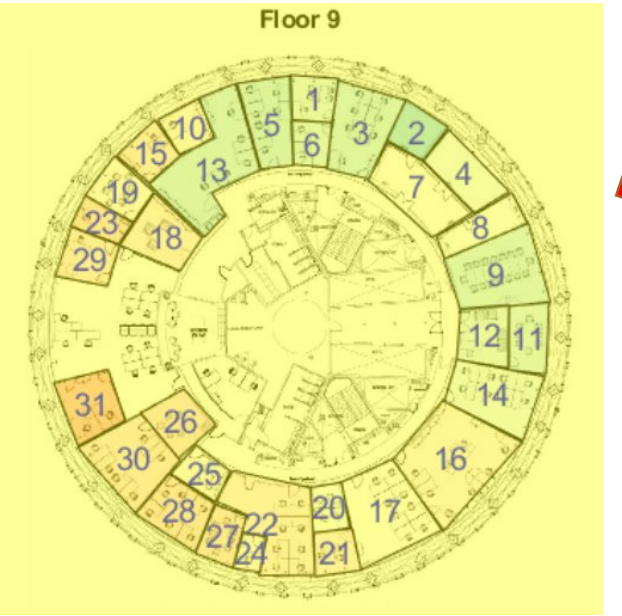
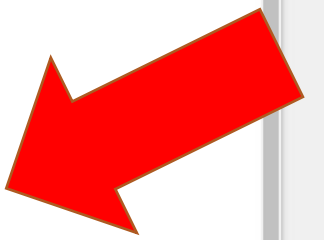
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
floor_index = 9;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```





script | Ln 1 | Col 16

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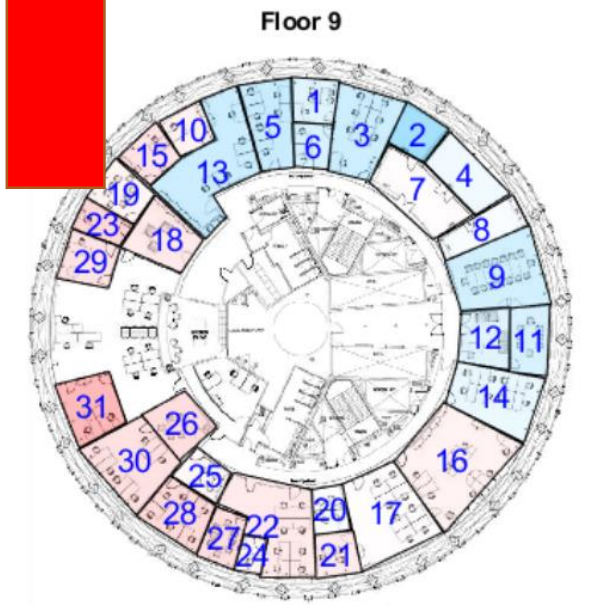
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
1  floor_index = ;
2  h = plot_spatio_floorplan(gca);
3  color_offic    floor_index,room_temp,colors);
```



color_offices | Ln 1 | Col 15

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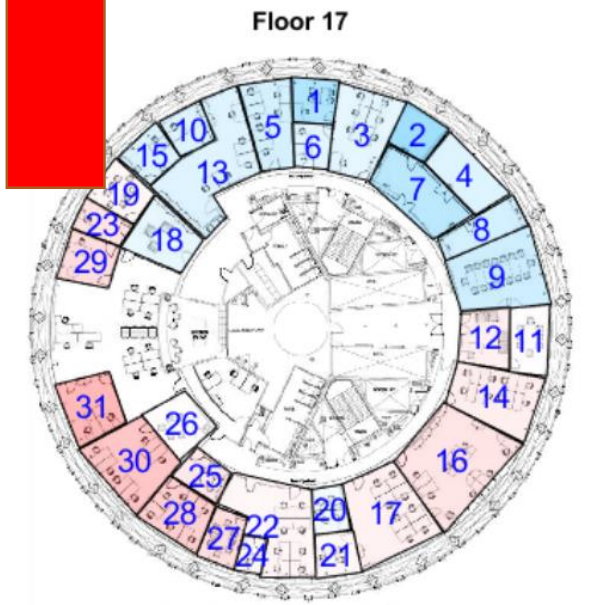
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
1  floor_index = 17;
2  h = plot_spatio_floorplan(gca);
3  color_offic    floor_index,room_temp,colors);
```



script | Ln 1 | Col 17

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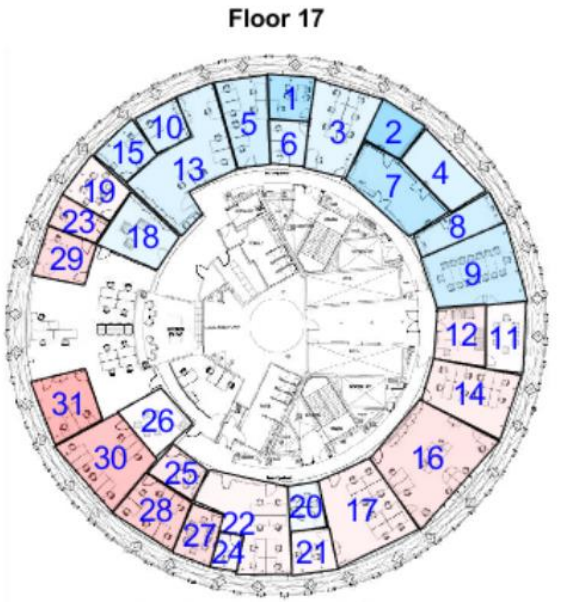
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Step | Stop

Specify the floor and visualize

```
1  floor_index = 17;
2  h = plot_spatco_floorplan(gca);
3  color_offices(h,floor_index,room_temp,colors);
```



script | Ln 1 | Col 17

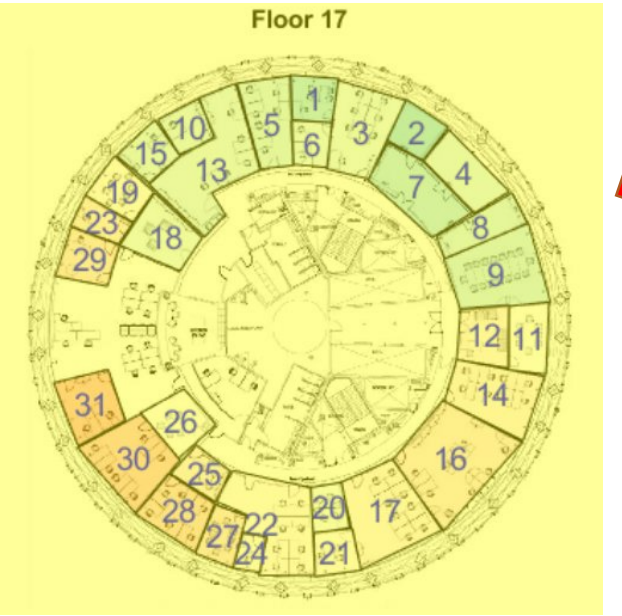
\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *

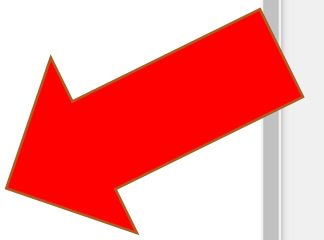
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print — FILE
Go To | Find — NAVIGATE
Text | Normal | B I U M — TEXT
Code | Task | Control | Refactor — CODE
Section Break | Run Section | Run and Advance | Run to End — SECTION
Run | Step | Stop — RUN

Specify the floor and visualize

```
floor_index = 17;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```





script | Ln 1 | Col 17

\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *

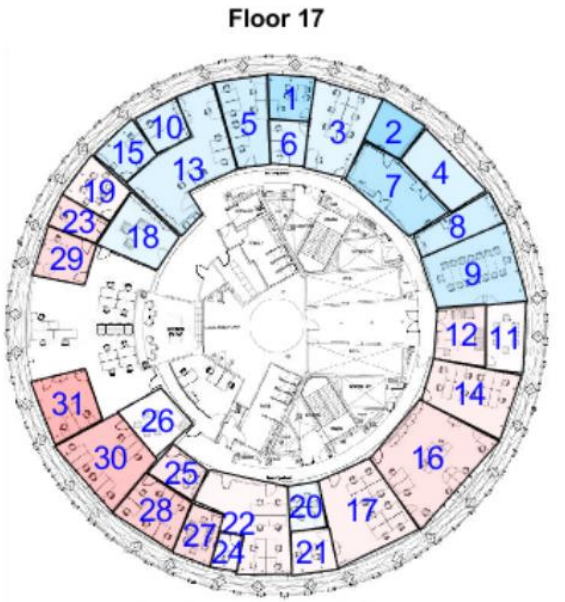
LIVE EDITOR | INSERT | VIEW

Code | Control | Task | Section Break | Text | Table of Contents | Code Example | Image | Hyperlink | Equation

CODE | SECTION | TEXT | IMAGE | LINK | EQUATION

Specify the floor and visualize

```
floor_index = 17;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```



script | Ln 1 | Col 17

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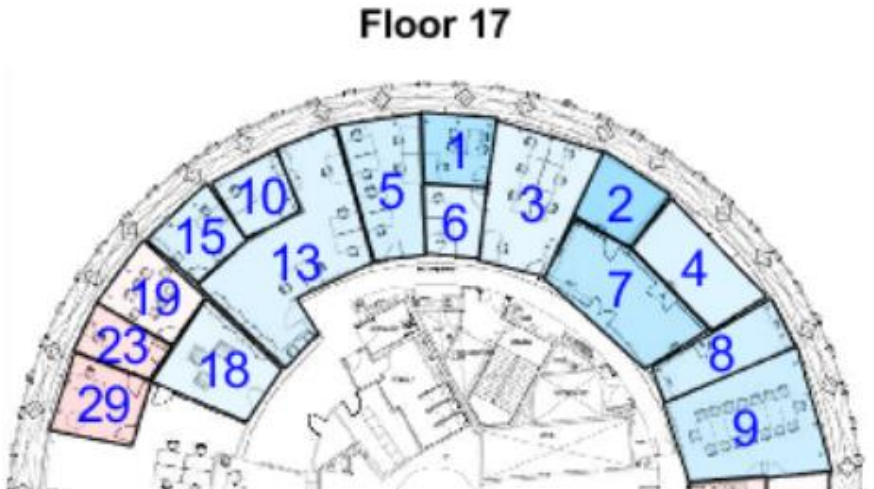
LIVE EDITOR | INSERT | VIEW

Control | Task | Section Break | Text | Table of Contents | Code Example | Image | Hyperlink | Equation

CODE | SECTION | TEXT | IMAGE | LINK | EQUATION

Specify the floor and visualize

```
floor_index = 17;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```



\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx

LIVE EDITOR | INSERT | VIEW

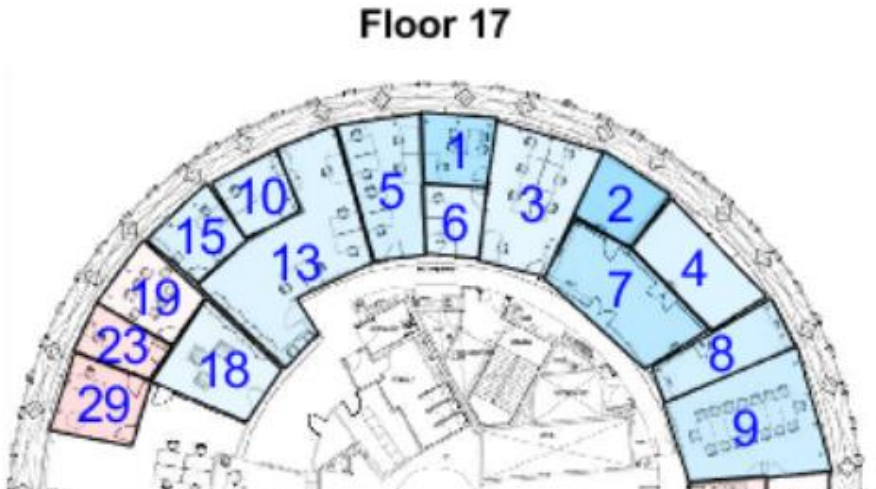
Code | Control | Task | Section Break | Text | Table of Contents | Code Example | Image | Hyperlink | Equation

TEXT | IMAGE | LINK | EQUATION

- Numeric Slider
- Drop Down
- Check Box
- Edit Field
- Button

ecify the floor and visualize

```
floor_index = 17;
h = plot_spatco_floorplan(gca);
color_offices(h,floor_index,room_temp,colors);
```



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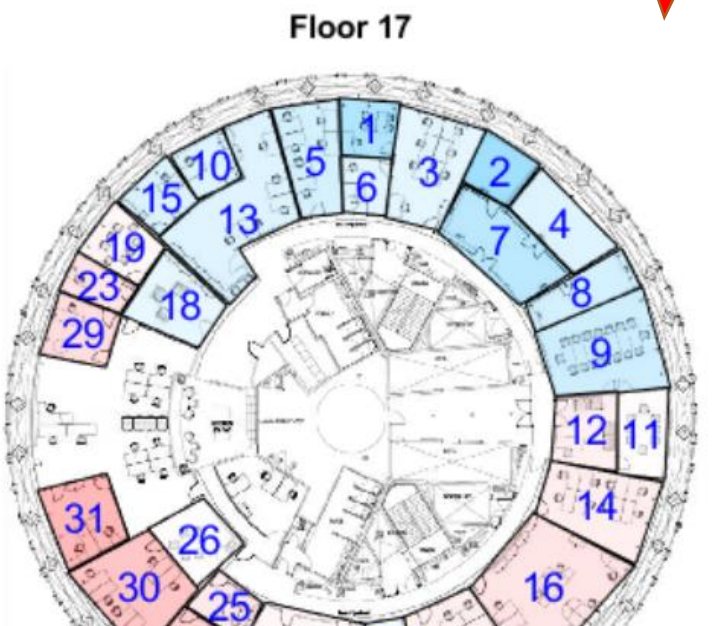
LIVE EDITOR | INSERT | VIEW

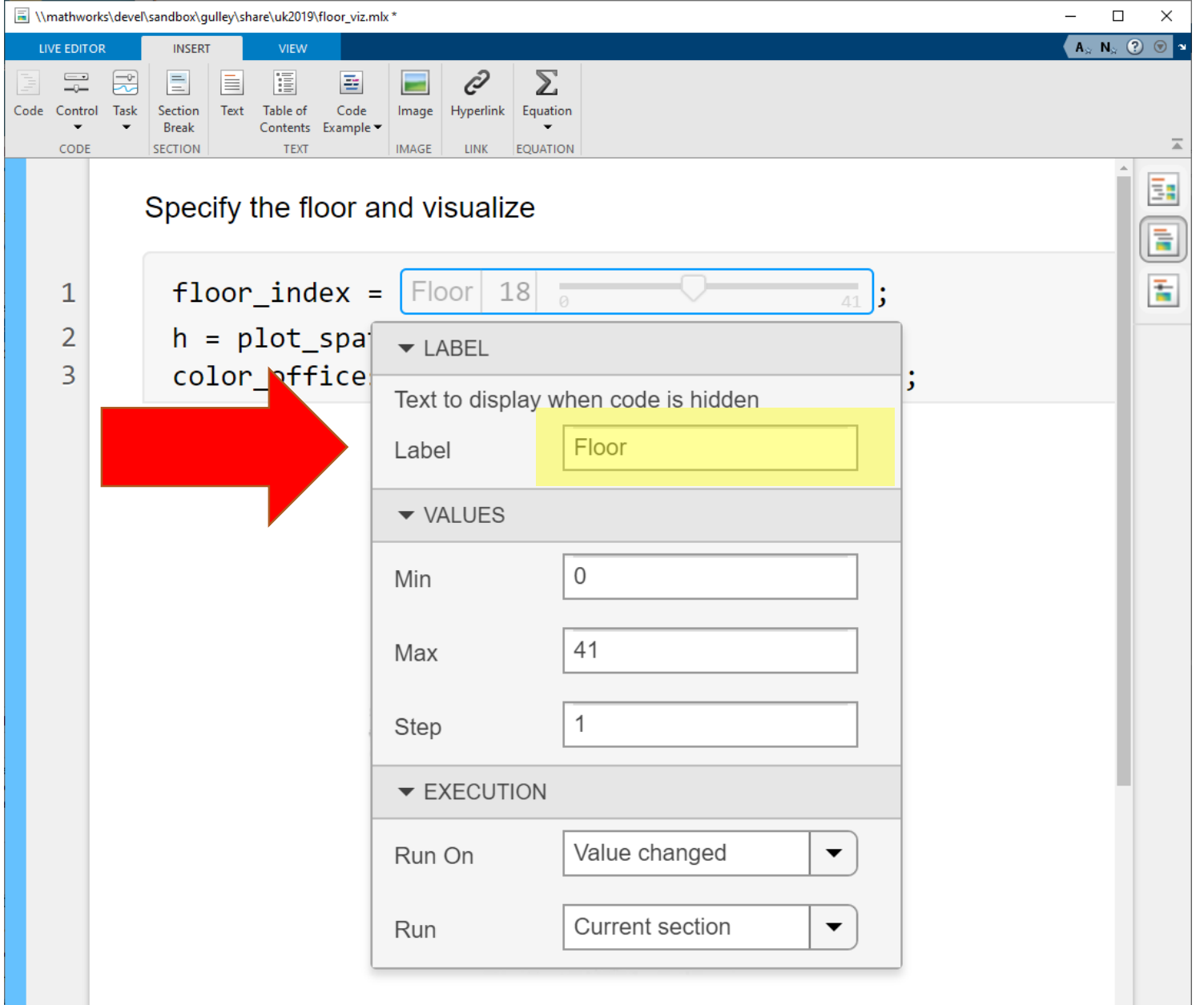
Code | Control | Task | Section Break | Text | Table of Contents | Code Example | Image | Hyperlink | Equation

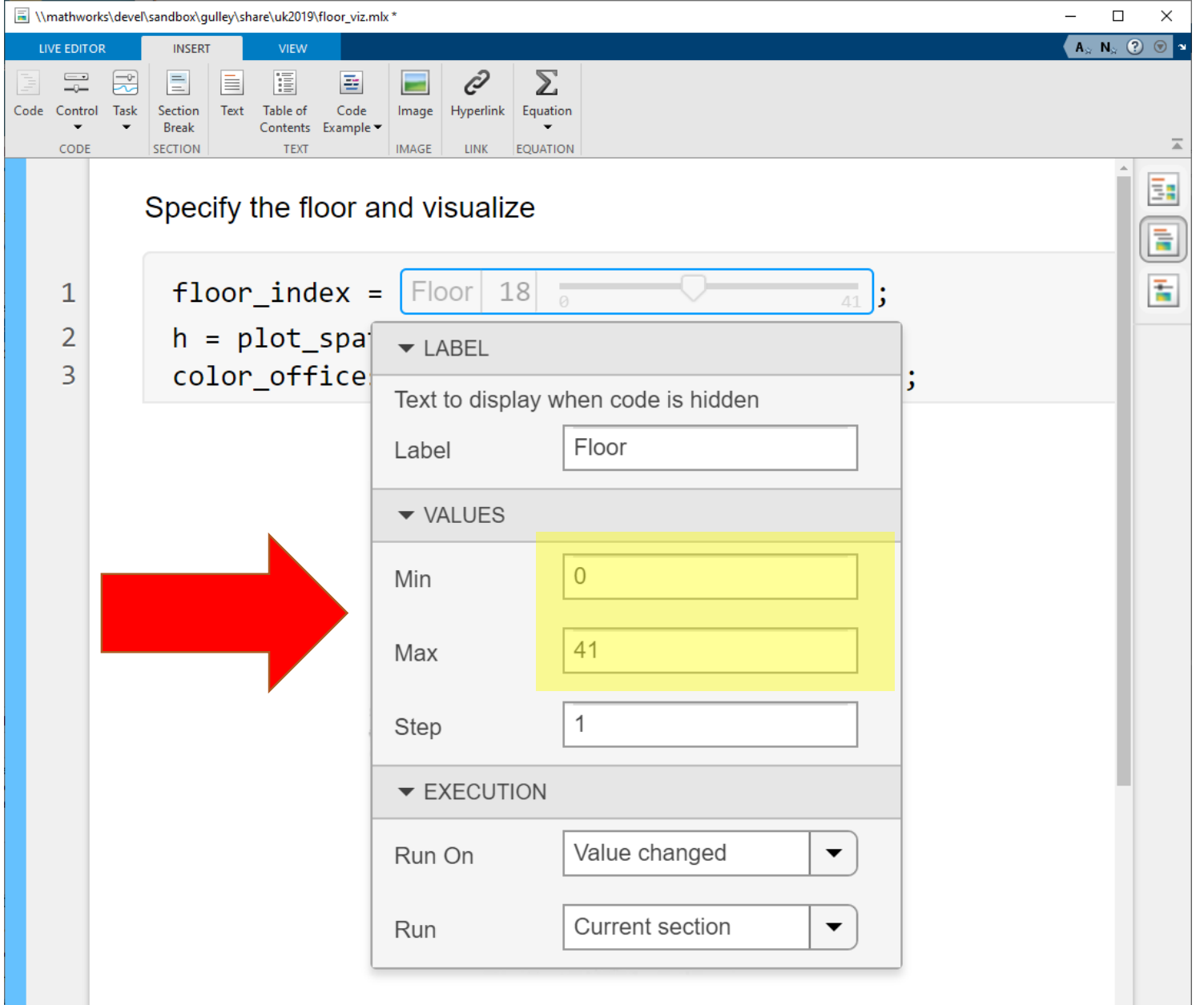
CODE | SECTION | TEXT | IMAGE | LINK | EQUATION

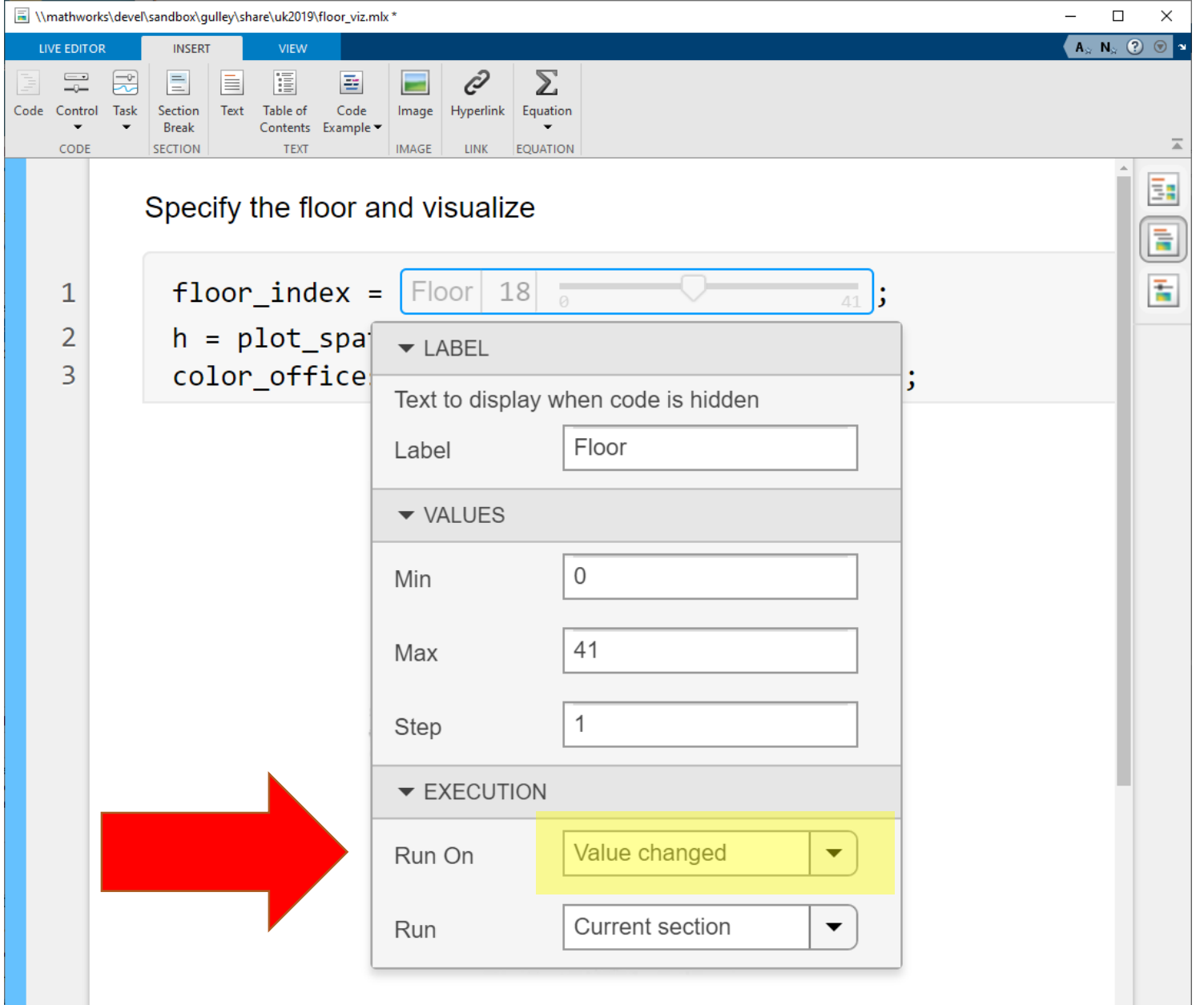
Specify the floor and visualize

