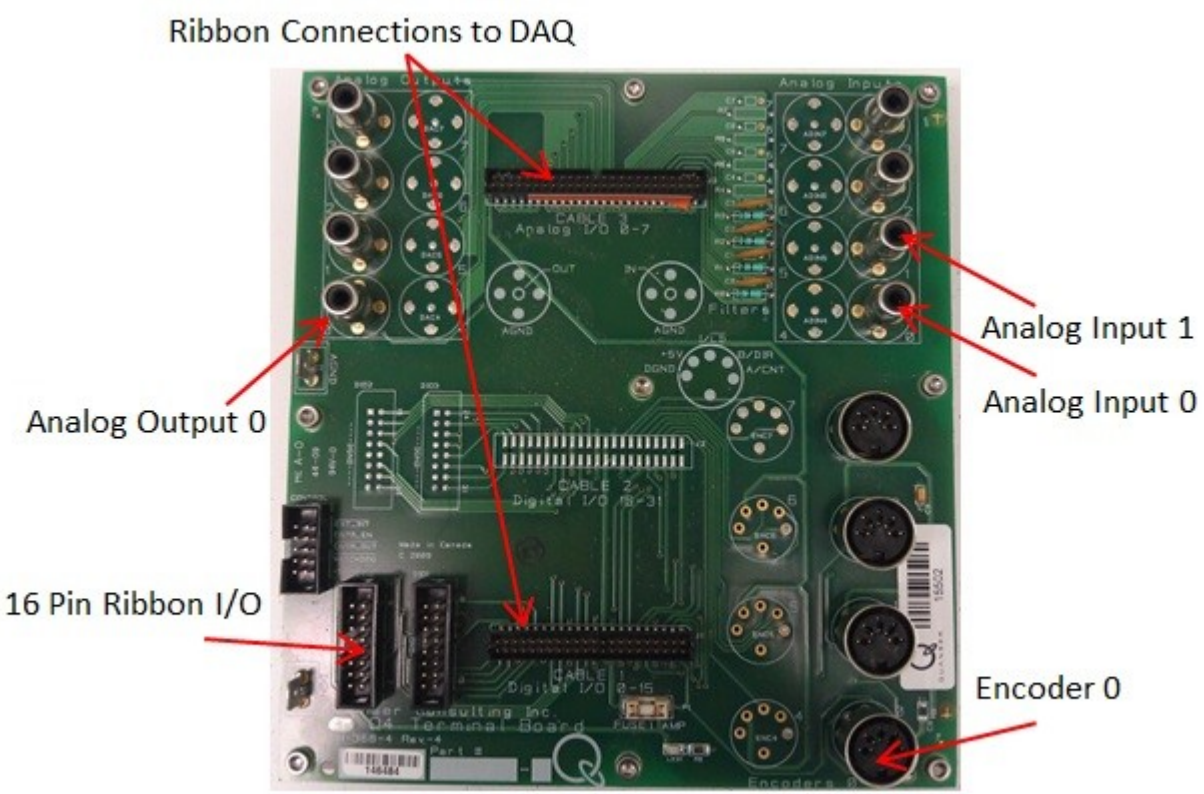
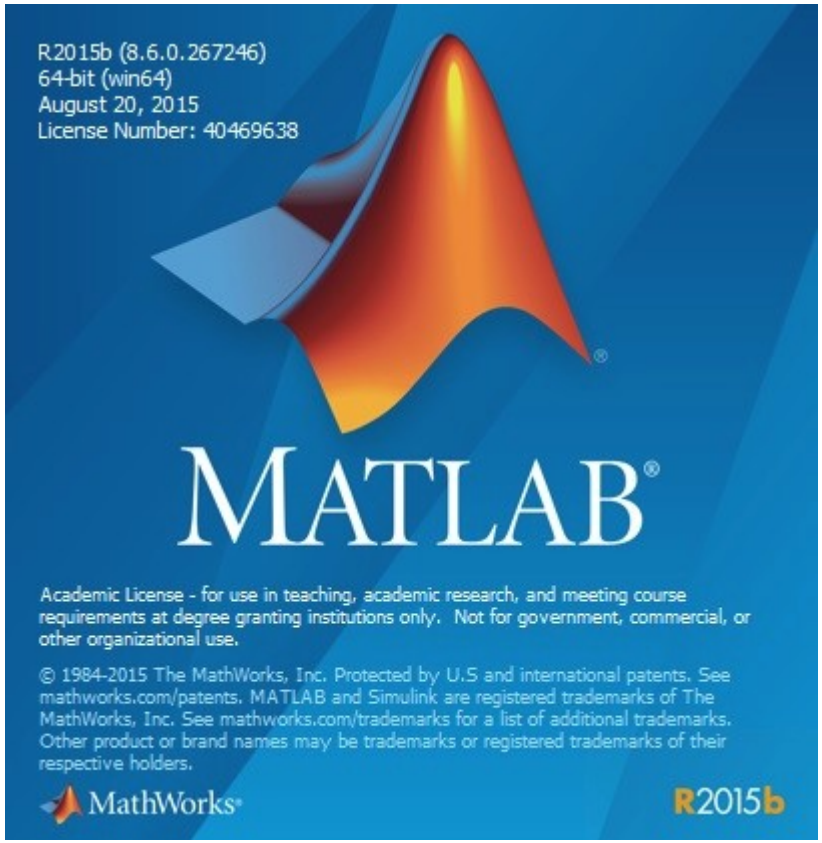
ECE 147C
Getting started with the hardware & software
Justin Pearson
2014.04.07