```
1  floor_index = 17;
2  h = plot_spatco_floorplan(gca);
3  color_offices(h,floor_index,room_temp,c
```

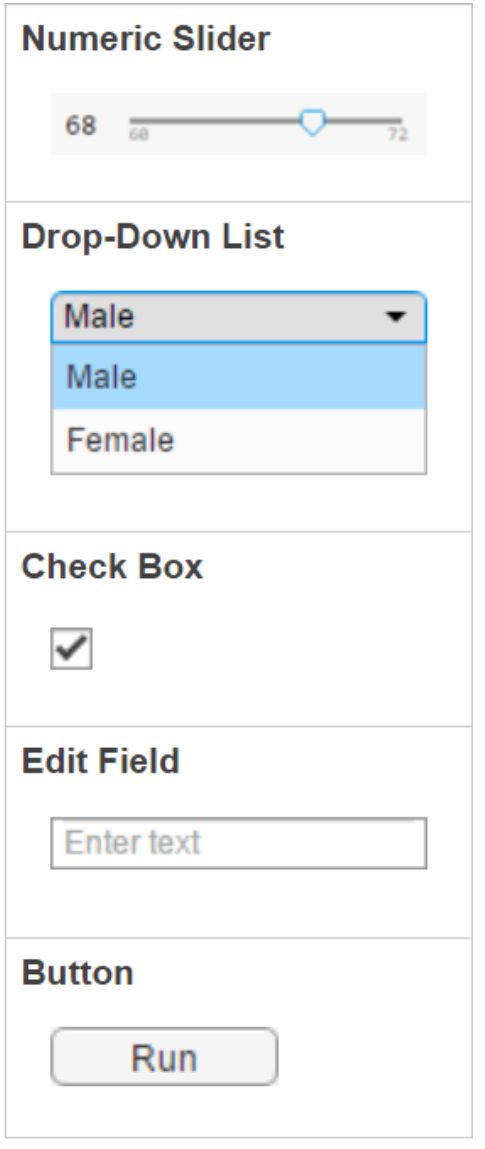



\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
LIVE EDITOR
INSERT
VIEW
Code
Control
Task
Section Break
Text
Table of Contents
Code Example
Image
Hyperlink
Equation
CODE
SECTION
TEXT
IMAGE
LINK
EQUATION
Specify the floor and visualize
1
floor_index = Floor 18 0 41 ;
2
h = plot_spa
3
color_office
;
LABEL
Text to display when code is hidden
Label
Floor
VALUES
Min
0
Max
41
Step
1
EXECUTION
Run On
Value changed
Run
Current section


\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
LIVE EDITOR
INSERT
VIEW
Code
Control
Task
Section Break
Text
Table of Contents
Code Example
Image
Hyperlink
Equation
CODE
SECTION
TEXT
IMAGE
LINK
EQUATION
Specify the floor and visualize
1 floor_index = Floor 18 0 41 ;
2 h = plot_spa
3 color_office
;
LABEL
Text to display when code is hidden
Label
Floor
VALUES
Min
0
Max
41
Step
1
EXECUTION
Run On
Value changed
Run
Current section


\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *
LIVE EDITOR
INSERT
VIEW
Code
Control
Task
Section Break
Text
Table of Contents
Code Example
Image
Hyperlink
Equation
CODE
SECTION
TEXT
IMAGE
LINK
EQUATION
Specify the floor and visualize
1 floor_index = Floor 18 0 41 ;
2 h = plot_spa
3 color_office
;
LABEL
Text to display when code is hidden
Label
Floor
VALUES
Min
0
Max
41
Step
1
EXECUTION
Run On
Value changed
Run
Current section

Live Controls



\\mathworks\devel\sandbox\gulley\share\uk2019\floor_viz.mlx *

LIVE EDITOR | INSERT | VIEW

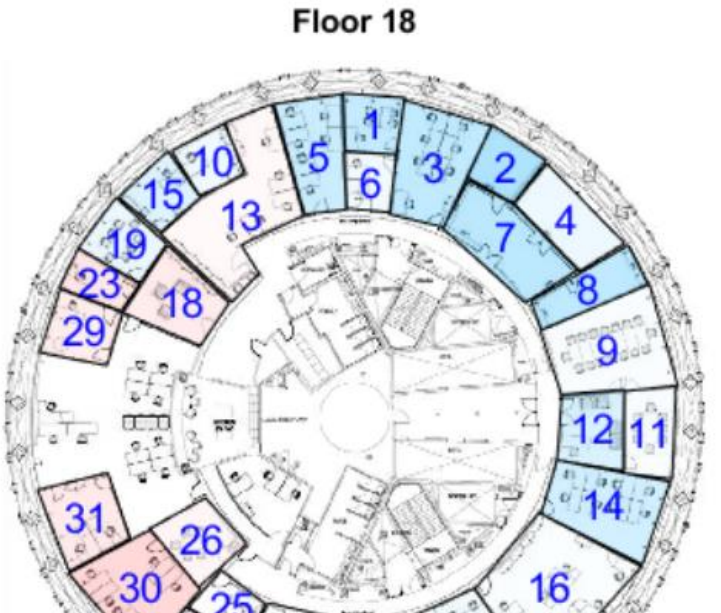
Code | Control | Task | Section Break | Text | Table of Contents | Code Example | Image | Hyperlink | Equation

CODE | SECTION | TEXT | IMAGE | LINK | EQUATION

Specify the floor and visualize

```
1  floor_index =  18 ;
2  h = plot_spatco_floorplan(gca);
3  color_offices(h,floor_index,room_temp,colors);
```

Hide code

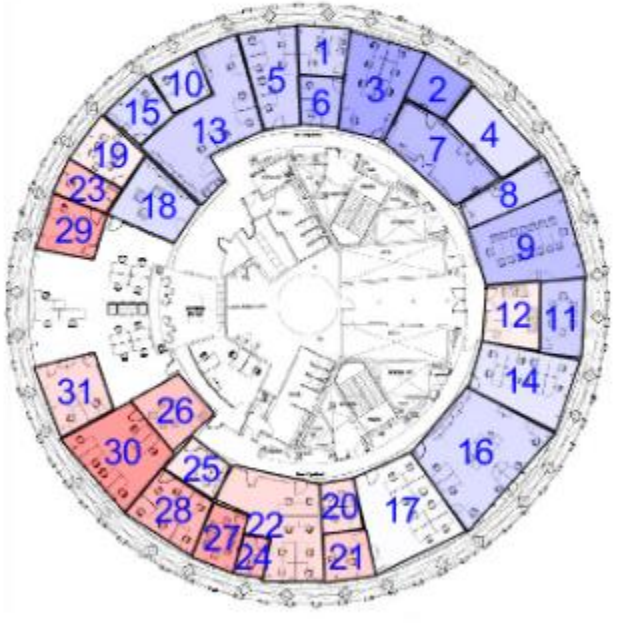


Specify the floor and visualize

Floor Number 8

0 41

Floor 8

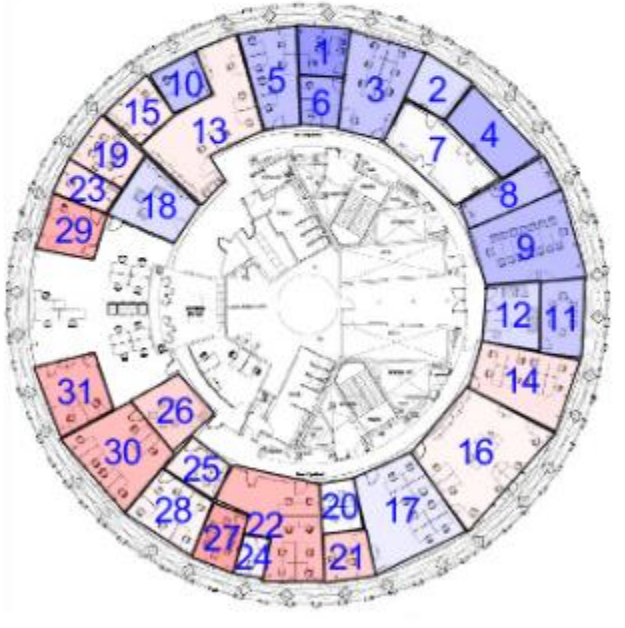


Specify the floor a visualize

Floor Number 13

0 41

Floor 13

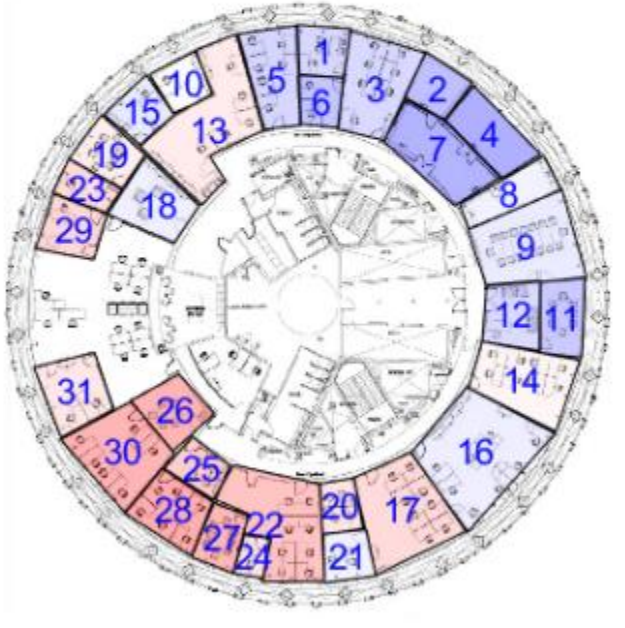


Specify the floor and visualize

Floor Number 18

0 41

Floor 18

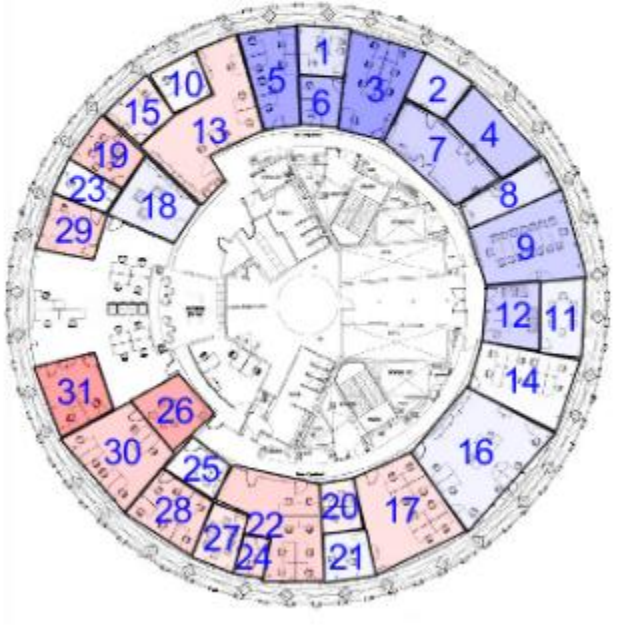


Specify the floor and vis ze

Floor Number 30

0 41

Floor 30

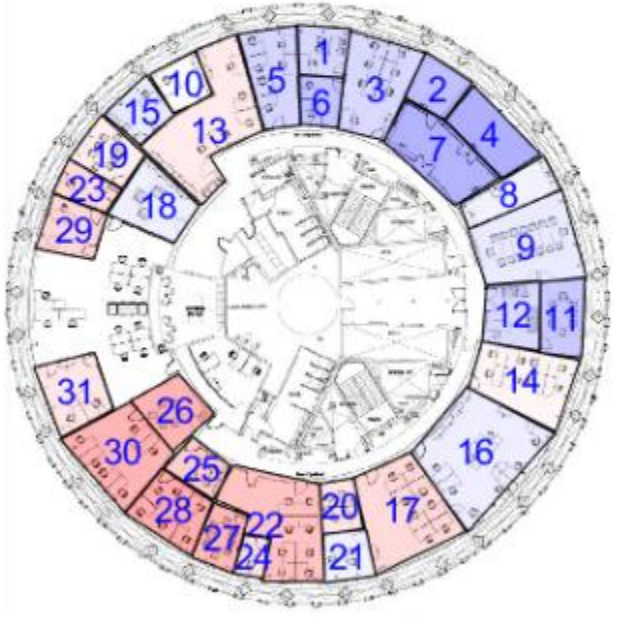


Specify the floor and visualize

Floor Number 18

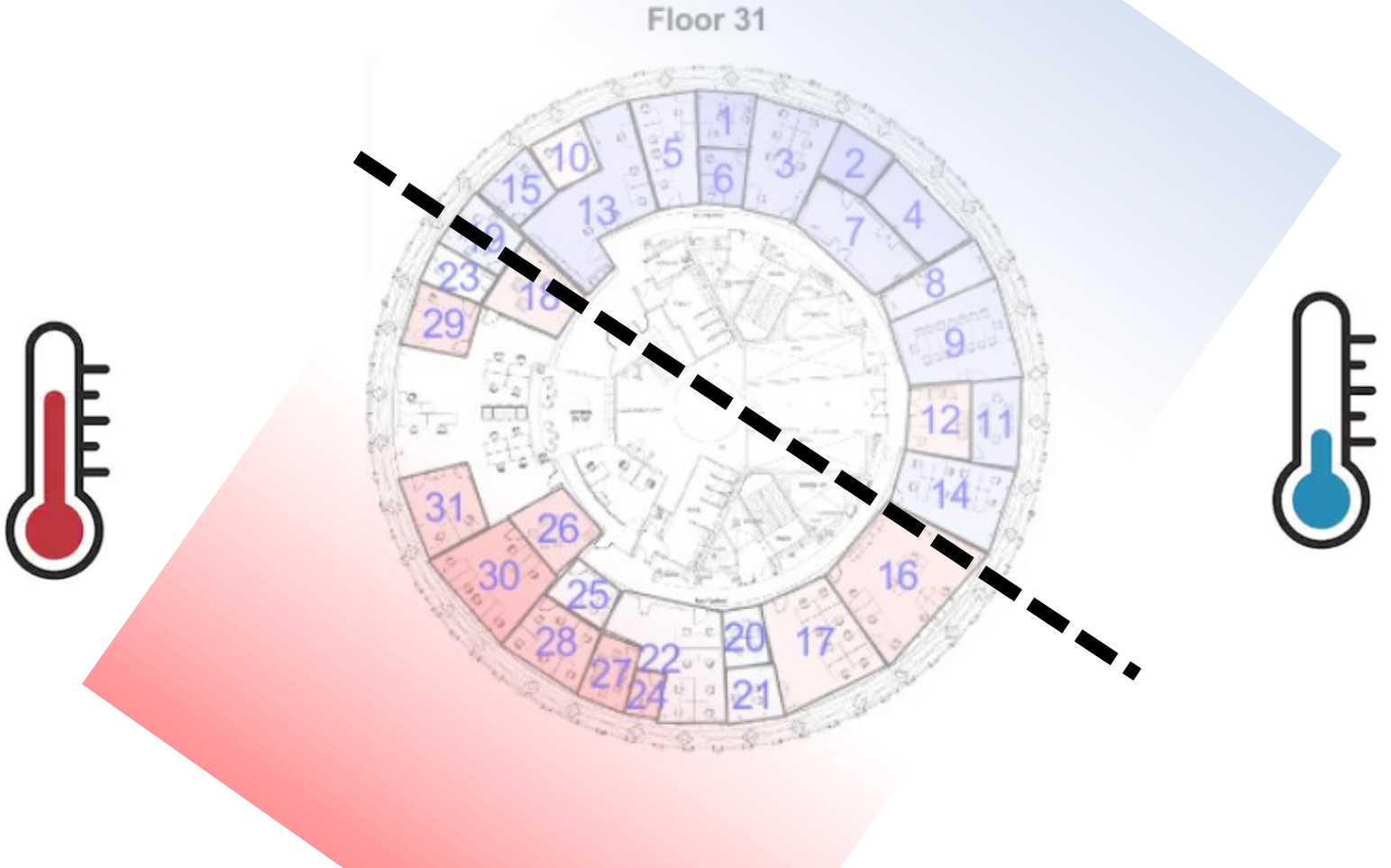
0 41

Floor 18

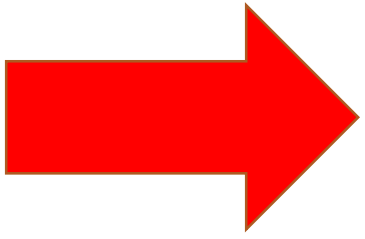


Specify the floor and visualize

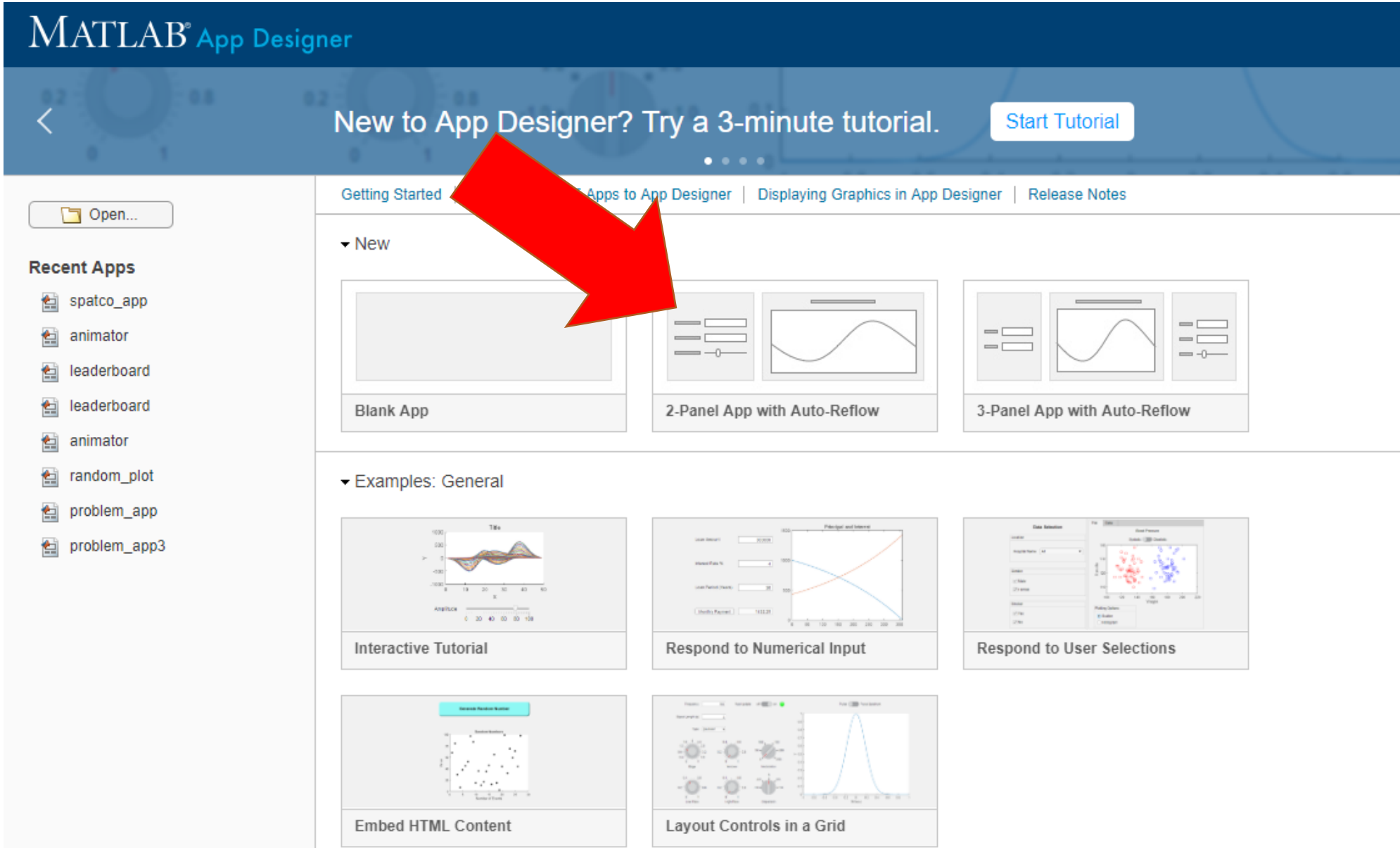
Floor Number 31



In which Ned makes an App with AppDesigner



```
>> appdesigner
```


MATLAB App Designer
New to App Designer? Try a 3-minute tutorial.
Start Tutorial
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Recent Apps
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animator
leaderboard
leaderboard
animator
random_plot
problem_app
problem_app3
Getting Started
Apps to App Designer
Displaying Graphics in App Designer
Release Notes
New
Blank App
2-Panel App with Auto-Reflow
3-Panel App with Auto-Reflow
Examples: General
Interactive Tutorial
Respond to Numerical Input
Respond to User Selections
Embed HTML Content
Layout Controls in a Grid

MATLAB® App Designer

New to App Designer? Try a 3-minute tutorial. Start Tutorial

Open...

Recent Apps

- spatco_app
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- leaderboard
- leaderboard
- animator
- random_plot
- problem_app
- problem_app3

Getting Started | Migrating GUIDE Apps to App Designer | Displaying Graphics in App Designer | Release Notes

▾ New

Blank App

2-Panel App with Auto-Reflow

3-Panel App with Auto-Reflow

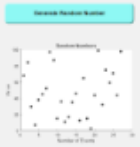
▾ Examples: General

Create a new 2-panel app that automatically resizes and reflows its layout to accommodate different screen sizes

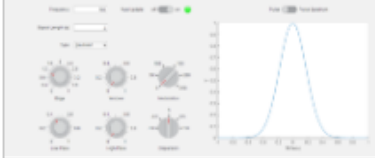
Interactive Tutorial

Respond to Numerical Input

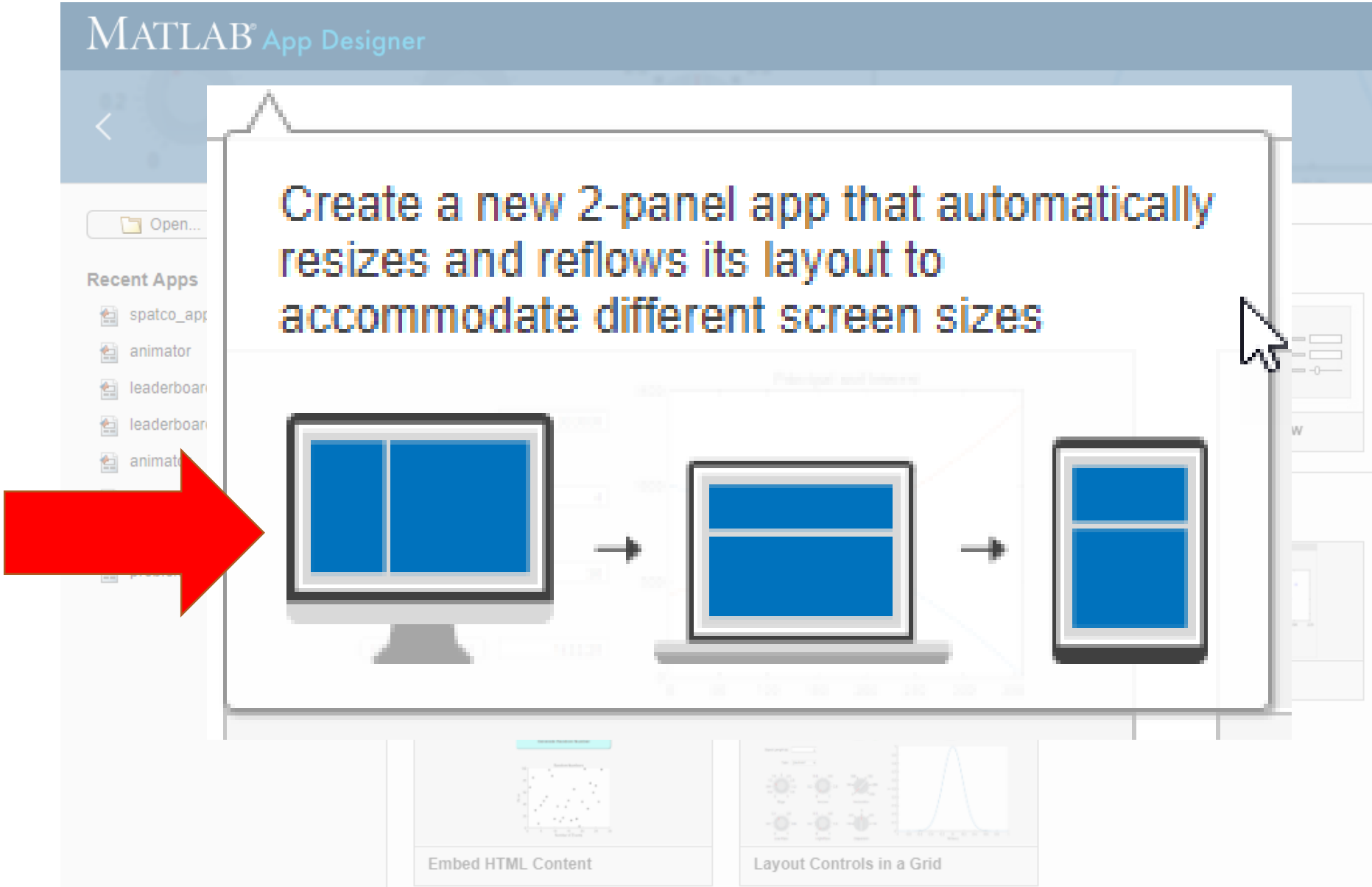
Respond to User Selections



Embed HTML Content



Layout Controls in a Grid


MATLAB App Designer
Open...
Recent Apps
spatco_app
animator
leaderboar
leaderboar
animat
Create a new 2-panel app that automatically resizes and reflows its layout to accommodate different screen sizes
Embed HTML Content
Layout Controls in a Grid

App Designer - \\mathworks\devel\sandbox\gulley\share\uk2019\spatco_app.mlapp

DESIGNER | CANVAS

Save | Convert | FILE
Same Size | Grouping | ARRANGE
Evenly | Apply Horizontally | Apply Vertically | SPACE
Show grid | Snap to grid | Interval: 10 | Show alignment hints | Show resizing hints | VIEW
Run | RUN

spatco_app.mlapp

COMPONENT LIBRARY

Search

COMMON

Axes | Button | Check Box
Date Picker | Drop Down | Edit Field (Numeric)
Edit Field (Text) | HTML | Image
Label | List Box | Radio Button Group
Slider | Spinner | State Button
Table | Text Area | Toggle Button Group

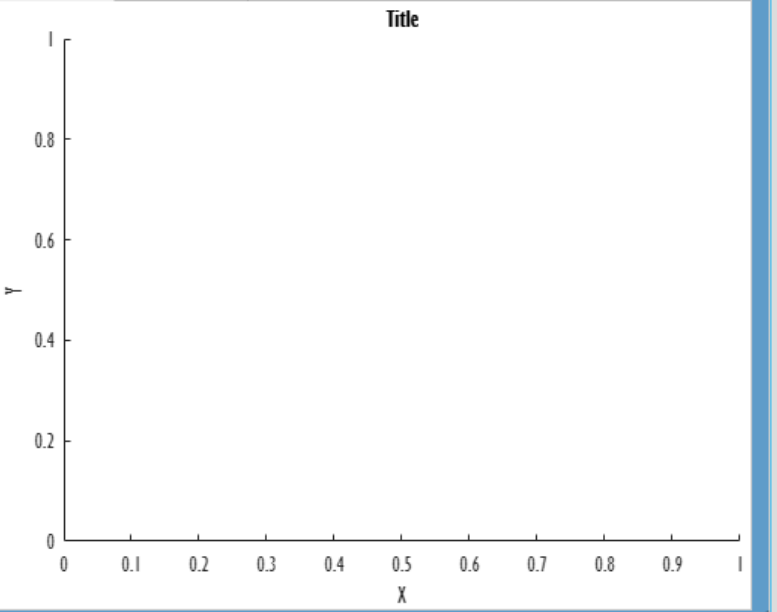
Design View | Code View

SpatCo HQ
Thermostats

Floor 1

Office 101

Floorplan | Thermostat



COMPONENT BROWSER

Search

app.UIFigure
app.LeftPanel
app.OfficeSpinner
app.SpatCoHQLabel
app.FloorSpinner
app.Image
app.ThermostatsLabel