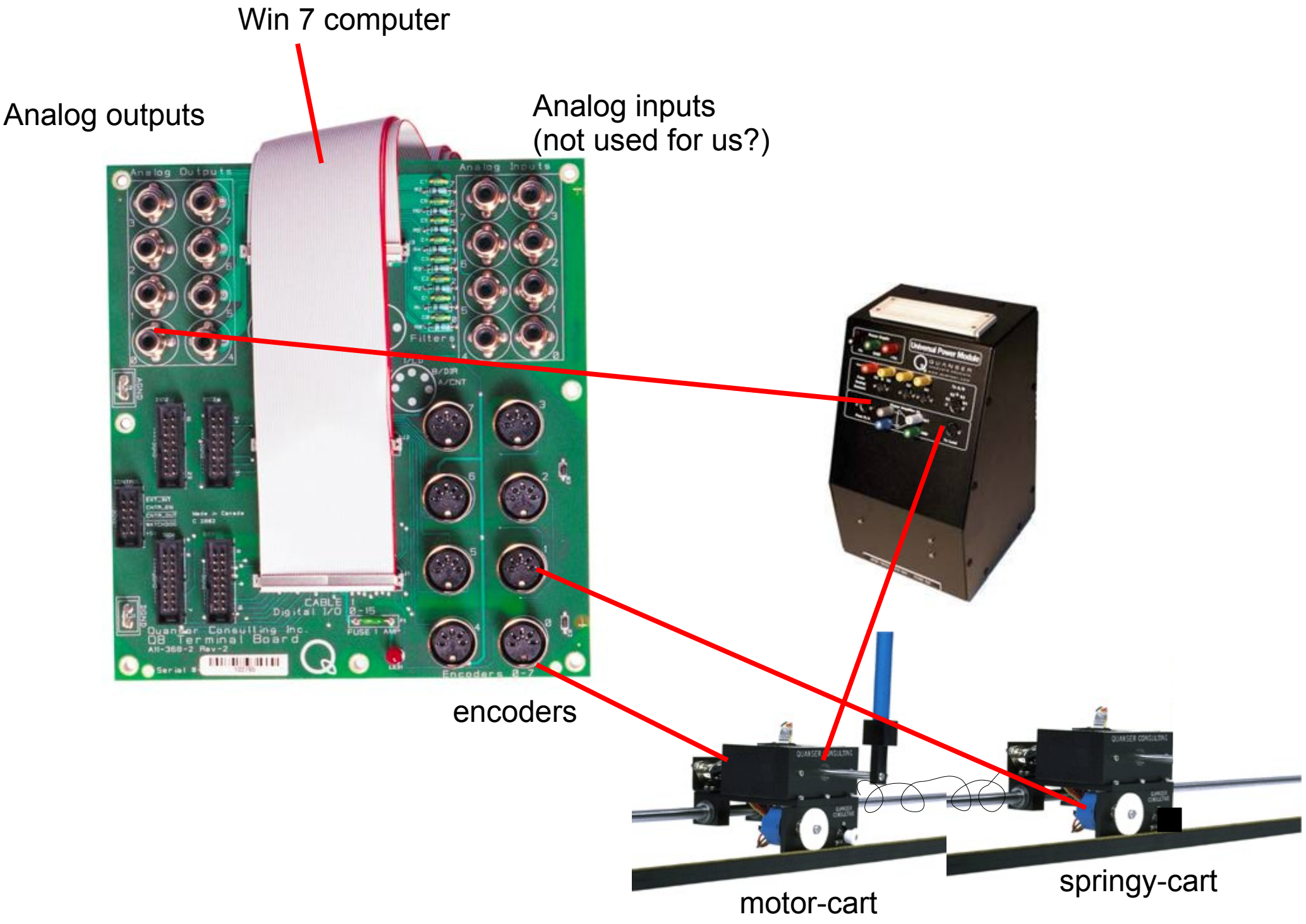
Our current setup: Windows 7,
MATLAB R2015B,
Quanser Q4 terminal board



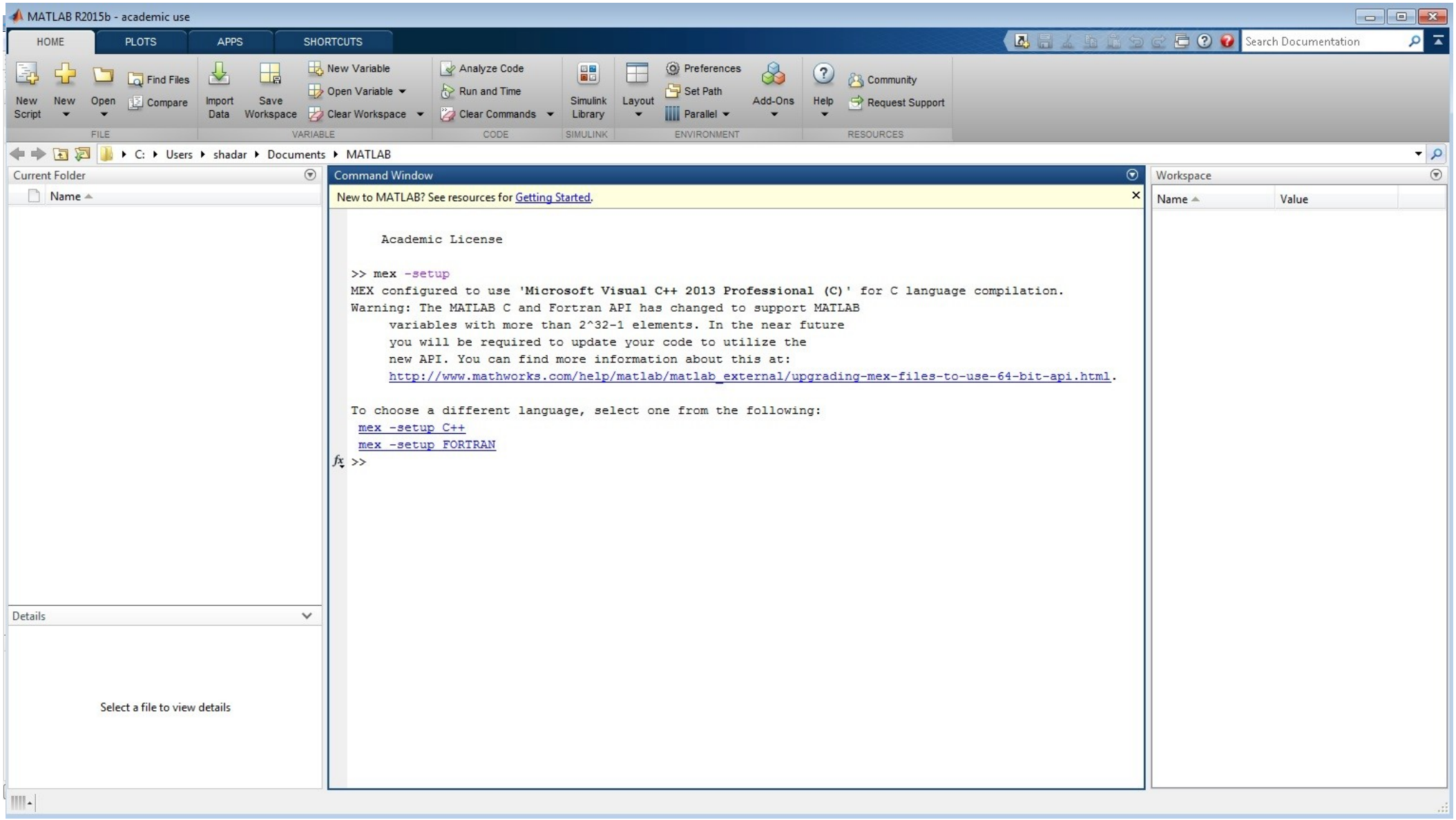