app.RightPanel
app.TabGroup
app.FloorplanTab
app.UIAxes
app.ThermostatTab
app.UIAxes2

Inspector | Callbacks

Search

Label: Floor

VALUE

Value: 1
Limits: -Inf,Inf
Step: 1
RoundFractionalValues
ValueDisplayFormat: %11.4g
HorizontalAlignment

App Designer - \\mathworks\devel\sandbox\gulley\share\uk2019\spatco_app.mlapp

DESIGNER | CANVAS

Save | Convert | FILE
ALIGN
Same Size | Grouping | ARRANGE
Evenly | Apply Horizontally | Apply Vertically | SPACE
Show grid | Snap to grid | Interval: 10 | Show alignment hints | Show resizing hints | VIEW
Run | RUN

spatco_app.mlapp

COMPONENT LIBRARY

Search

COMMON

Axes | Button | Check Box
Date Picker | Drop Down | Edit Field (Numeric)
Edit Field (Text) | HTML | Image
Label | List Box | Radio Button Group
Slider | Spinner | State Button
Table | Text Area | Toggle Button Group

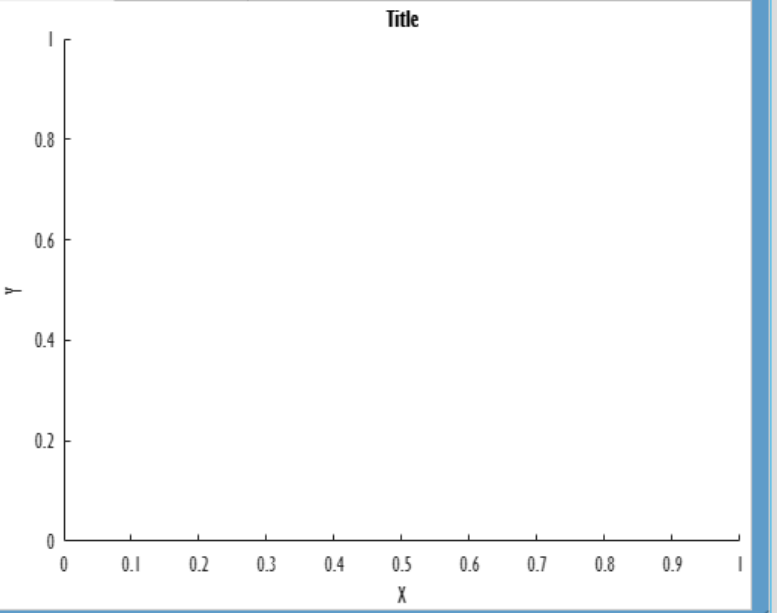
Design View | Code View

SpatCo HQ
Thermostats

Floor 1

Office 101

Floorplan | Thermostat



COMPONENT BROWSER

Search

app.UIFigure
app.LeftPanel
app.OfficeSpinner
app.SpatCoHQLabel
app.FloorSpinner
app.Image
app.ThermostatsLabel
app.RightPanel
app.TabGroup
app.FloorplanTab
app.UIAxes
app.ThermostatTab
app.UIAxes2

Inspector | Callbacks

Search

Label: Floor

VALUE

Value: 1
Limits: -Inf,Inf
Step: 1
RoundFractionalValues
ValueDisplayFormat: %11.4g
HorizontalAlignment

SpatCo HQ

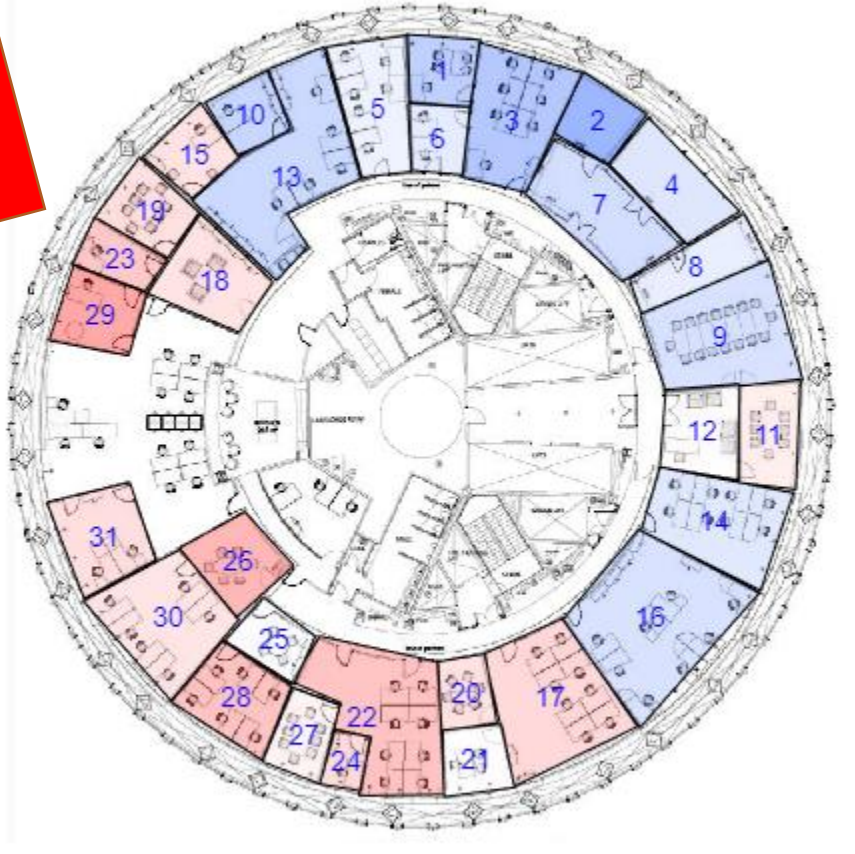
Thermostats

Floor 6

Office 601

Floorplan | Thermostat

Office Plan for Floor 6



SpatCo HQ

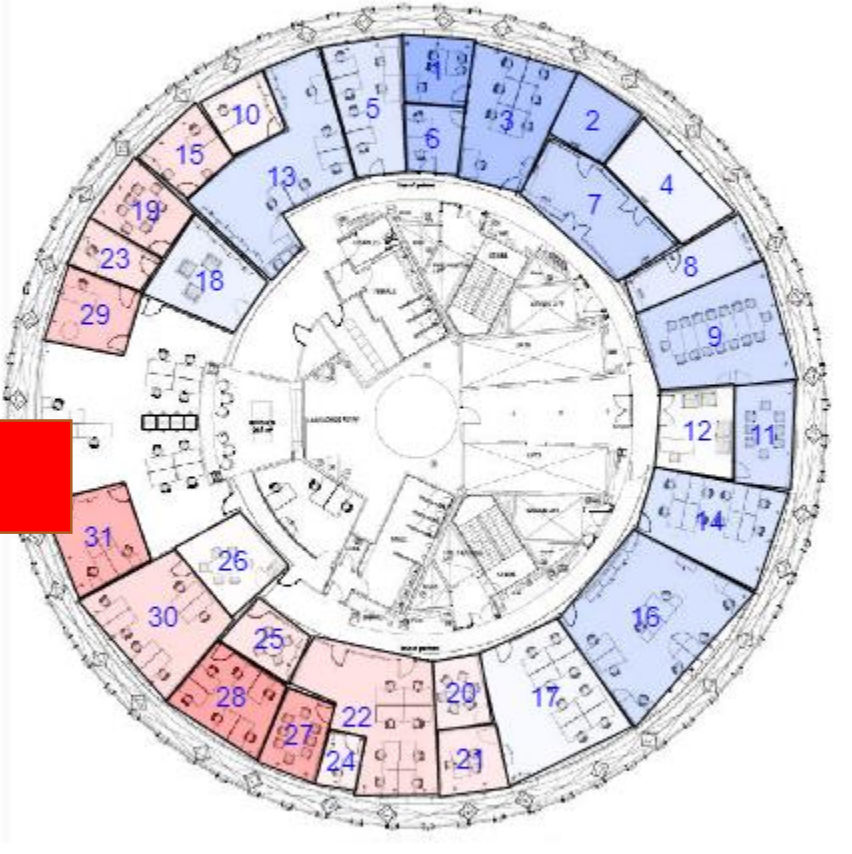
Thermostats

Floor 7

Office 701

Floorplan | Thermostat

Office Plan for Floor 7



SpatCo HQ

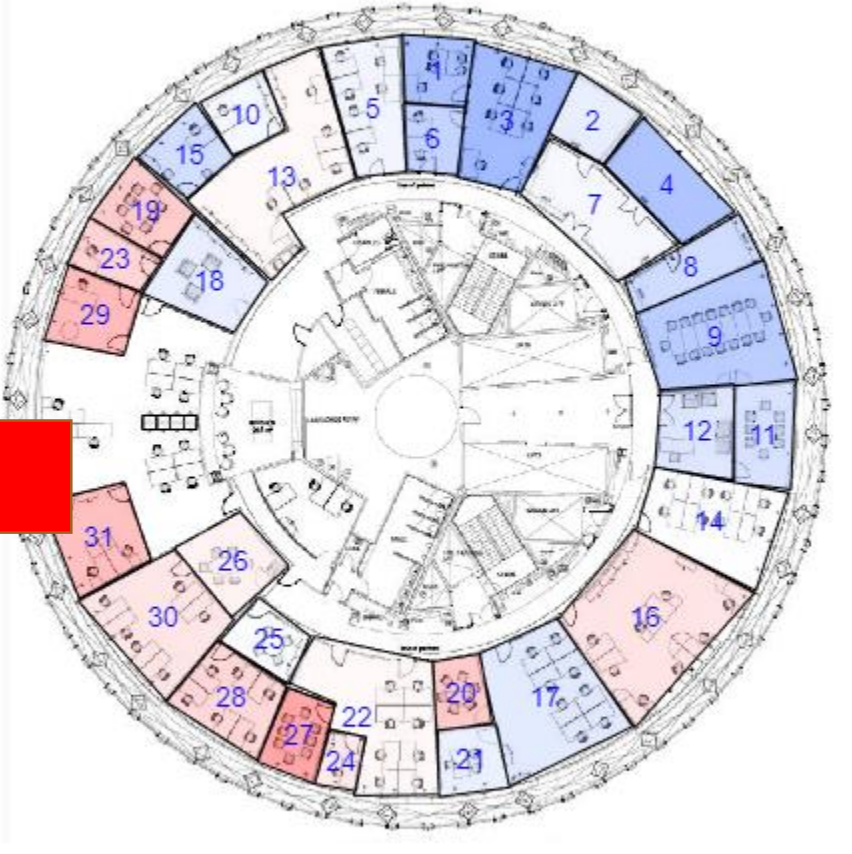
Thermostats

Floor 8

Office 801

Floorplan | Thermostat

Office Plan for Floor 8



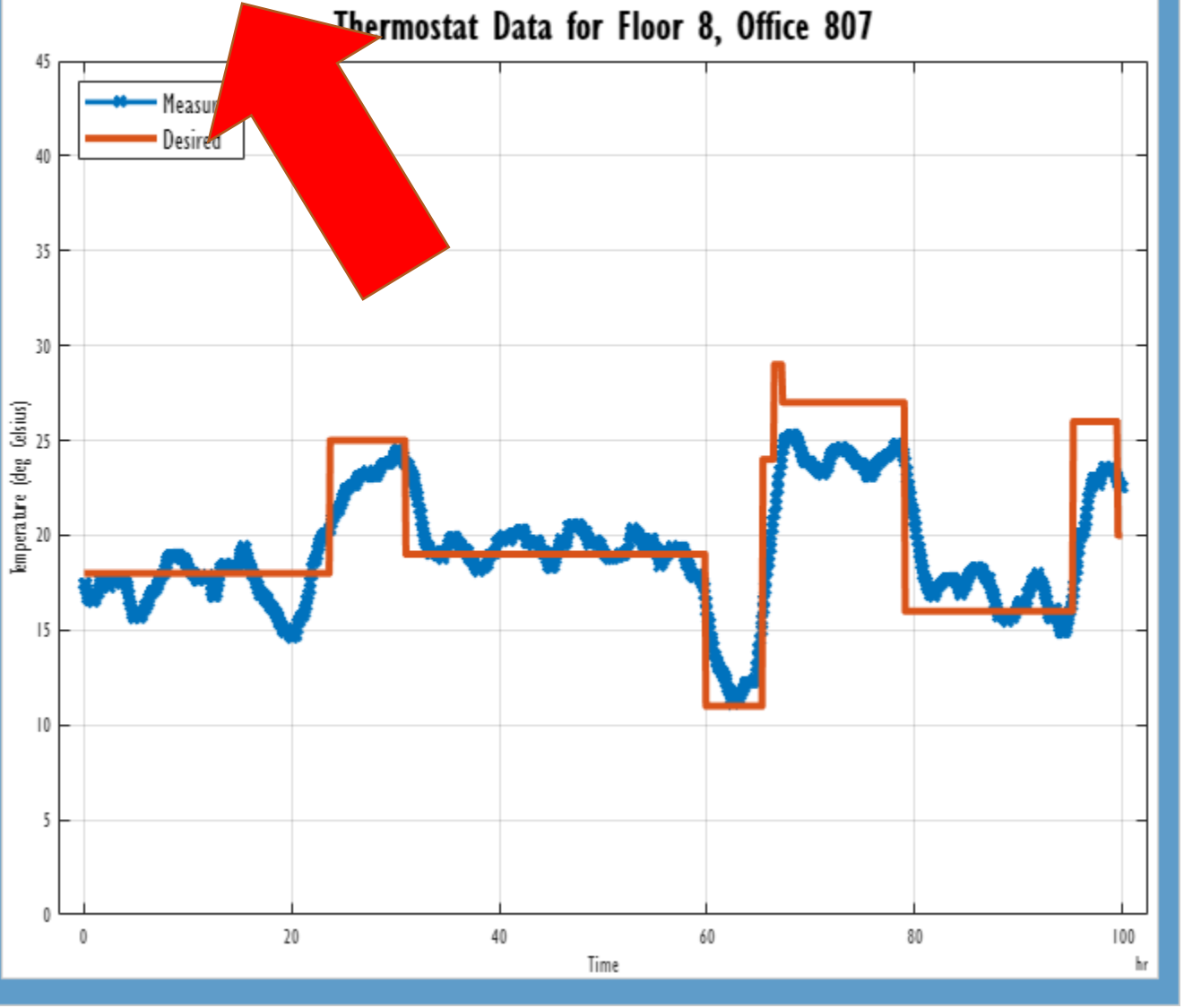
SpatCo HQ

Thermostats

Floor 8

Office 807

Floorplan | Thermostat

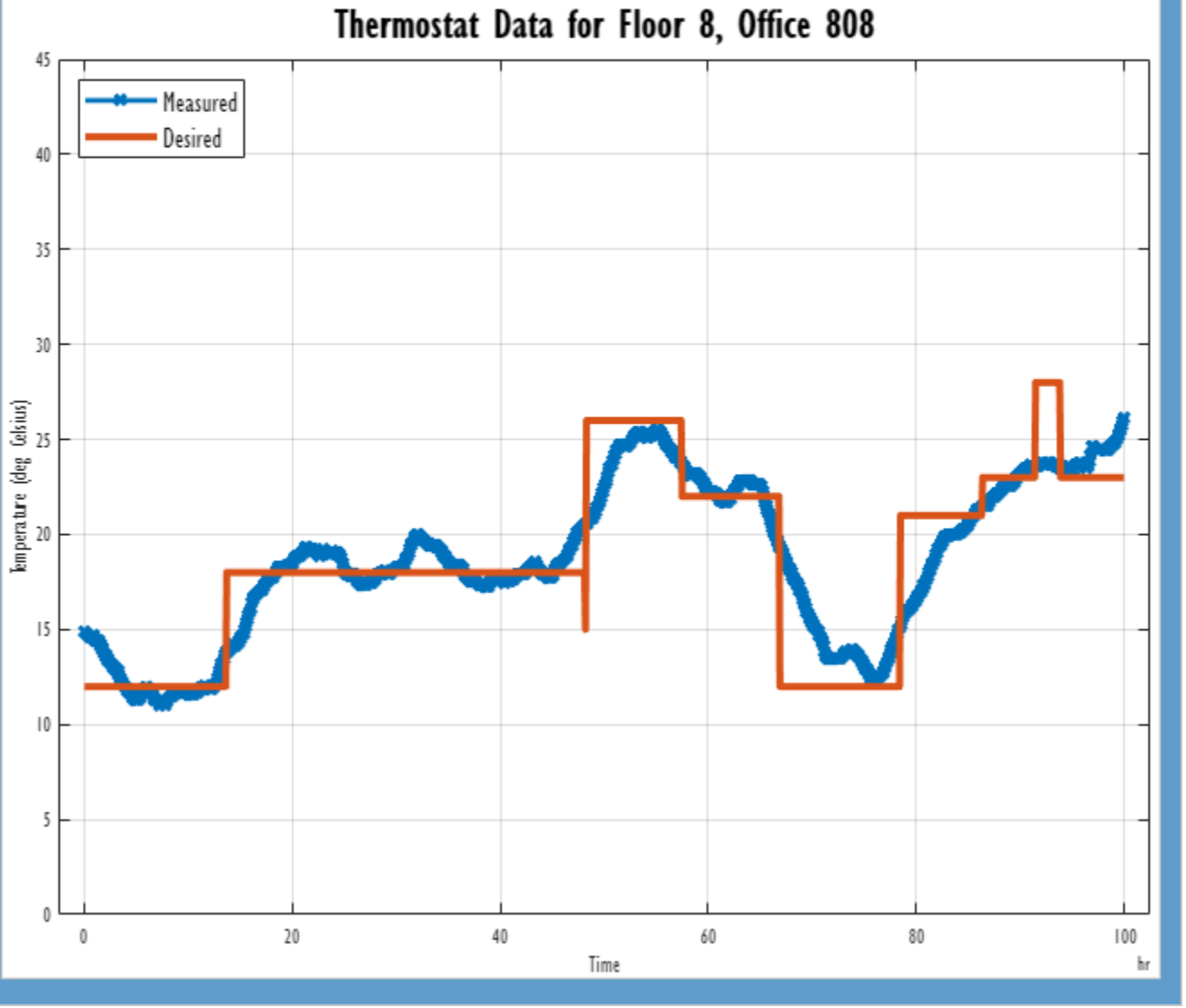


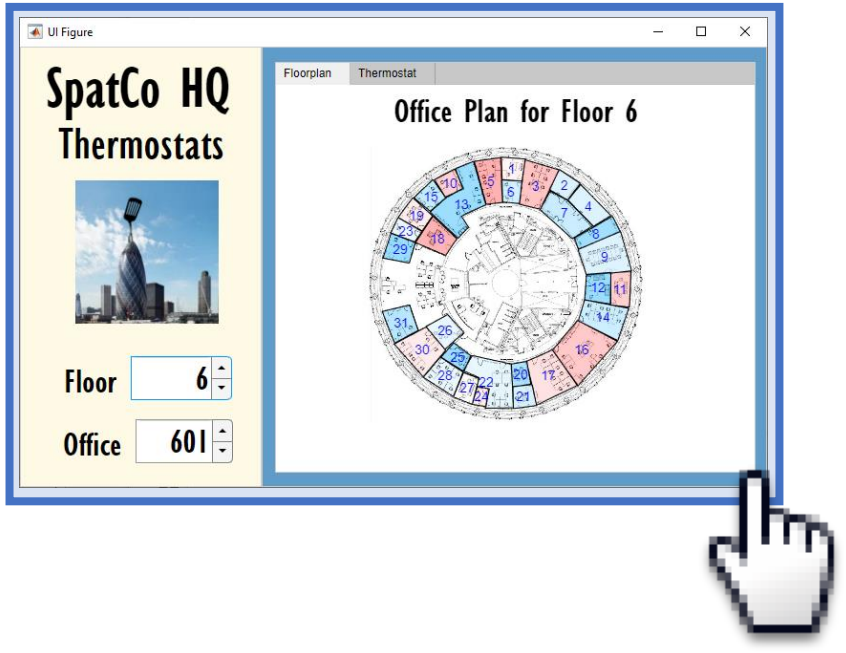
SpatCo HQ
Thermostats

Floor 8

Office 808

Floorplan | Thermostat




UI Figure
SpatCo HQ
Thermostats
Floor
6
Office
601
Floorplan
Thermostat
Office Plan for Floor 6

UI Figure

SpatCo HQ
Thermostats

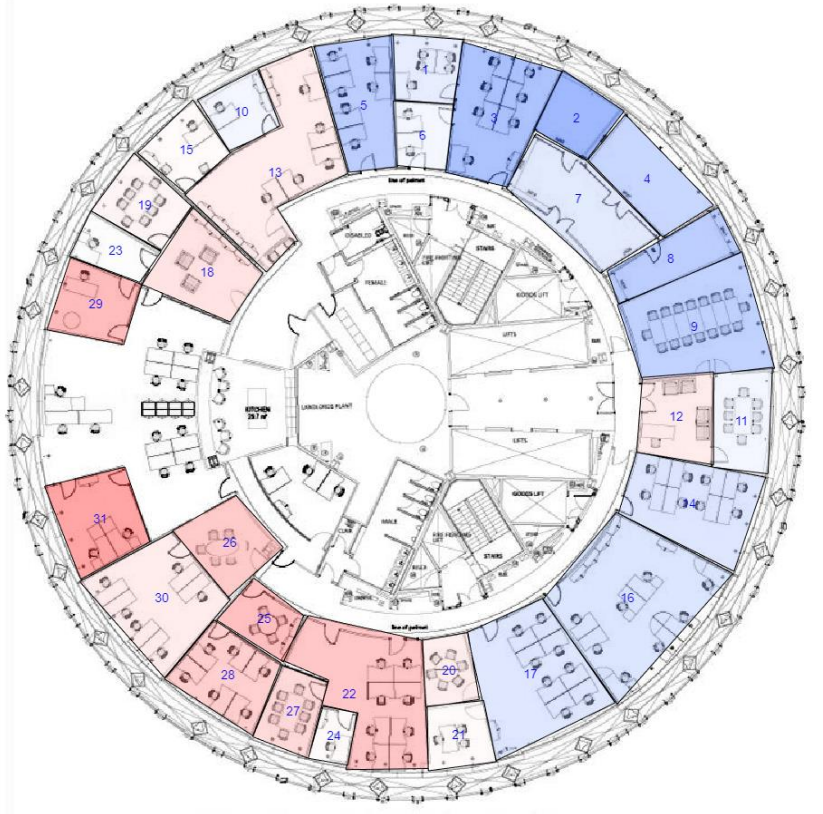
Floor 8

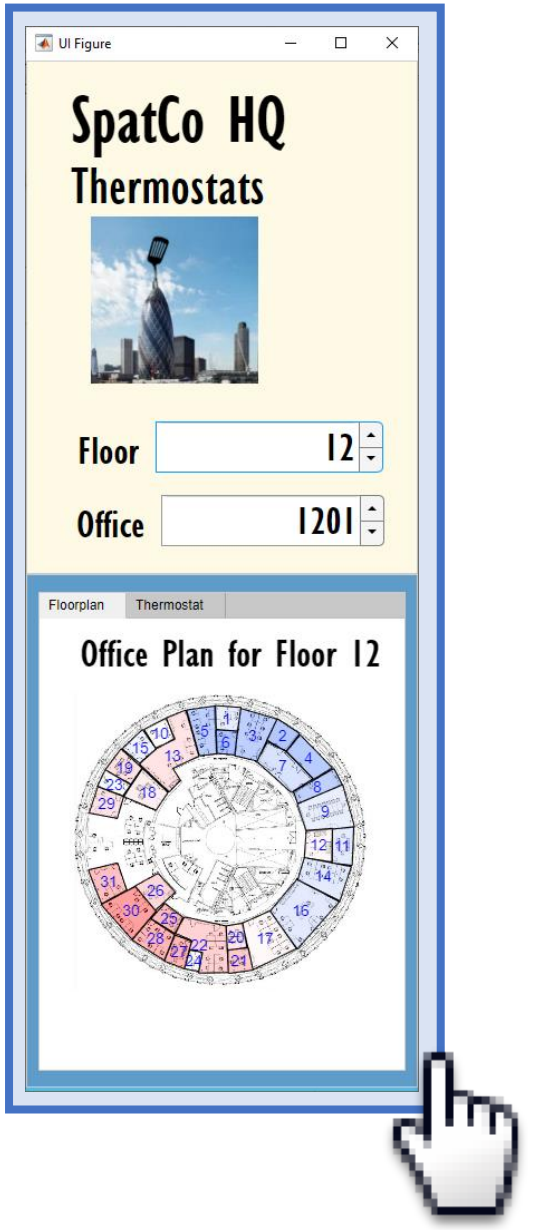
Office 801

Start

Floorplan | Thermostat

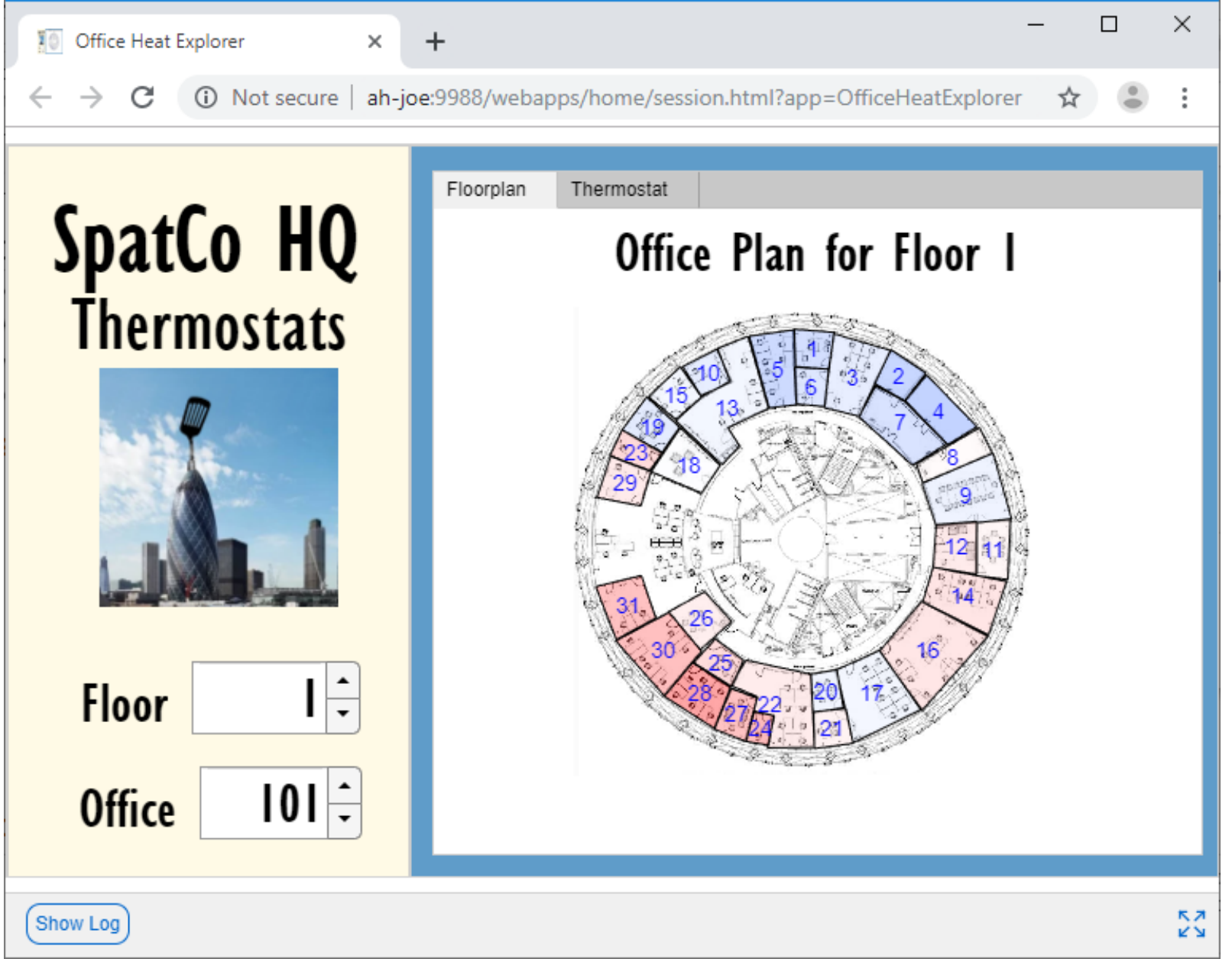
Office Plan for Floor 8



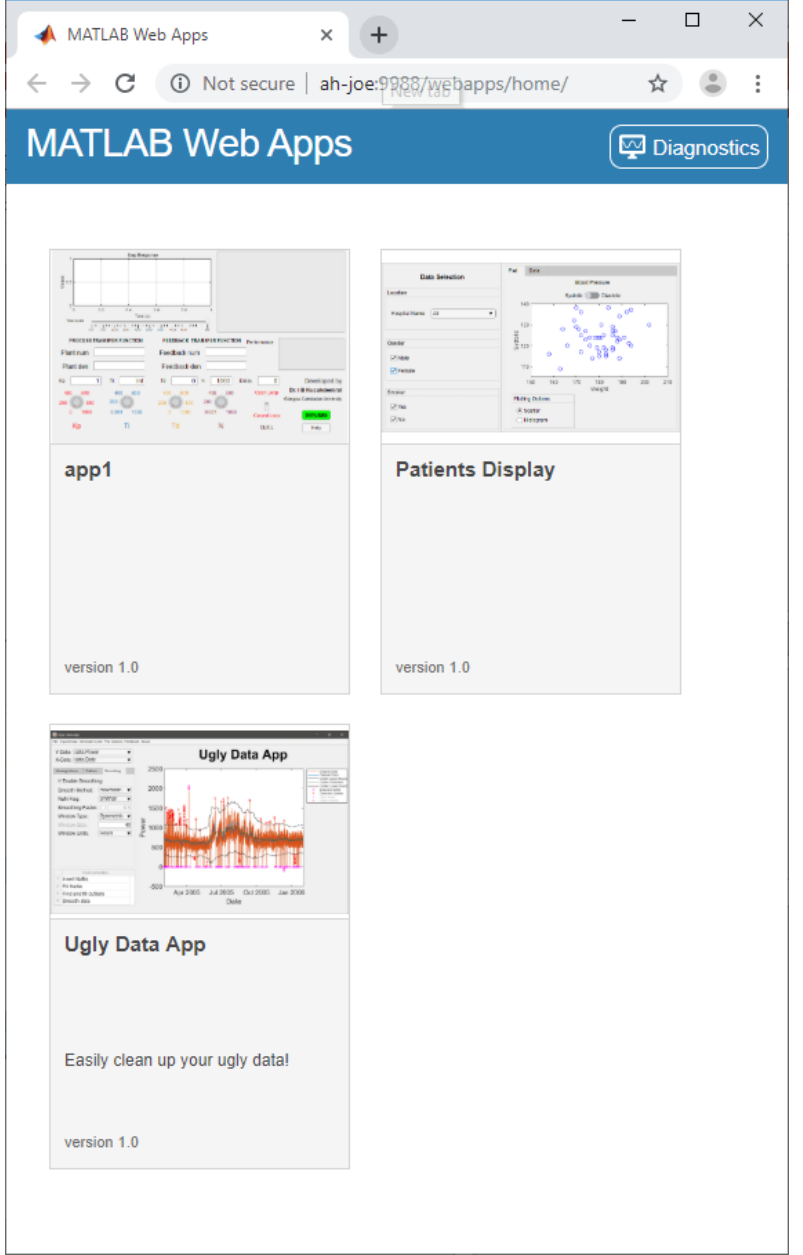

UI Figure
SpatCo HQ
Thermostats
Floor
12
Office
1201
Floorplan
Thermostat
Office Plan for Floor 12

In which Joe creates a Web App.

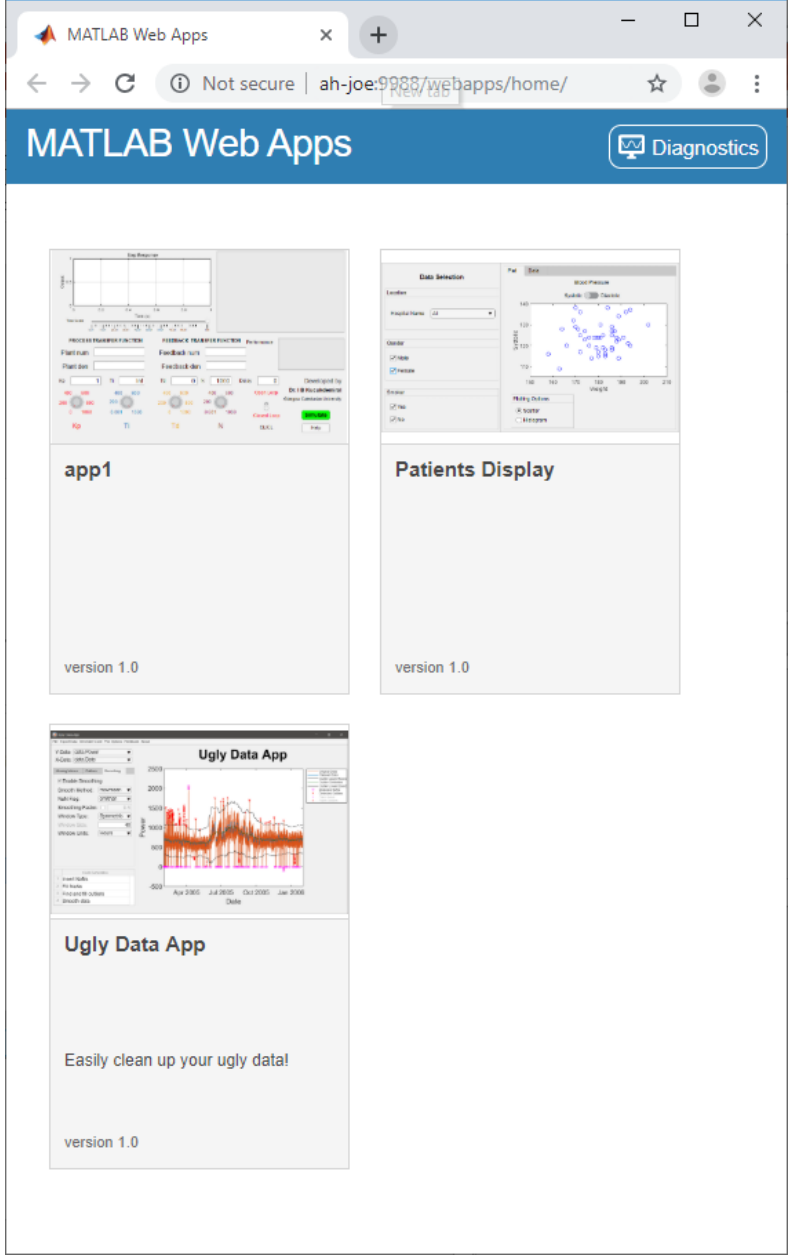
Web Apps

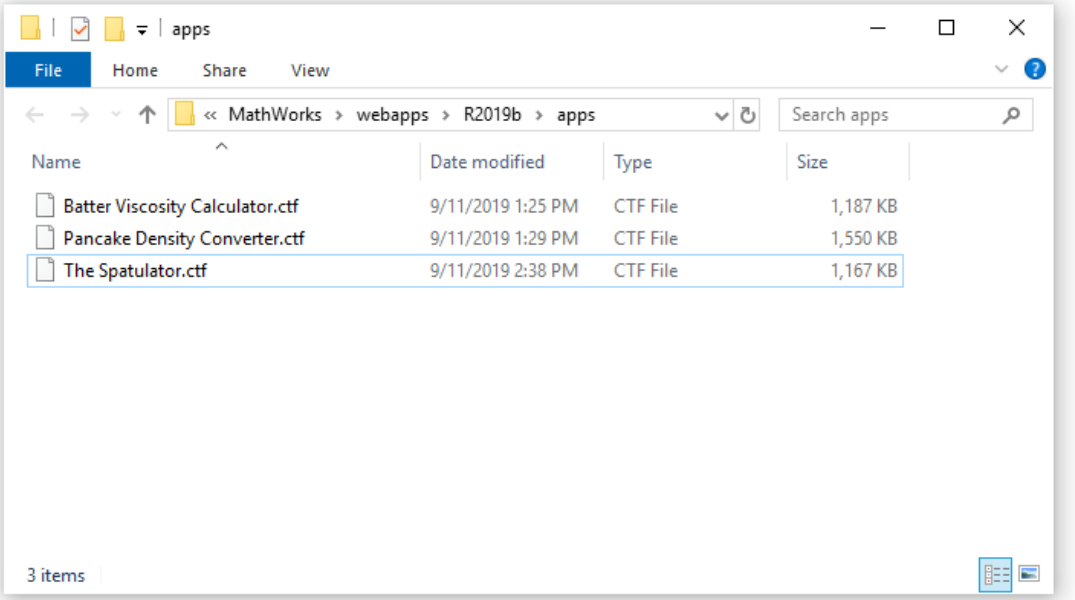

Office Heat Explorer
Not secure
ah-joe:9988/webapps/home/session.html?app=OfficeHeatExplorer
SpatCo HQ
Thermostats
Floor
1
Office
101
Floorplan
Thermostat
Office Plan for Floor 1
Show Log

Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0

Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0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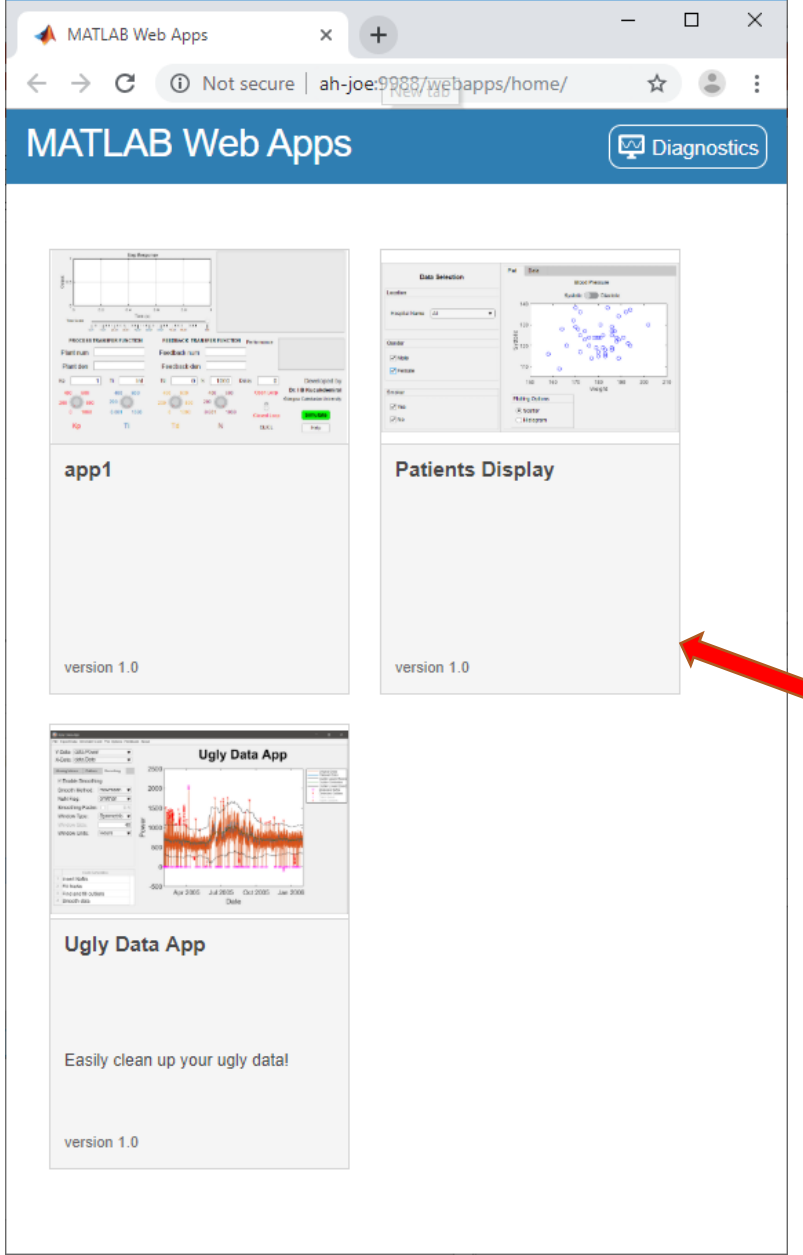
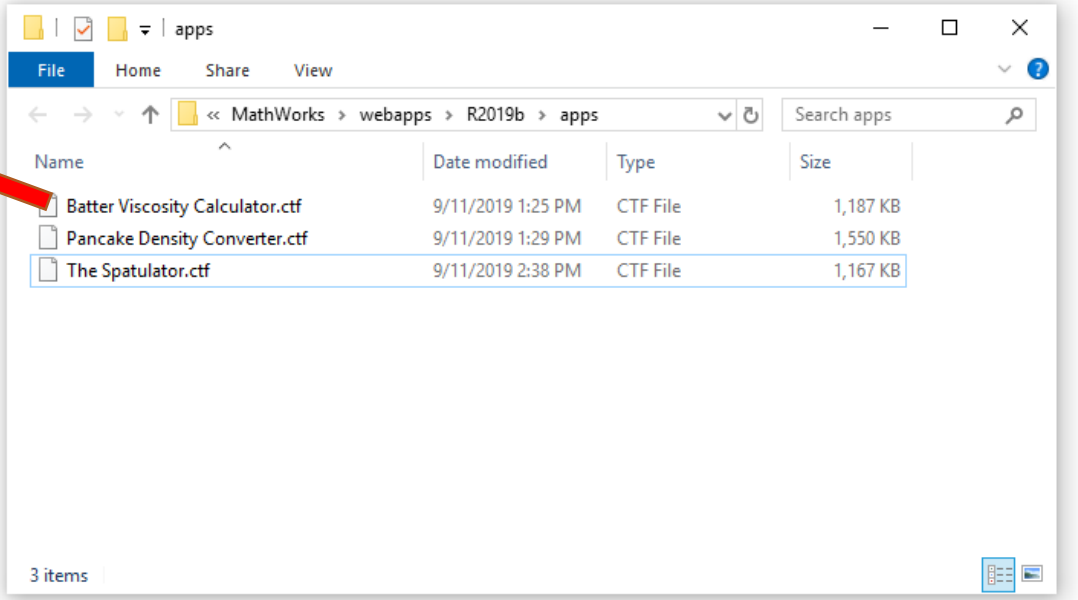
File
Home
Share
View
« MathWorks › webapps › R2019b › apps
Search apps
Name
Date modified
Type
Size
Batter Viscosity Calculator.ctf
9/11/2019 1:25 PM
CTF File
1,187 KB
Pancake Density Converter.ctf
9/11/2019 1:29 PM
CTF File
1,550 KB
The Spatulator.ctf
9/11/2019 2:38 PM
CTF File
1,167 KB
3 items

Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0


apps
File
Home
Share
View
« MathWorks › webapps › R2019b › apps
Search apps
Name
Date modified
Type
Size
Batter Viscosity Calculator.ctf
9/11/2019 1:25 PM
CTF File
1,187 KB
Pancake Density Converter.ctf
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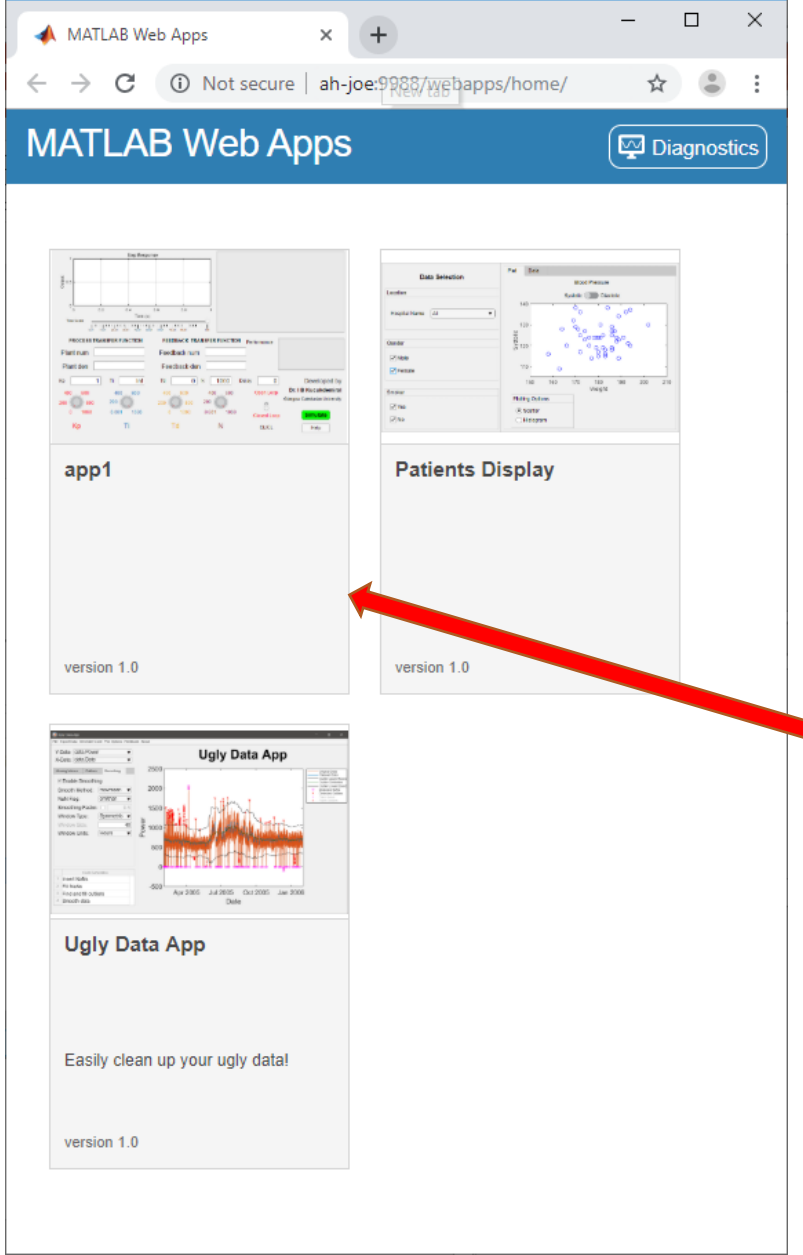
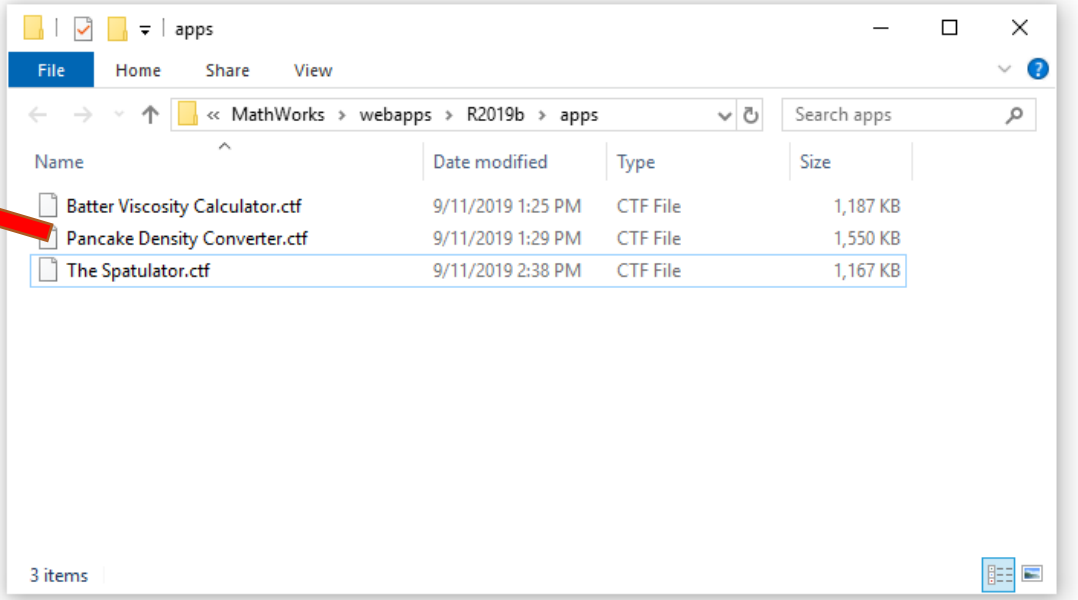
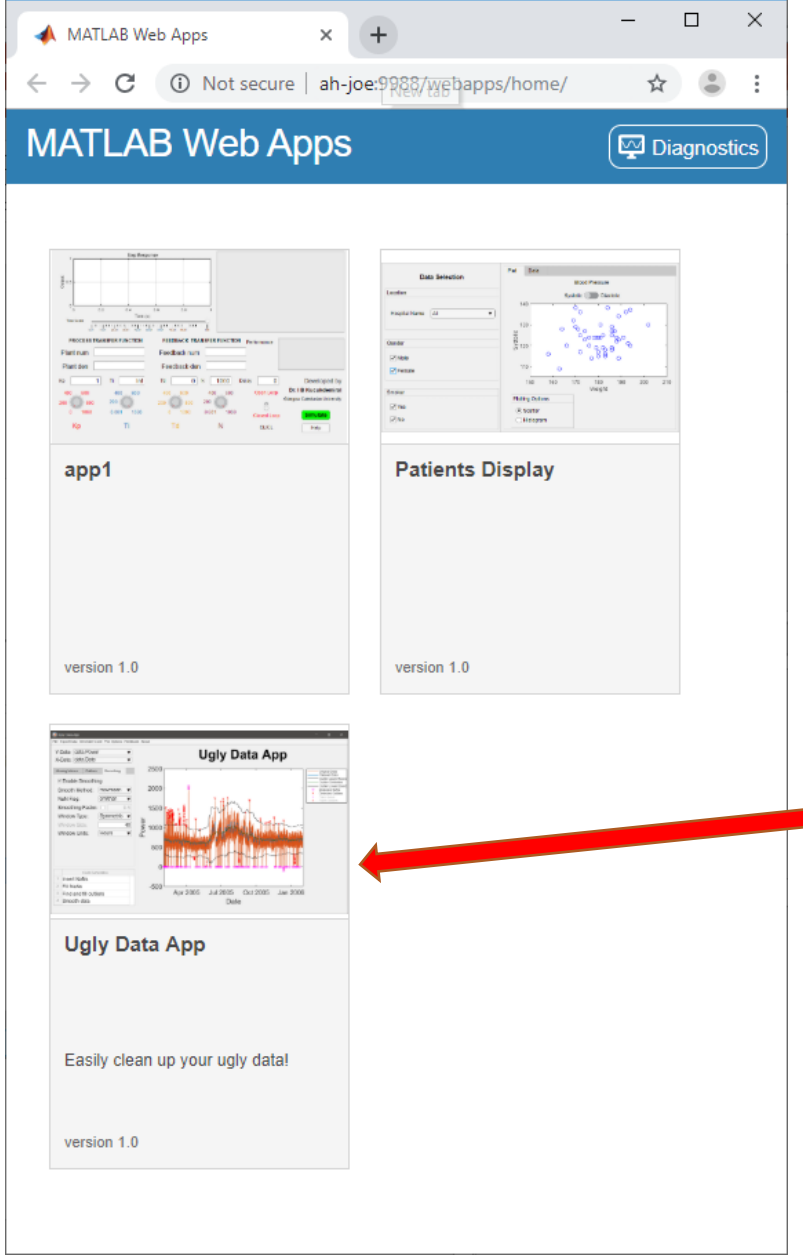
1,550 KB
The Spatulator.ctf
9/11/2019 2:38 PM
CTF File
1,167 KB
3 items

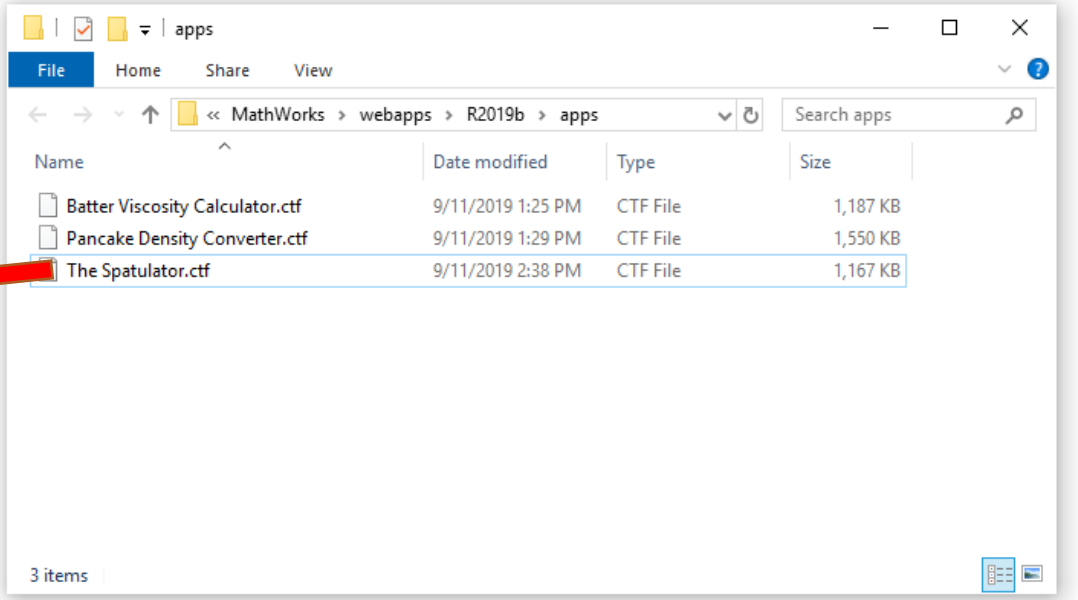
Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0

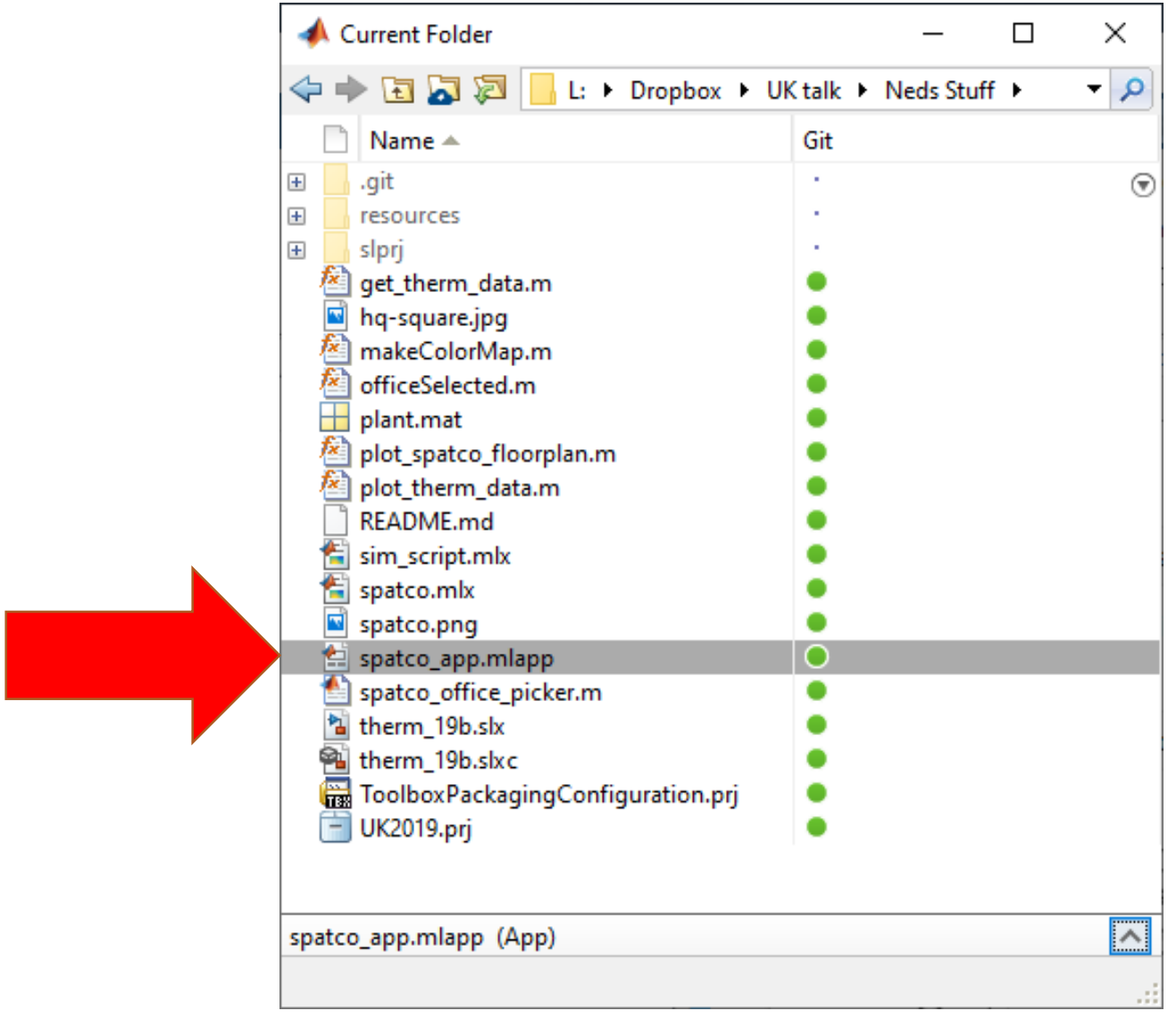

apps
File
Home
Share
View
« MathWorks › webapps › R2019b › apps
Search apps
Name
Date modified
Type
Size
Batter Viscosity Calculator.ctf 9/11/2019 1:25 PM CTF File 1,187 KB
Pancake Density Converter.ctf 9/11/2019 1:29 PM CTF File 1,550 KB
The Spatulator.ctf 9/11/2019 2:38 PM CTF File 1,167 KB
3 items

Web Apps

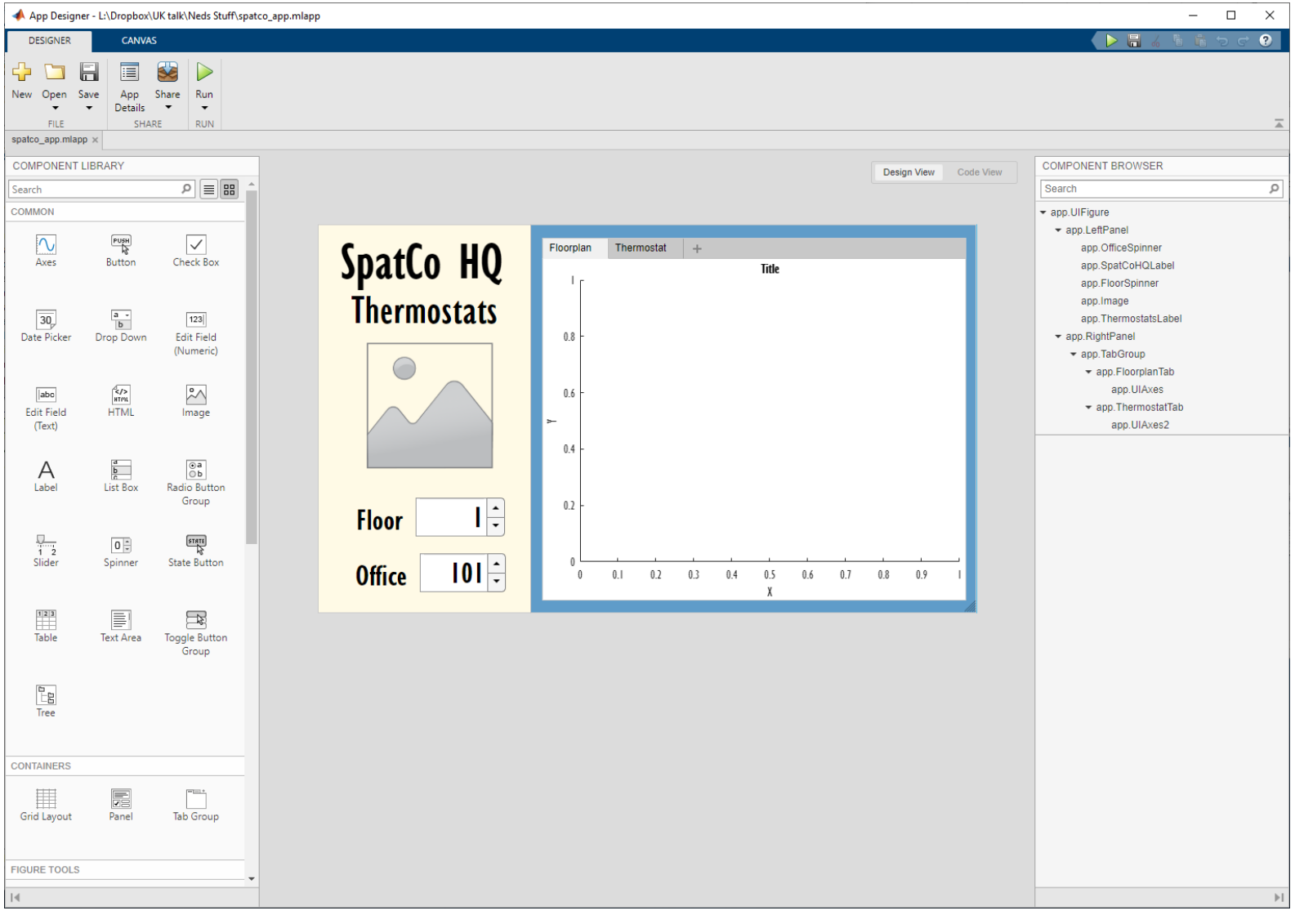

MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0


apps
File
Home
Share
View
« MathWorks › webapps › R2019b › apps
Search apps
Name
Date modified
Type
Size
Batter Viscosity Calculator.ctf
9/11/2019 1:25 PM
CTF File
1,187 KB
Pancake Density Converter.ctf
9/11/2019 1:29 PM
CTF File
1,550 KB
The Spatulator.ctf
9/11/2019 2:38 PM
CTF File
1,167 KB
3 items

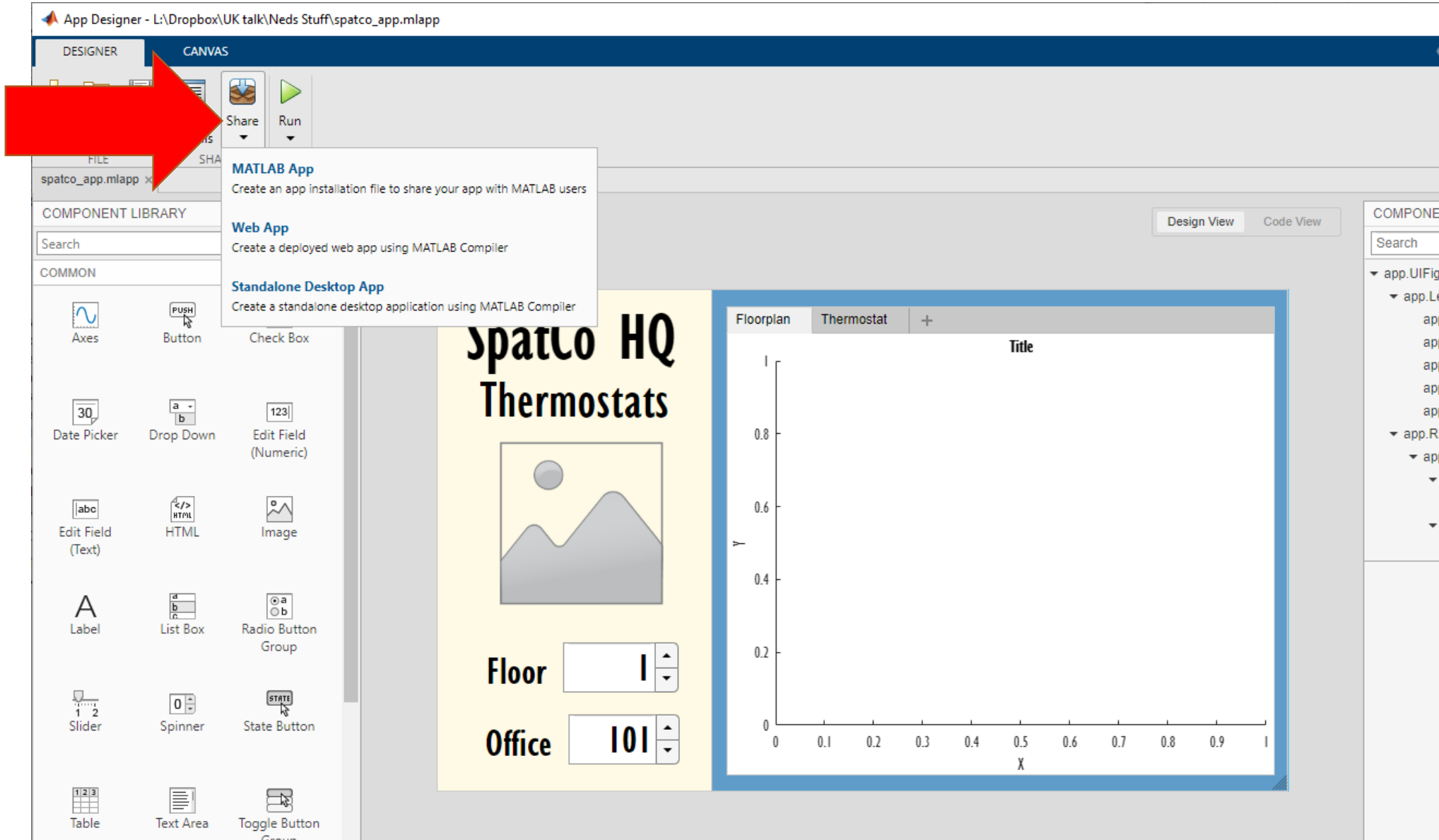
Web Apps


Current Folder
L: ▸ Dropbox ▸ UK talk ▸ Neds Stuff ▸
Name
Git
.git
resources
slprj
get_therm_data.m
hq-square.jpg
makeColorMap.m
officeSelected.m
plant.mat
plot_spatco_floorplan.m
plot_therm_data.m
README.md
sim_script.mlx
spatco.mlx
spatco.png
spatco_app.mlapp