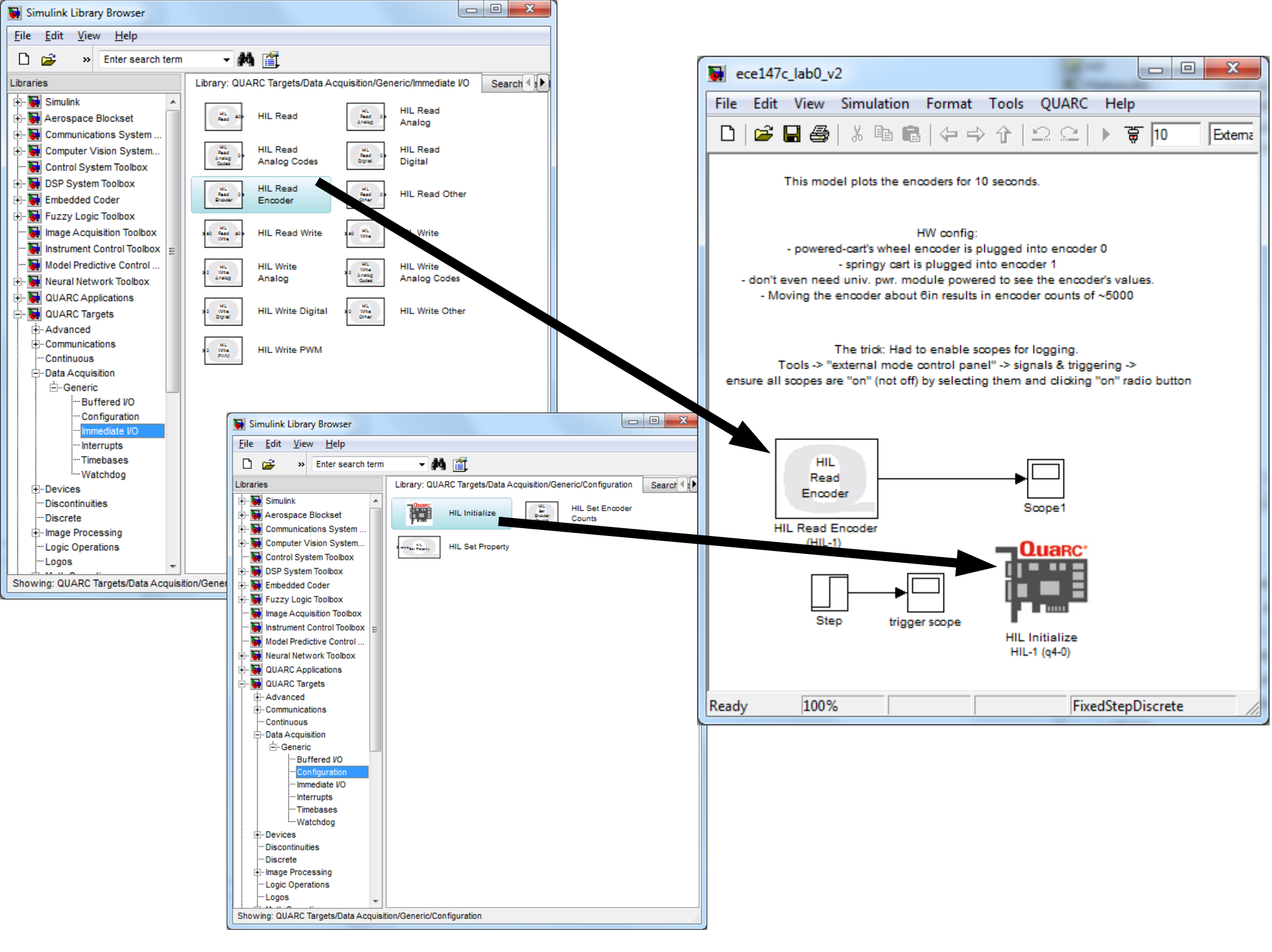
http://www.clemson.edu/ces/crb/ece495/past_projects/MagnaDoodle/Fall2013Websites/Team%2017/Images/P1_F2_Quanser%20Q4%20HIL%20Board%20Connections.jpg