spatco_office_picker.m
therm_19b.slx
therm_19b.slxc
ToolboxPackagingConfiguration.prj
UK2019.prj
spatco_app.mlapp (App)

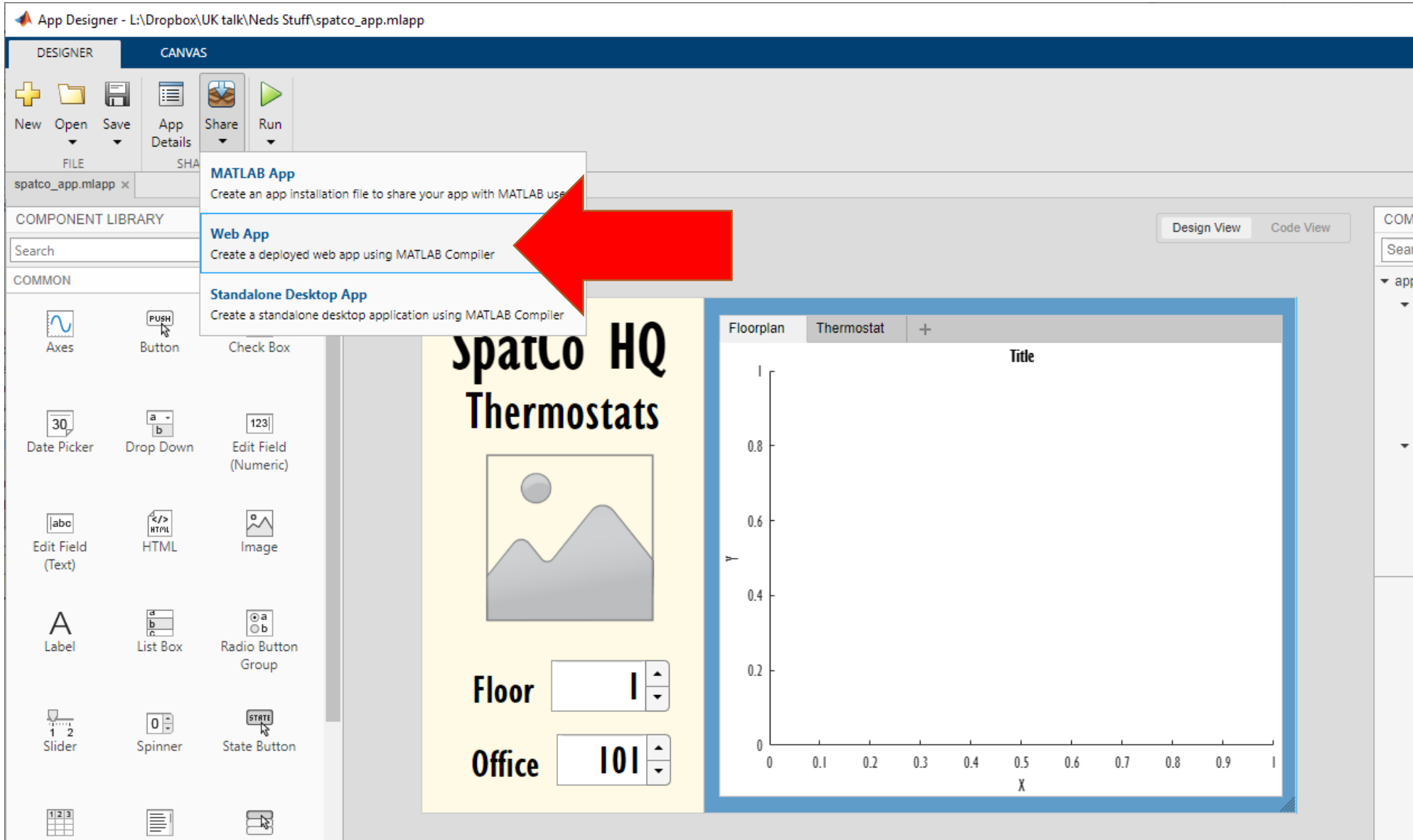
Web Apps


App Designer - L:\Dropbox\UK talk\Neds Stuff\spatco_app.mlapp
DESIGNER
CANVAS
New
Open
Save
App Details
Share
Run
FILE
SHARE
RUN
spatco_app.mlapp
COMPONENT LIBRARY
Search
COMMON
Axes
Button
Check Box
Date Picker
Drop Down
Edit Field (Numeric)
Edit Field (Text)
HTML
Image
Label
List Box
Radio Button Group
Slider
Spinner
State Button
Table
Text Area
Toggle Button Group
Tree
CONTAINERS
Grid Layout
Panel
Tab Group
FIGURE TOOLS
Design View
Code View
SpatCo HQ
Thermostats
Floor
1
Office
101
Floorplan
Thermostat
Title
X
Y
COMPONENT BROWSER
Search
app.UIFigure
app.LeftPanel
app.OfficeSpinner
app.SpatCoHQLabel
app.FloorSpinner
app.Image
app.ThermostatsLabel
app.RightPanel
app.TabGroup
app.FloorplanTab
app.UIAxes
app.ThermostatTab
app.UIAxes2

Web Apps


App Designer - L:\Dropbox\UK talk\Neds Stuff\spatco_app.mlapp
DESIGNER
CANVAS
Share
Run
MATLAB App
Create an app installation file to share your app with MATLAB users
Web App
Create a deployed web app using MATLAB Compiler
Standalone Desktop App
Create a standalone desktop application using MATLAB Compiler
spatco_app.mlapp
COMPONENT LIBRARY
Search
COMMON
Axes
Button
Check Box
Date Picker
Drop Down
Edit Field (Numeric)
Edit Field (Text)
HTML
Image
Label
List Box
Radio Button Group
Slider
Spinner
State Button
Table
Text Area
Toggle Button
Design View
Code View
Spatco HQ
Thermostats
Floor
1
Office
101
Floorplan
Thermostat
Title
Y
X

Web Apps


App Designer - L:\Dropbox\UK talk\Neds Stuff\spatco_app.mlapp
DESIGNER
CANVAS
New
Open
Save
App Details
Share
Run
FILE
MATLAB App
Create an app installation file to share your app with MATLAB use
Web App
Create a deployed web app using MATLAB Compiler
Standalone Desktop App
Create a standalone desktop application using MATLAB Compiler
spatco_app.mlapp
COMPONENT LIBRARY
Search
COMMON
Axes
Button
Check Box
Date Picker
Drop Down
Edit Field (Numeric)
Edit Field (Text)
HTML
Image
Label
List Box
Radio Button Group
Slider
Spinner
State Button
Design View
Code View
Spatco HQ
Thermostats
Floor
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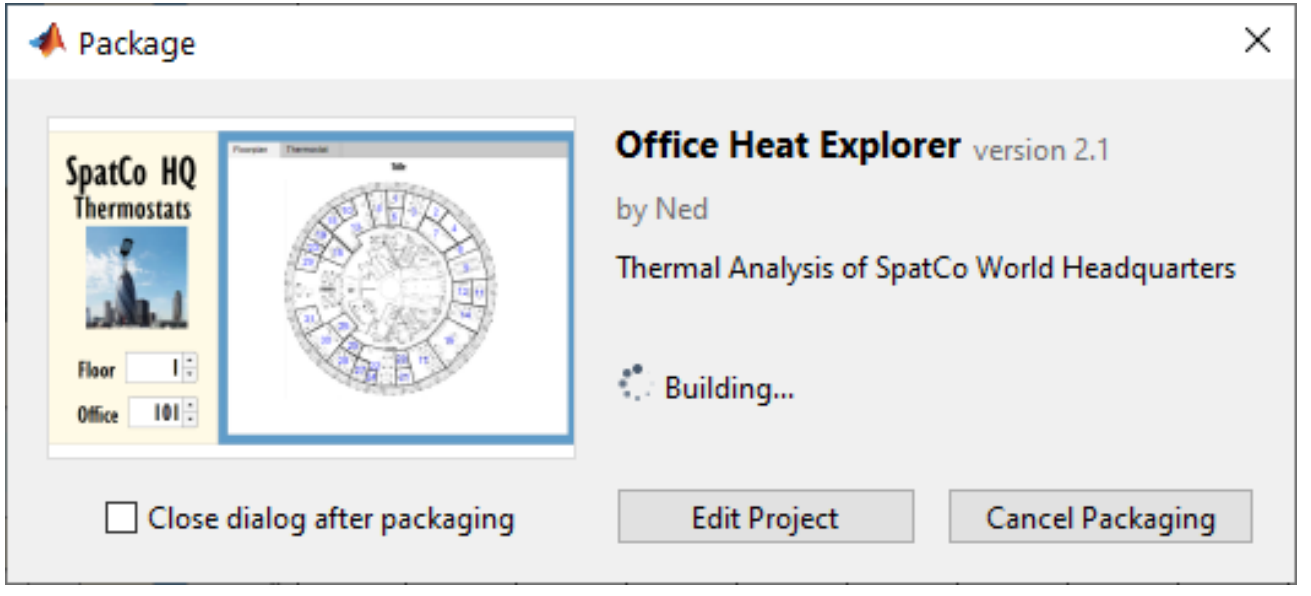
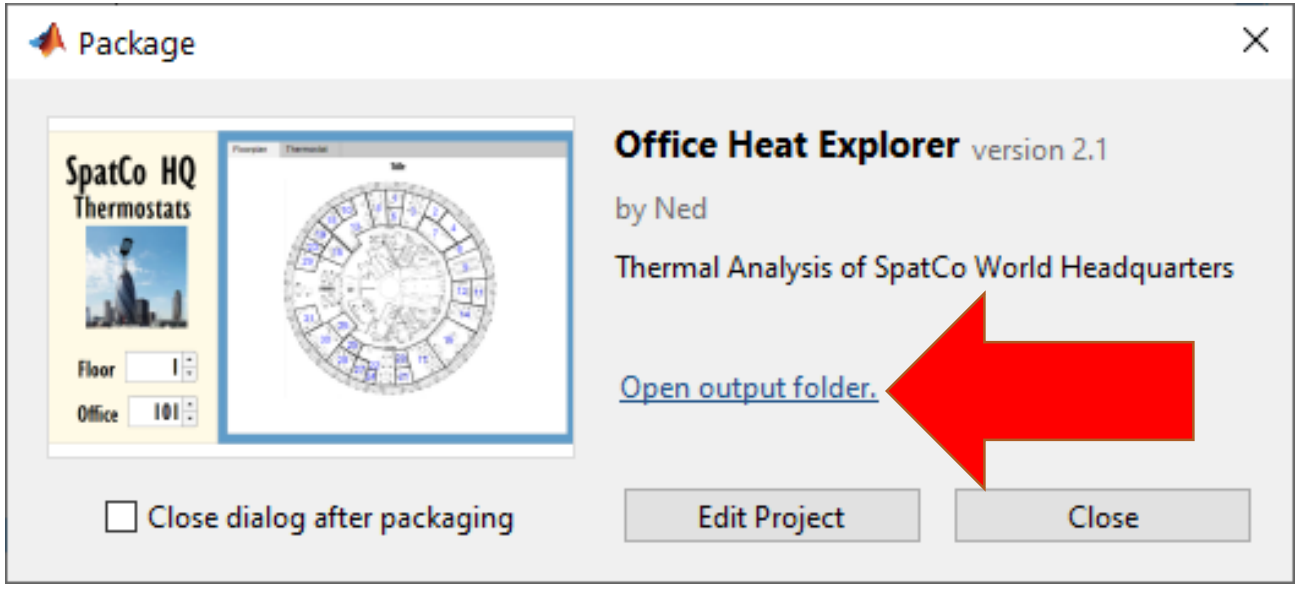
Office
101
Floorplan
Thermostat
Title
X
Y

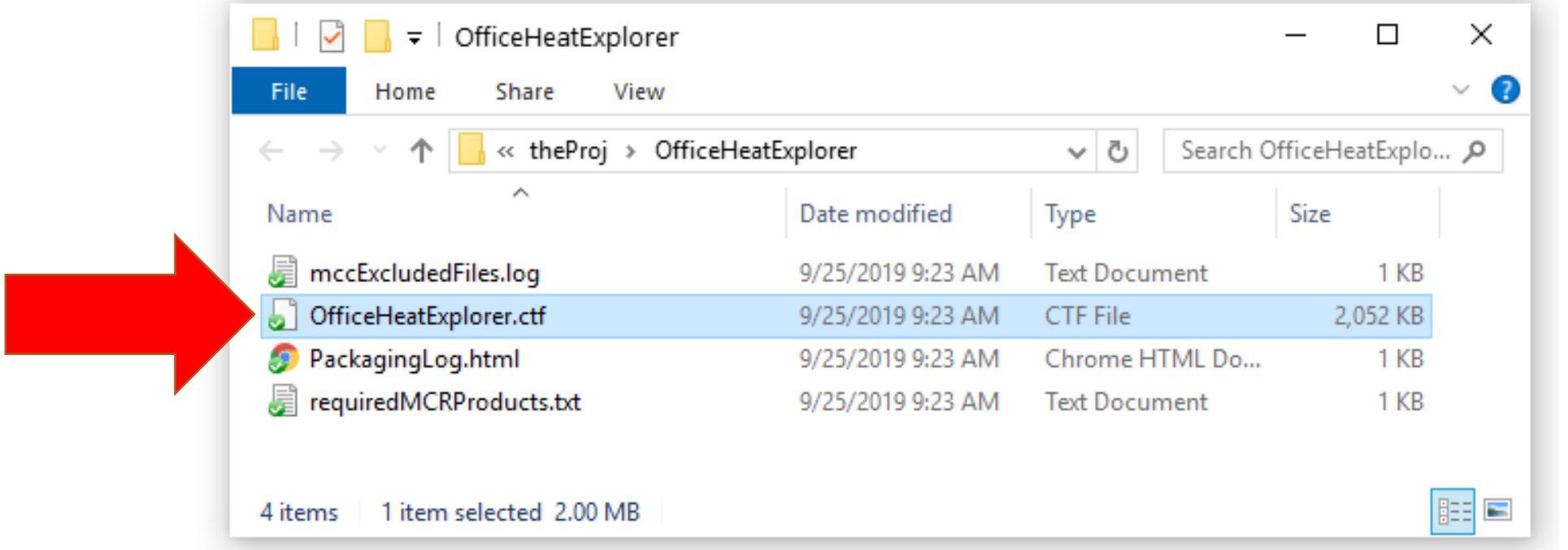
Web Apps


Package
SpatCo HQ
Thermostats
Floor
1
Office
101
Office Heat Explorer version 2.1
by Ned
Thermal Analysis of SpatCo World Headquarters
Building...
Close dialog after packaging
Edit Project
Cancel Packaging

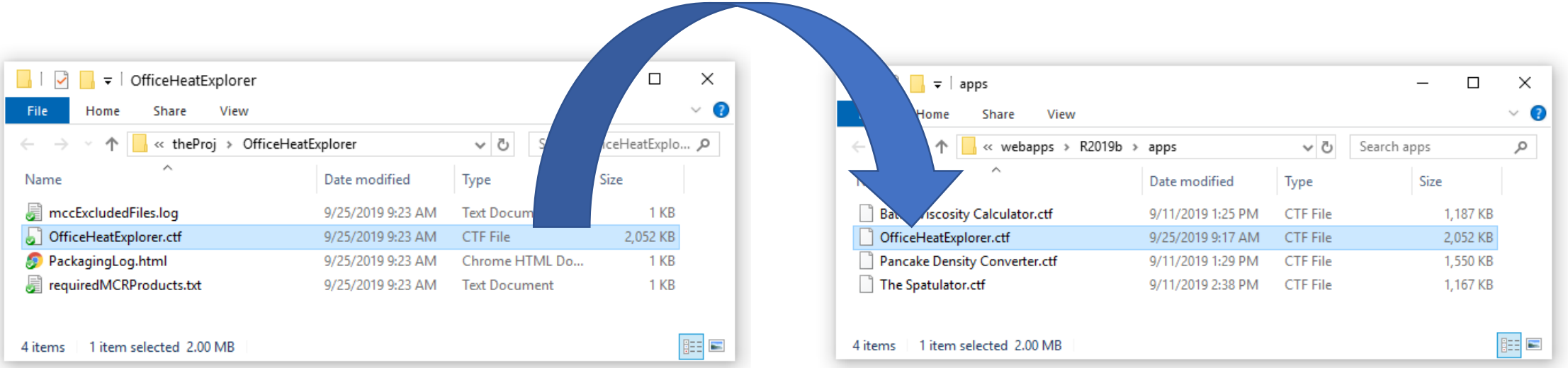
Web Apps


Package
SpatCo HQ
Thermostats
Floor 1
Office 101
Office Heat Explorer version 2.1
by Ned
Thermal Analysis of SpatCo World Headquarters
Open output folder.
Close dialog after packaging
Edit Project
Close

Web Apps


OfficeHeatExplorer
File
Home
Share
View
« theProj › OfficeHeatExplorer
Search OfficeHeatExplo...
Name
Date modified
Type
Size
mccExcludedFiles.log
9/25/2019 9:23 AM
Text Document
1 KB
OfficeHeatExplorer.ctf
9/25/2019 9:23 AM
CTF File
2,052 KB
PackagingLog.html
9/25/2019 9:23 AM
Chrome HTML Do...
1 KB
requiredMCRProducts.txt
9/25/2019 9:23 AM
Text Document
1 KB
4 items
1 item selected 2.00 MB

Web Apps


OfficeHeatExplorer
File
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View
« theProj › OfficeHeatExplorer
Name
Date modified
Type
Size
mccExcludedFiles.log 9/25/2019 9:23 AM Text Docum 1 KB
OfficeHeatExplorer.ctf 9/25/2019 9:23 AM CTF File 2,052 KB
PackagingLog.html 9/25/2019 9:23 AM Chrome HTML Do... 1 KB
requiredMCRProducts.txt 9/25/2019 9:23 AM Text Document 1 KB
4 items 1 item selected 2.00 MB
apps
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View
« webapps › R2019b › apps
Search apps
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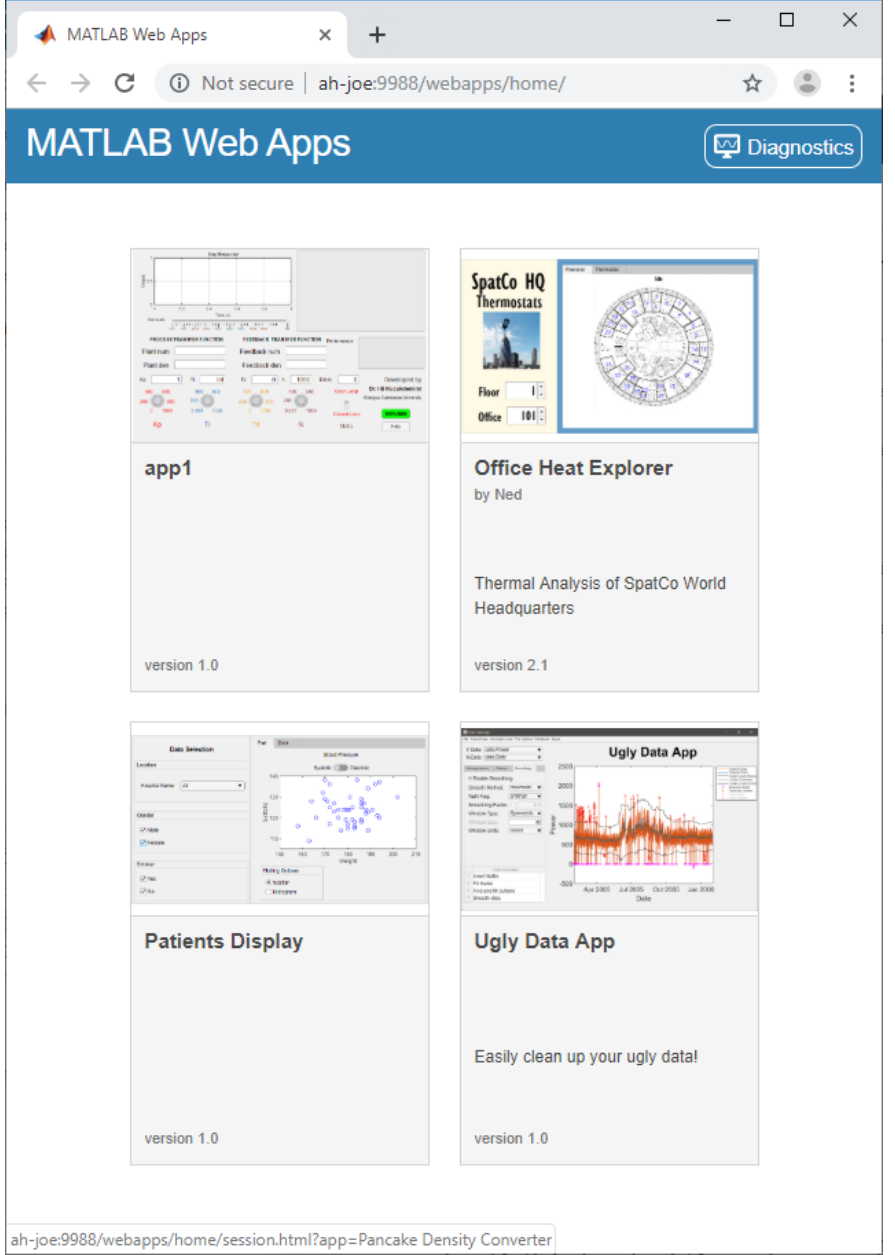
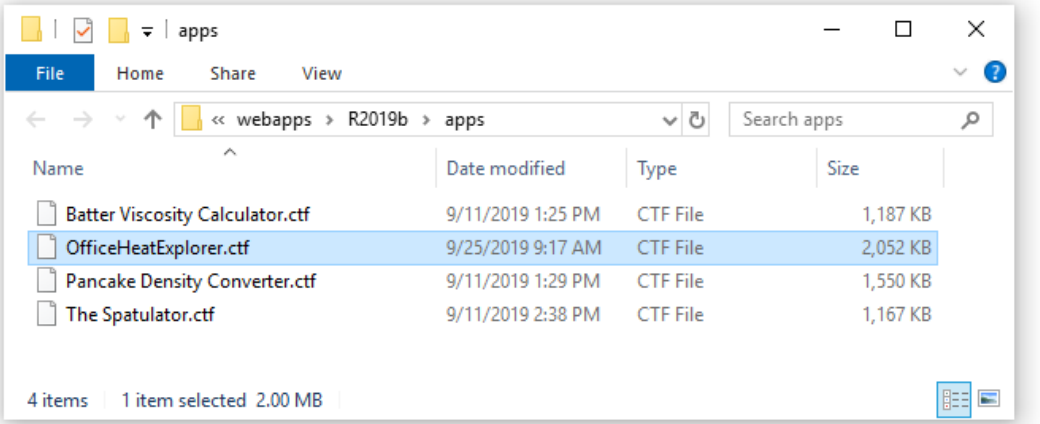
Viscosity Calculator.ctf 9/11/2019 1:25 PM CTF File 1,187 KB
OfficeHeatExplorer.ctf 9/25/2019 9:17 AM CTF File 2,052 KB
Pancake Density Converter.ctf 9/11/2019 1:29 PM CTF File 1,550 KB
The Spatulator.ctf 9/11/2019 2:38 PM CTF File 1,167 KB
4 items 1 item selected 2.00 MB

Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
SpatCo HQ Thermostats
Floor
Office
Office Heat Explorer
by Ned
Thermal Analysis of SpatCo World Headquarters
version 2.1
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0
ah-joe:9988/webapps/home/session.html?app=Pancake Density Converter


apps
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Home
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View
« webapps › R2019b › apps
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Name
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Batter Viscosity Calculator.ctf 9/11/2019 1:25 PM CTF File 1,187 KB
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Pancake Density Converter.ctf 9/11/2019 1:29 PM CTF File 1,550 KB
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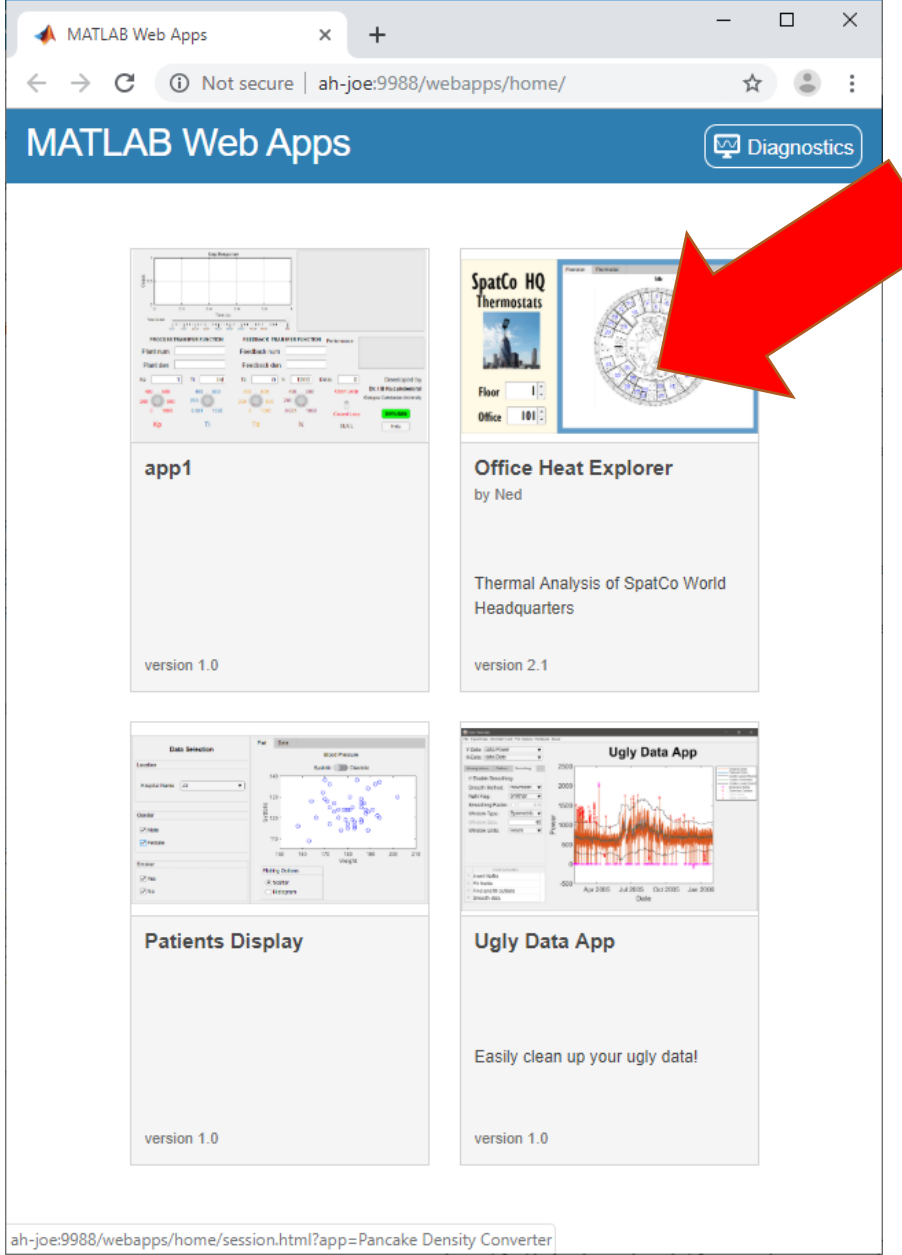