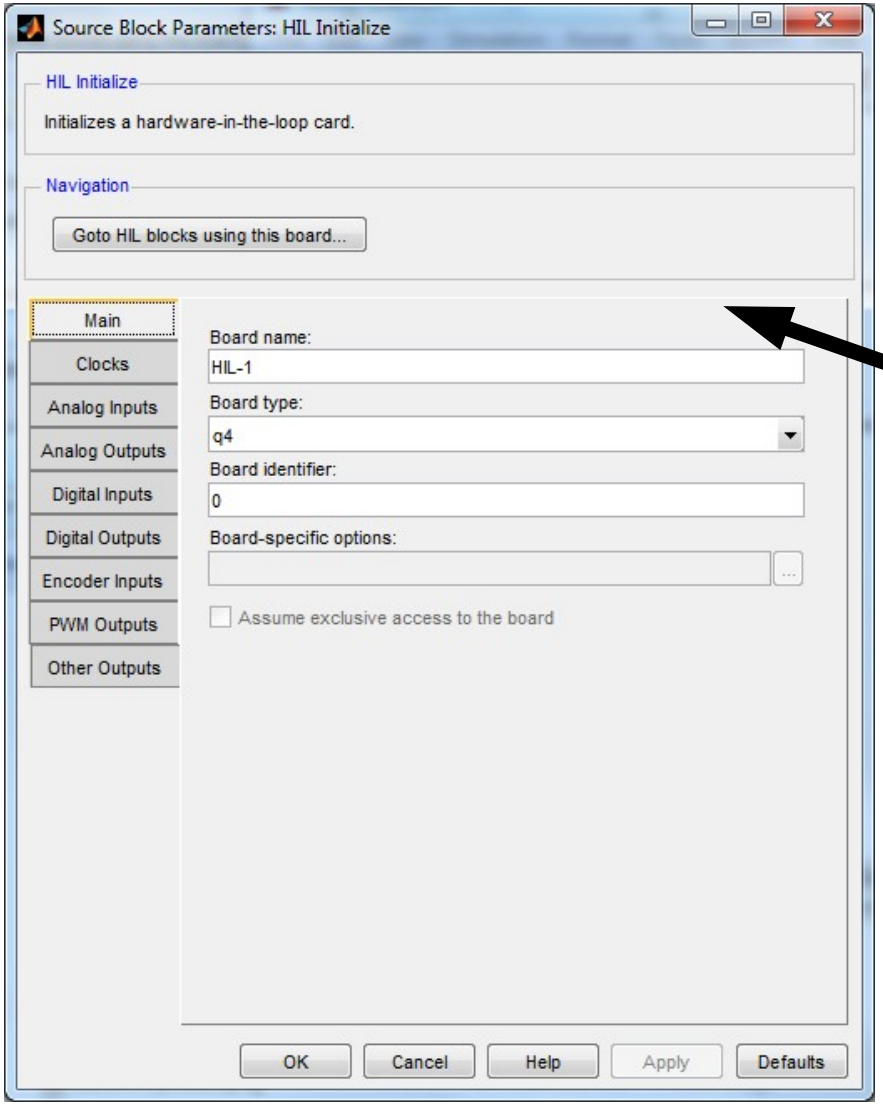
Hardware setup

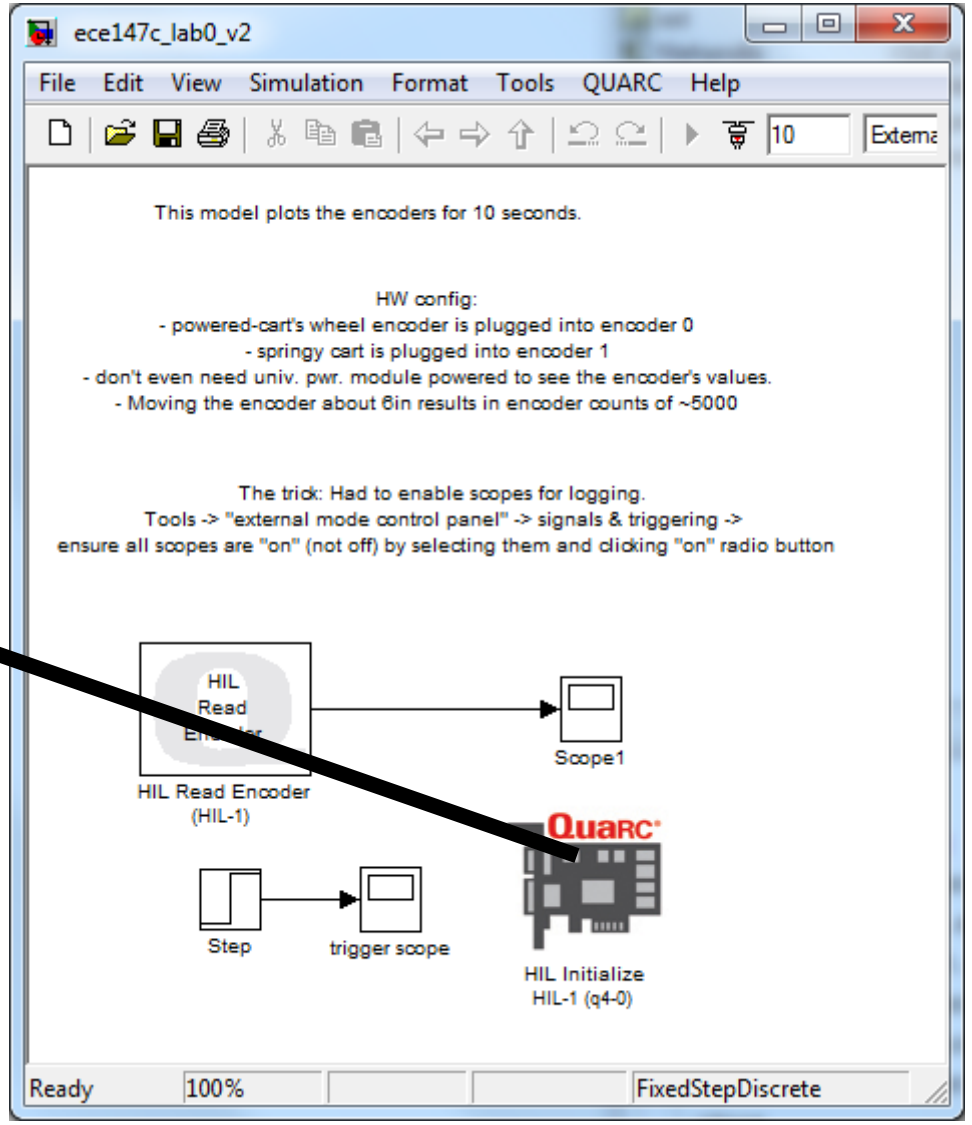

Win 7 computer
Analog outputs
Analog inputs
(not used for us?)