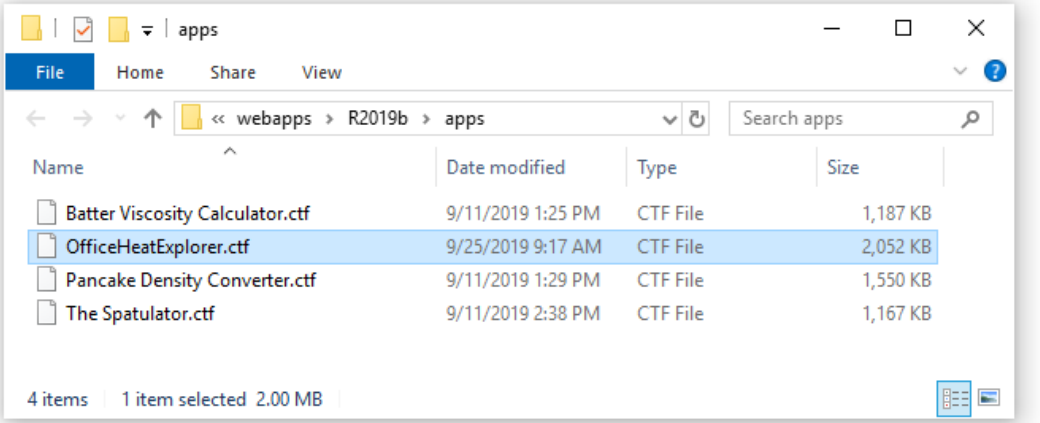
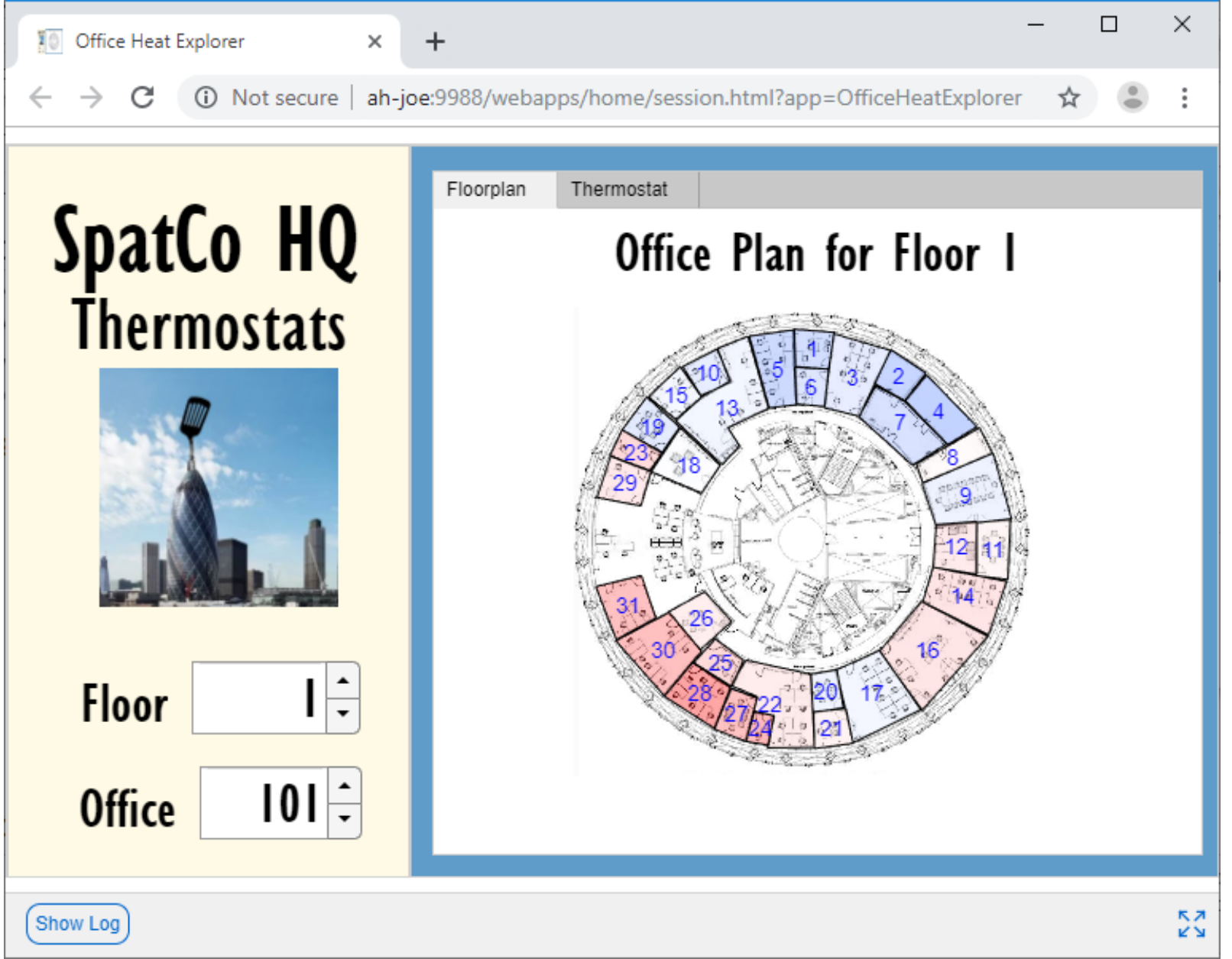
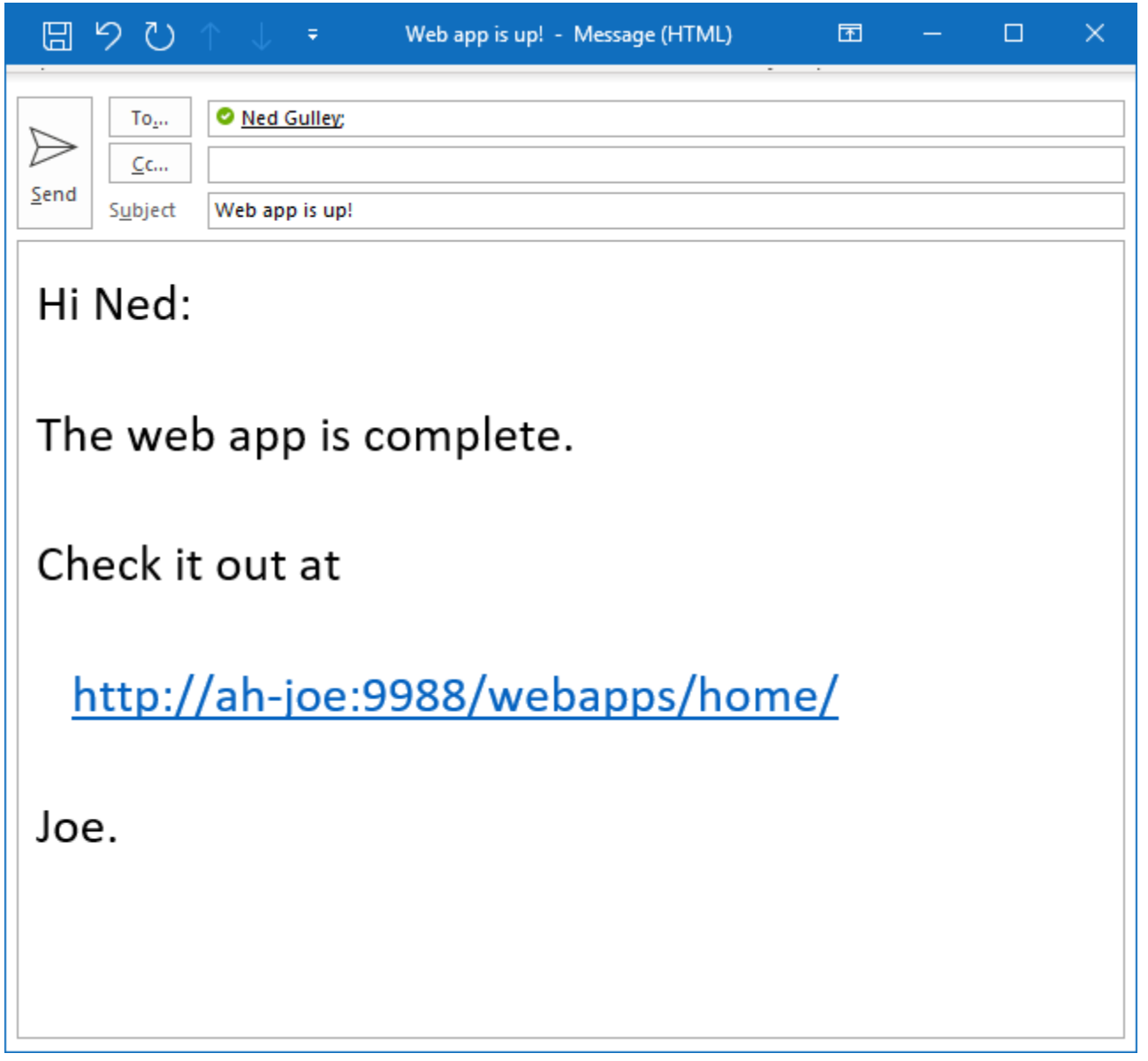
Web Apps


MATLAB Web Apps
Not secure | ah-joe:9988/webapps/home/
MATLAB Web Apps
Diagnostics
app1
version 1.0
SpatCo HQ Thermostats
Floor
Office
Office Heat Explorer
by Ned
Thermal Analysis of SpatCo World Headquarters
version 2.1
Patients Display
version 1.0
Ugly Data App
Ugly Data App
Easily clean up your ugly data!
version 1.0
ah-joe:9988/webapps/home/session.html?app=Pancake Density Converter


apps
File
Home
Share
View
« webapps › R2019b › apps
Search apps
Name
Date modified
Type
Size
Batter Viscosity Calculator.ctf 9/11/2019 1:25 PM CTF File 1,187 KB
OfficeHeatExplorer.ctf 9/25/2019 9:17 AM CTF File 2,052 KB
Pancake Density Converter.ctf 9/11/2019 1:29 PM CTF File 1,550 KB
The Spatulator.ctf 9/11/2019 2:38 PM CTF File 1,167 KB
4 items
1 item selected 2.00 MB

Web Apps


Office Heat Explorer
Not secure
ah-joe:9988/webapps/home/session.html?app=OfficeHeatExplorer
SpatCo HQ
Thermostats
Floor
1
Office
101
Floorplan
Thermostat
Office Plan for Floor 1
Show Log


Web app is up! - Message (HTML)
Send
To...
Ned Gulley;
Cc...
Subject
Web app is up!
Hi Ned:
The web app is complete.
Check it out at
http://ah-joe:9988/webapps/home/
Joe.

Office Heat Explorer

Not secure | ah-joe:9988/webapps/home/session.html?app=OfficeHeatExplorer

SpatCo HQ

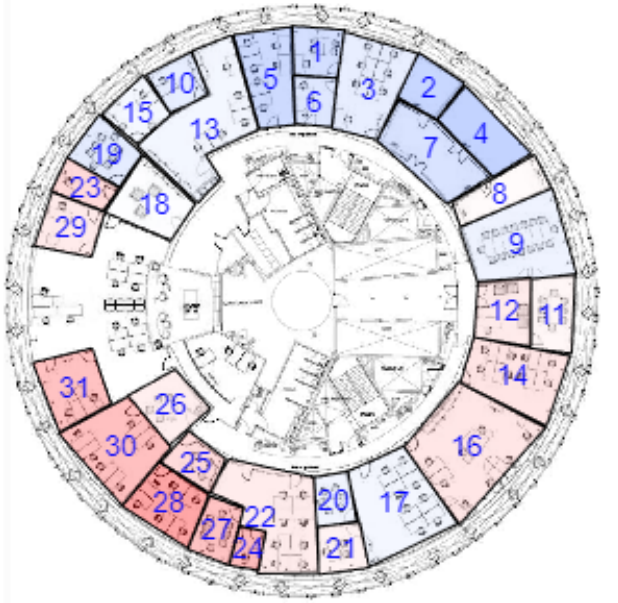
Thermostats

Floor 1

Office 101

Floorplan | Thermostat

Office Plan for Floor 1



Show Log

One week later…

SpoonCorp

In which Ned summarizes the Talk

Projects

Git Integration

Live Tasks

Function Argument Validation

Live Controls

AppDesigner Adaptive Layout

Web Apps

Projects

Git Integration

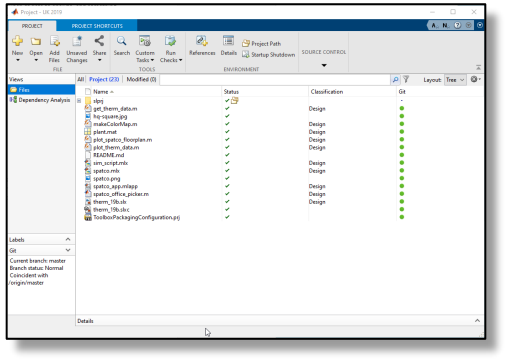
Live Tasks

Function Argument Validation

Live Controls

AppDesigner Adaptive Layout

Web Apps



Projects

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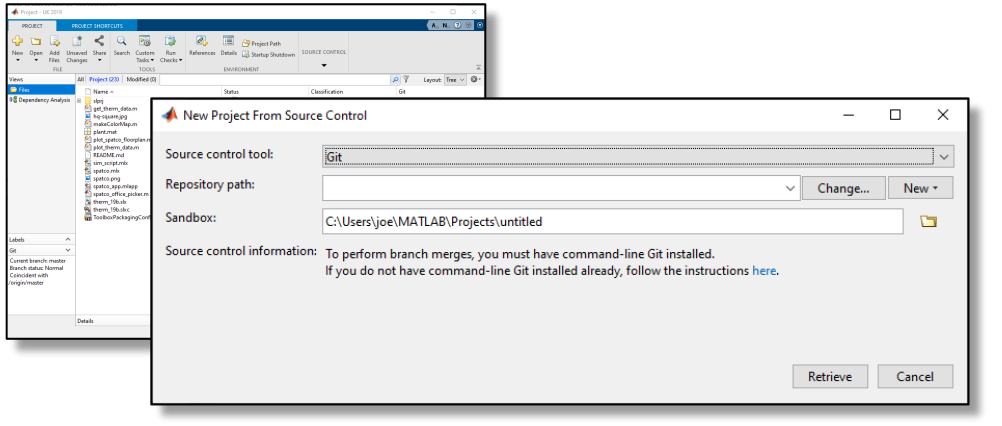

Projects

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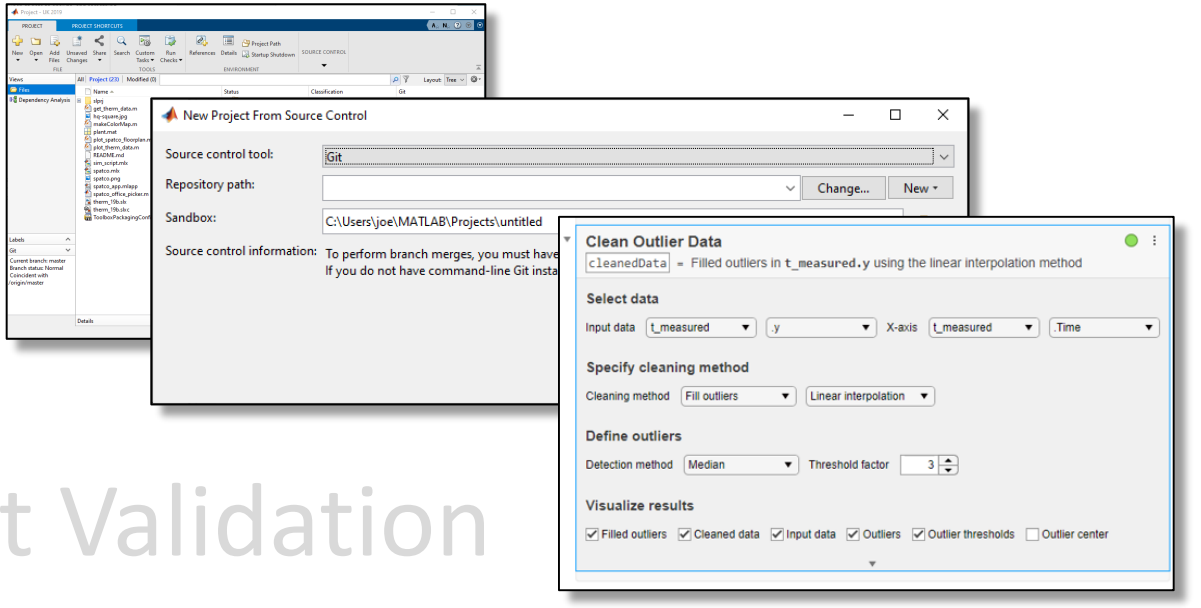
Web Apps



Projects

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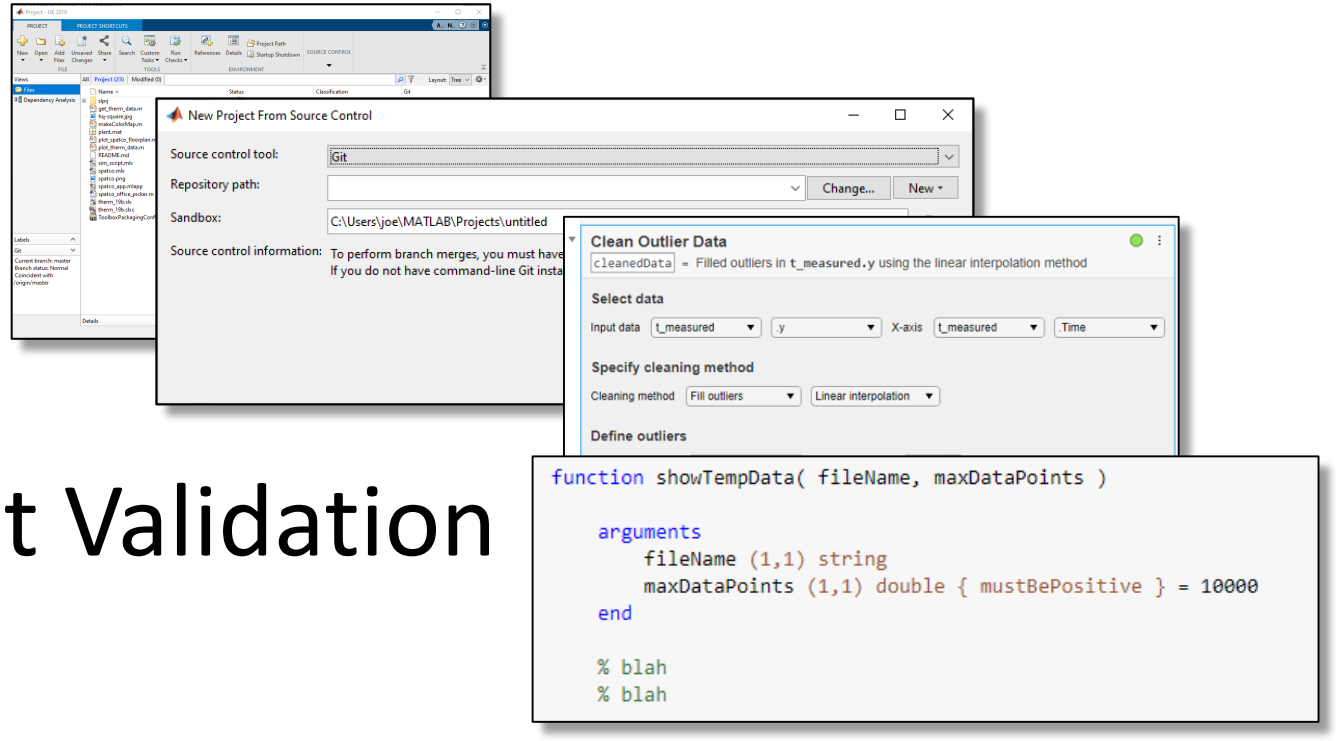

Projects

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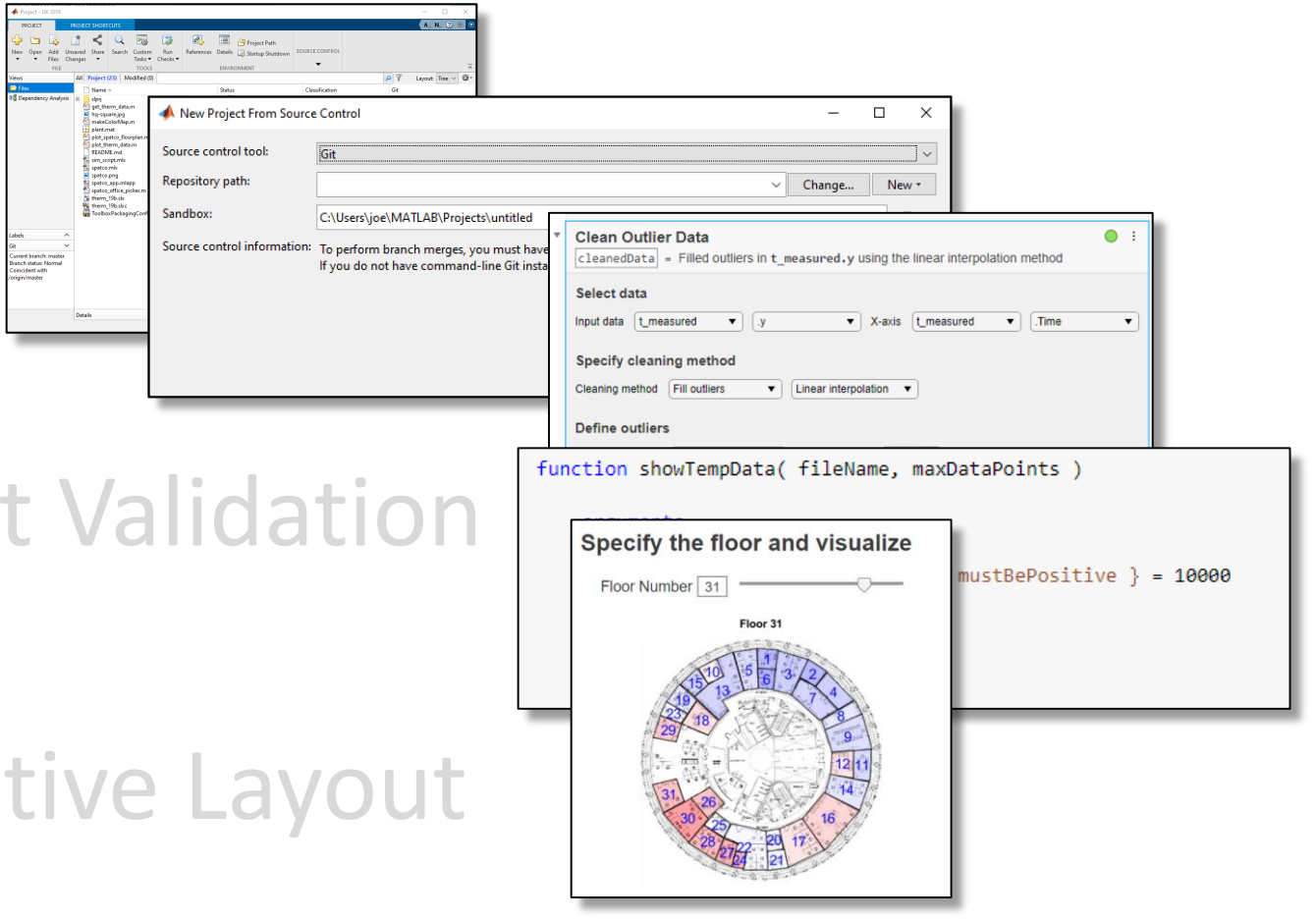

Projects

Git Integration

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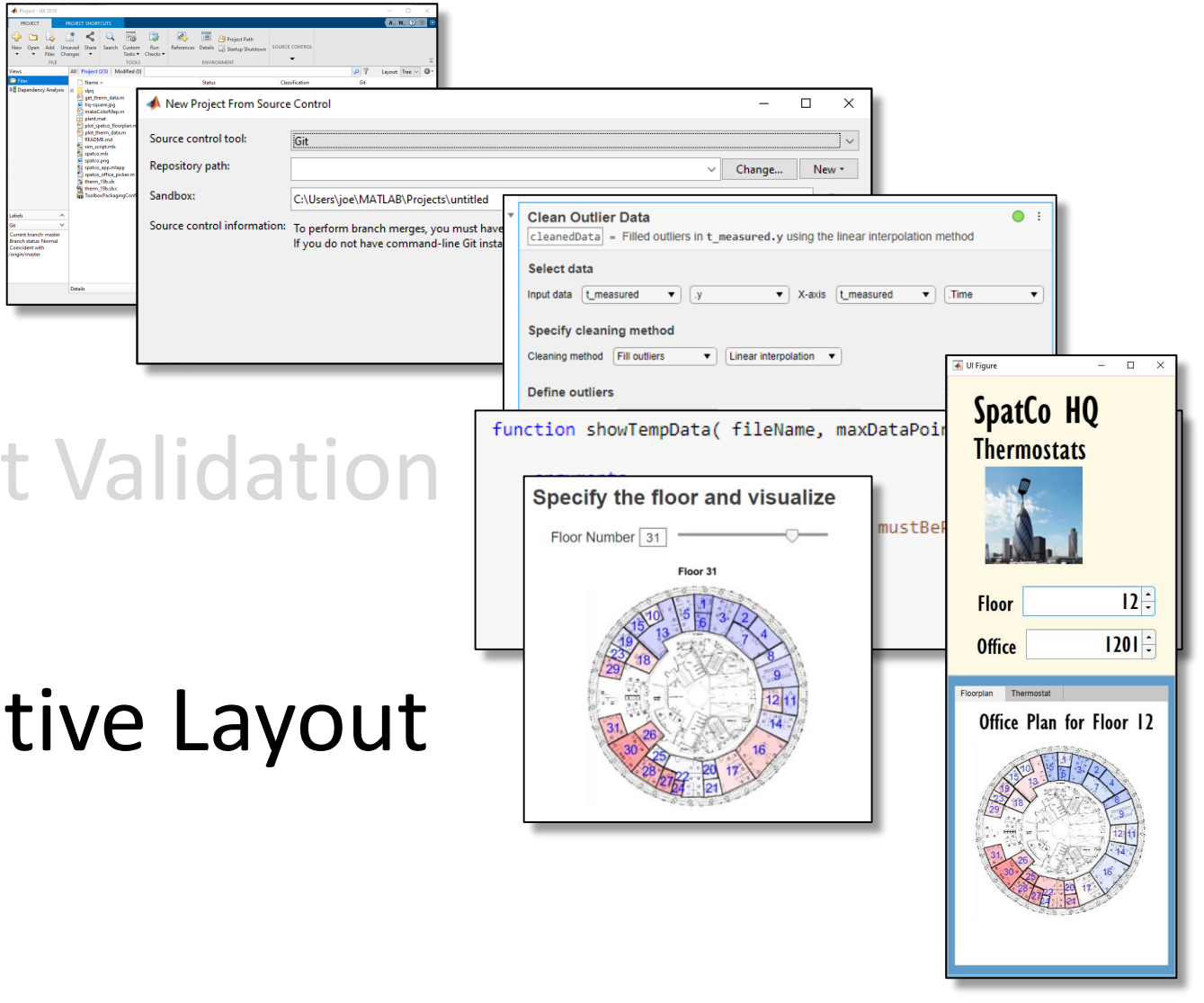

Projects

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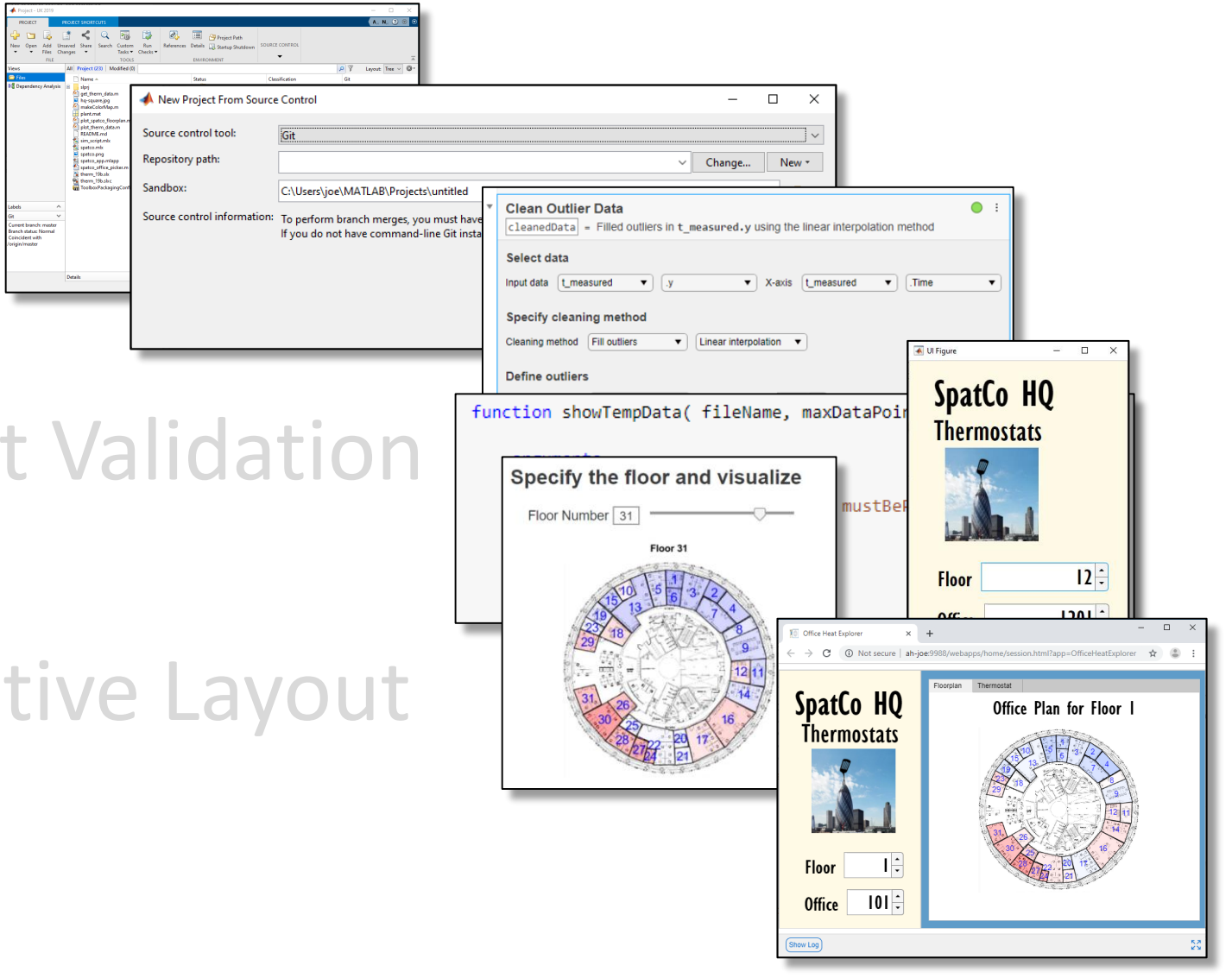

Thank you!