encoders
motor-cart
springy-cart

How to build a simple Simulink model to read the encoders


MATLAB R2015b - academic use
HOME
PLOTS
APPS
SHORTCUTS
Search Documentation
New Script
New
Open
Find Files
Compare
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
Analyze Code
Run and Time
Clear Commands
Simulink Library
Layout
Preferences
Set Path
Parallel
Add-Ons
Help
Community
Request Support
FILE
VARIABLE
CODE
SIMULINK
ENVIRONMENT
RESOURCES
C: ▸ Users ▸ shadar ▸ Documents ▸ MATLAB
Current Folder
Name
Details
Select a file to view details
Command Window
New to MATLAB? See resources for Getting Started.
Academic License
>> mex -setup
MEX configured to use 'Microsoft Visual C++ 2013 Professional (C)' for C language compilation.
Warning: The MATLAB C and Fortran API has changed to support MATLAB
variables with more than 2^32-1 elements. In the near future
you will be required to update your code to utilize the
new API. You can find more information about this at:
http://www.mathworks.com/help/matlab/matlab_external/upgrading-mex-files-to-use-64-bit-api.html.
To choose a different language, select one from the following:
mex -setup C++
mex -setup FORTRAN
>>
Workspace
Name
Value


Simulink Library Browser
File Edit View Help
Enter search term
Libraries
Library: QUARC Targets/Data Acquisition/Generic/Immediate I/O
Search
Simulink
Aerospace Blockset
Communications System ...
Computer Vision System...
Control System Toolbox
DSP System Toolbox
Embedded Coder
Fuzzy Logic Toolbox
Image Acquisition Toolbox
Instrument Control Toolbox
Model Predictive Control ...
Neural Network Toolbox
QUARC Applications
QUARC Targets
Advanced
Communications
Continuous
Data Acquisition
Generic
Buffered I/O
Configuration
Immediate I/O
Interrupts
Timebases
Watchdog
Devices
Discontinuities
Discrete
Image Processing
Logic Operations
Logos
HIL Read
HIL Read Analog
HIL Read Analog Codes
HIL Read Digital
HIL Read Encoder
HIL Read Other
HIL Read Write
HIL Write
HIL Write Analog
HIL Write Analog Codes
HIL Write Digital
HIL Write Other
HIL Write PWM
Showing: QUARC Targets/Data Acquisition/Gener
Simulink Library Browser
File Edit View Help
Enter search term
Libraries
Library: QUARC Targets/Data Acquisition/Generic/Configuration
Search
HIL Initialize
HIL Set Encoder Counts
HIL Set Property
Showing: QUARC Targets/Data Acquisition/Generic/Configuration
ece147c_lab0_v2
File Edit View Simulation Format Tools QUARC Help
10
This model plots the encoders for 10 seconds.
HW config:
- powered-cart's wheel encoder is plugged into encoder 0
- springy cart is plugged into encoder 1
- don't even need univ. pwr. module powered to see the encoder's values.
- Moving the encoder about 6in results in encoder counts of ~5000
The trick: Had to enable scopes for logging.
Tools -> "external mode control panel" -> signals & triggering ->
ensure all scopes are "on" (not off) by selecting them and clicking "on" radio button
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
Step
trigger scope
HIL Initialize
HIL-1 (q4-0)
Ready
100%
FixedStepDiscrete


Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Board name:
HIL-1
Board type:
q4
Board identifier:
0
Board-specific options:
Assume exclusive access to the board
OK
Cancel
Help
Apply
Defaults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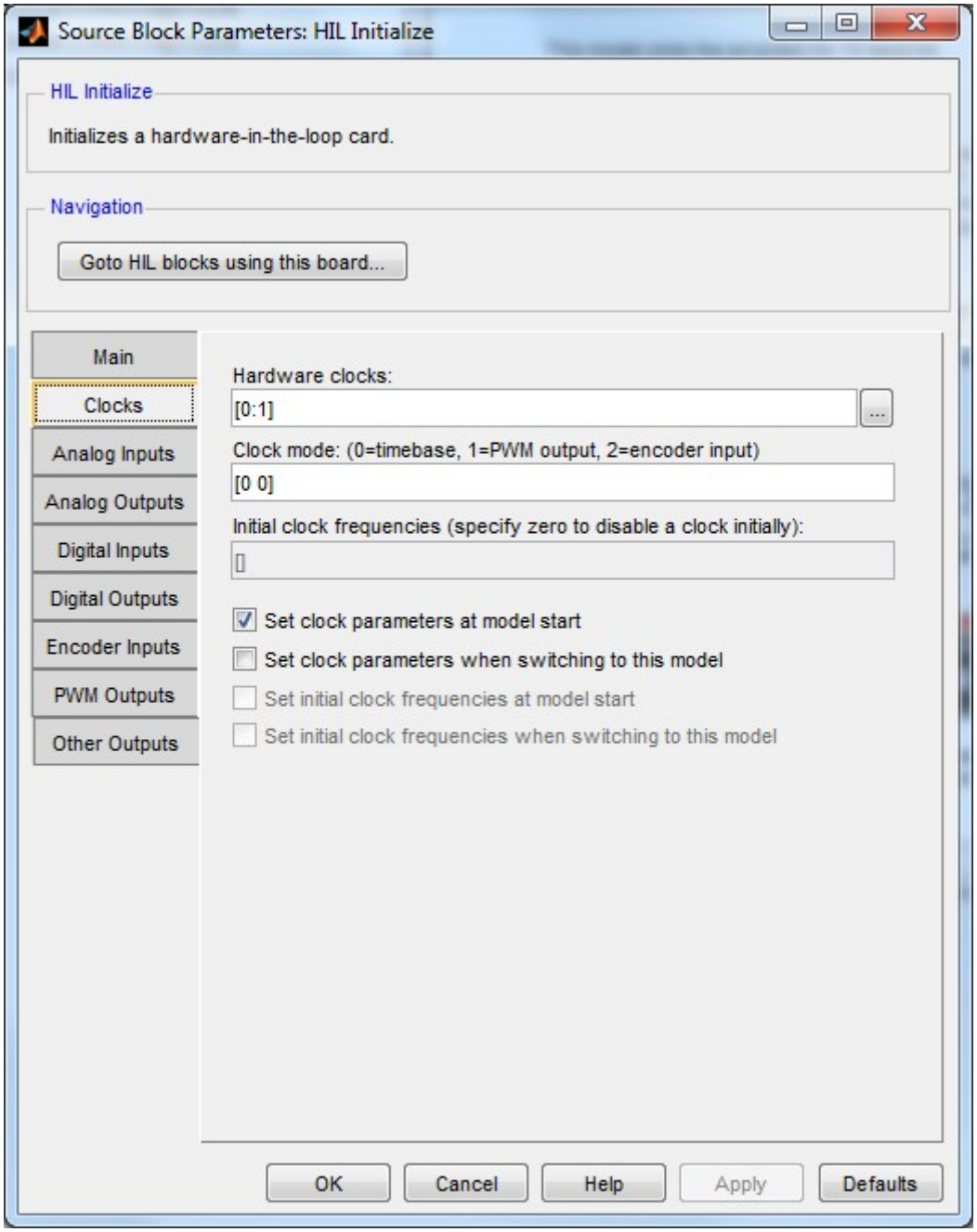
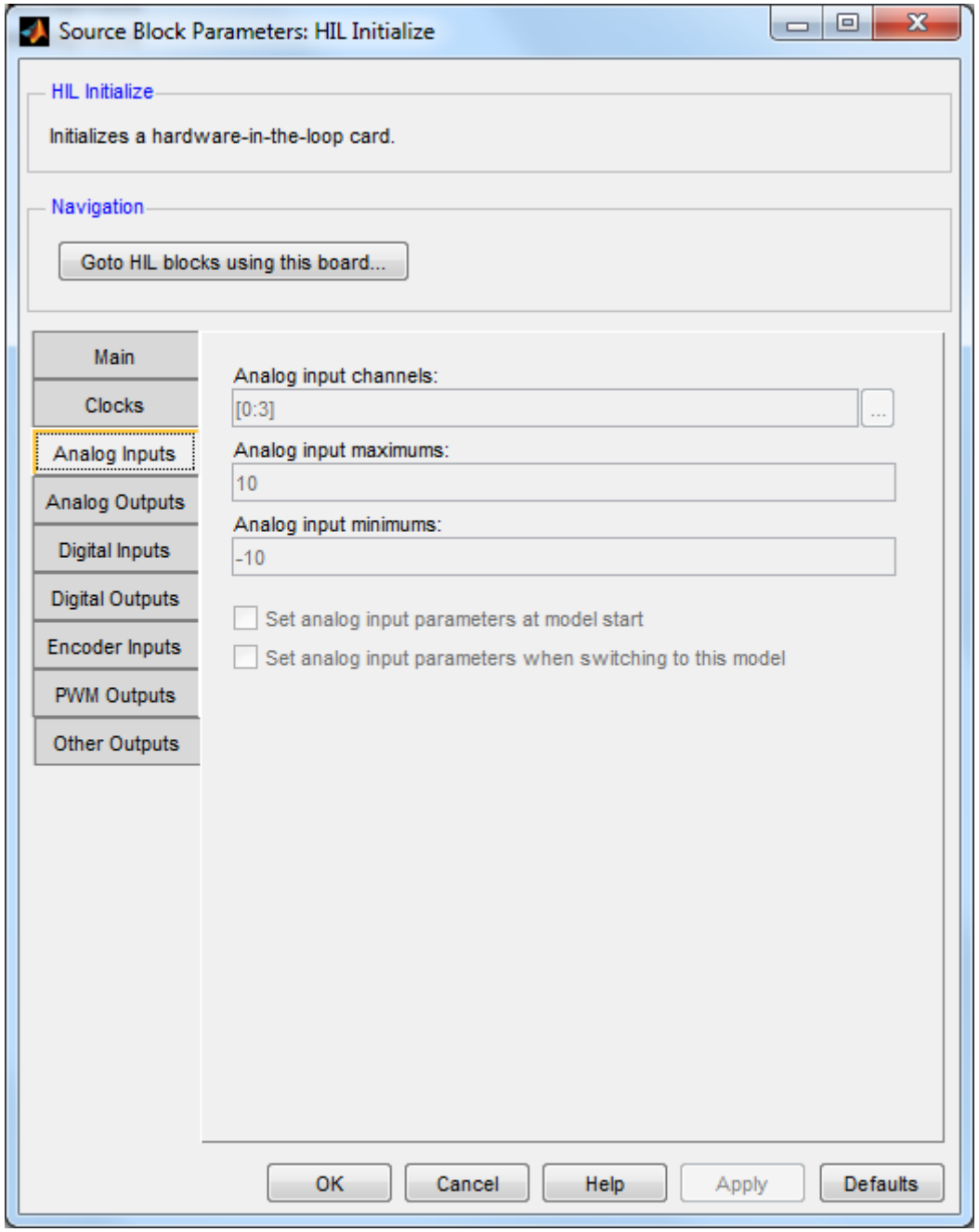
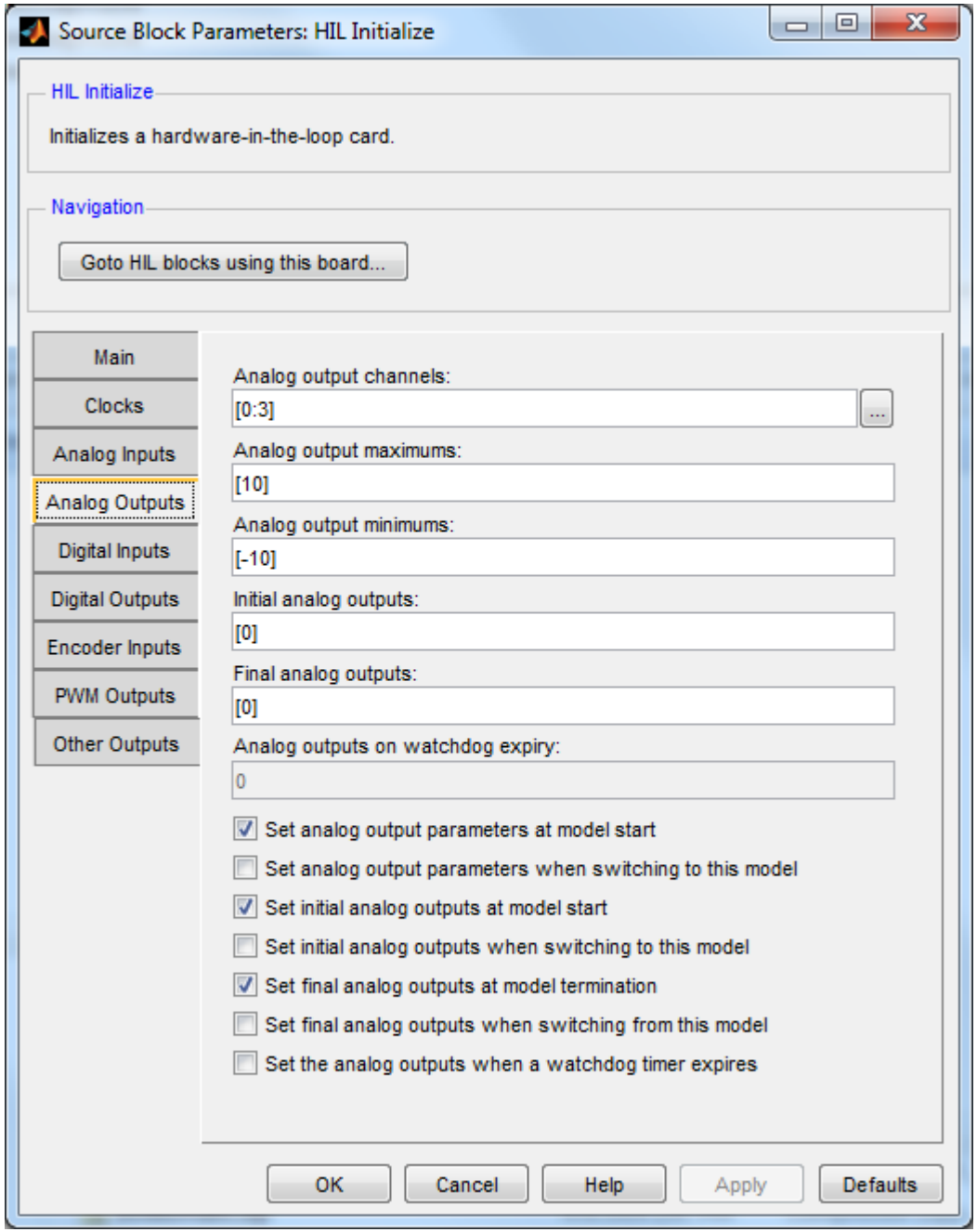
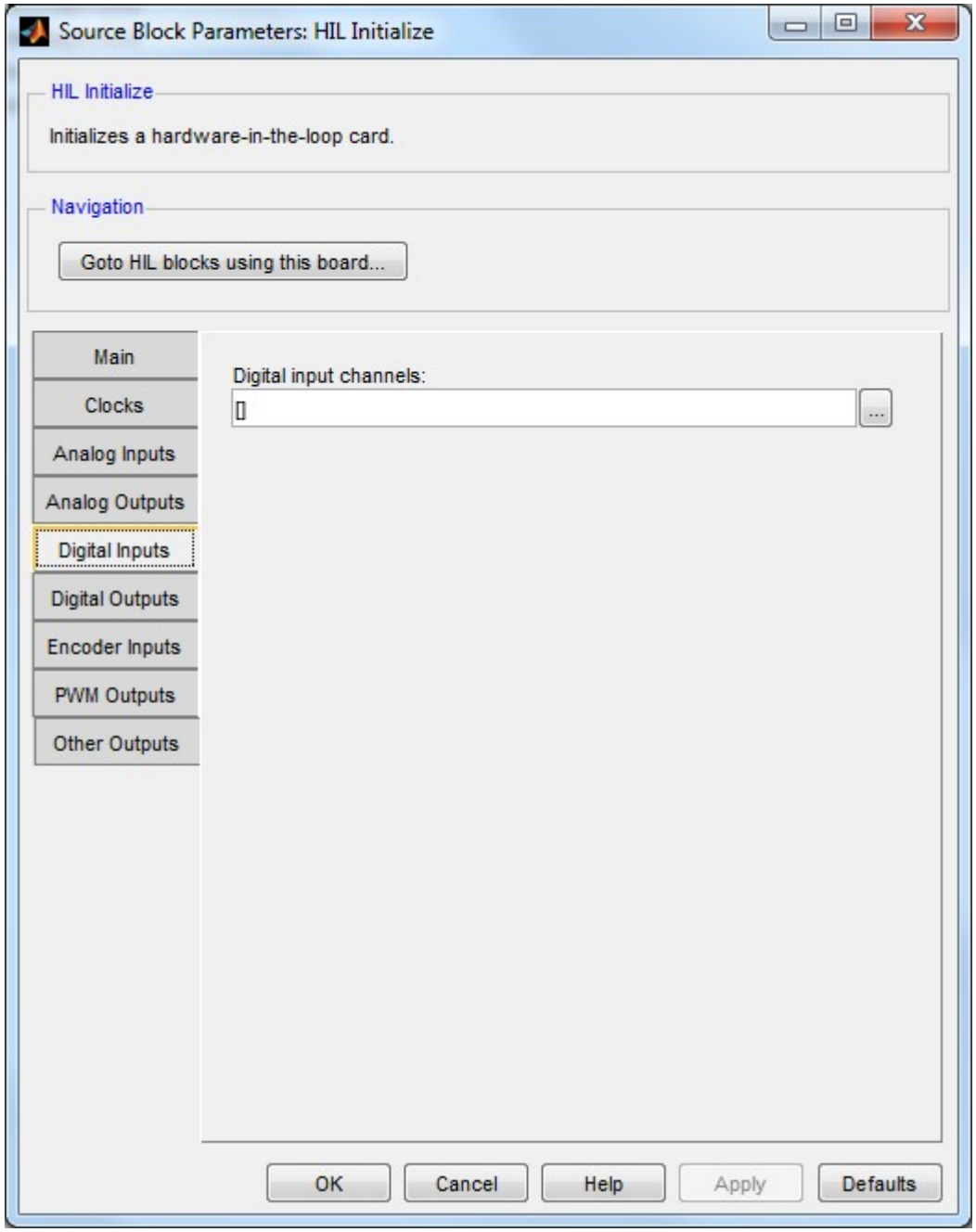
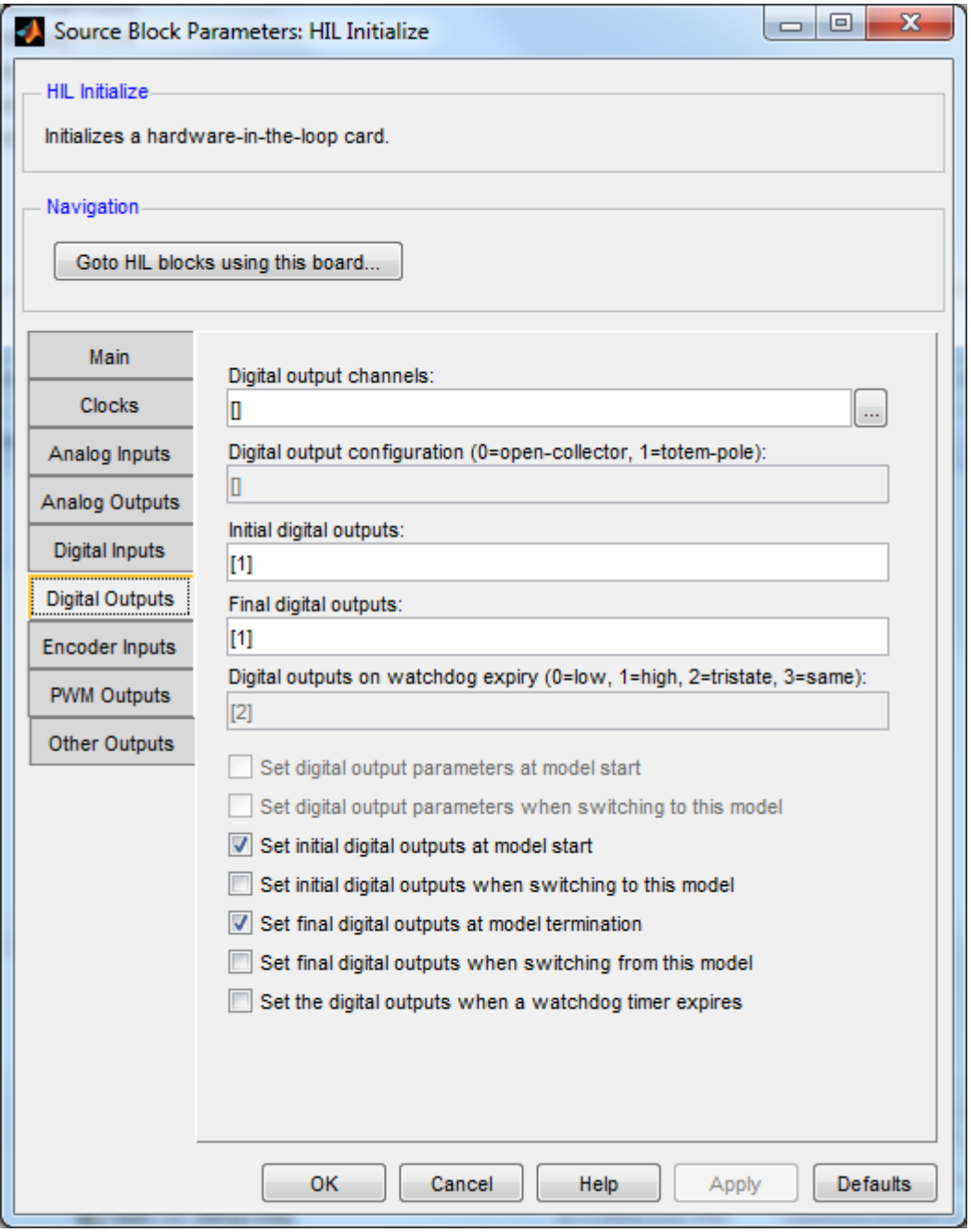
(HIL-1)
Scope1
Step
trigger scope
HIL Initialize
HIL-1 (q4-0)
Ready
100%
FixedStepDiscrete

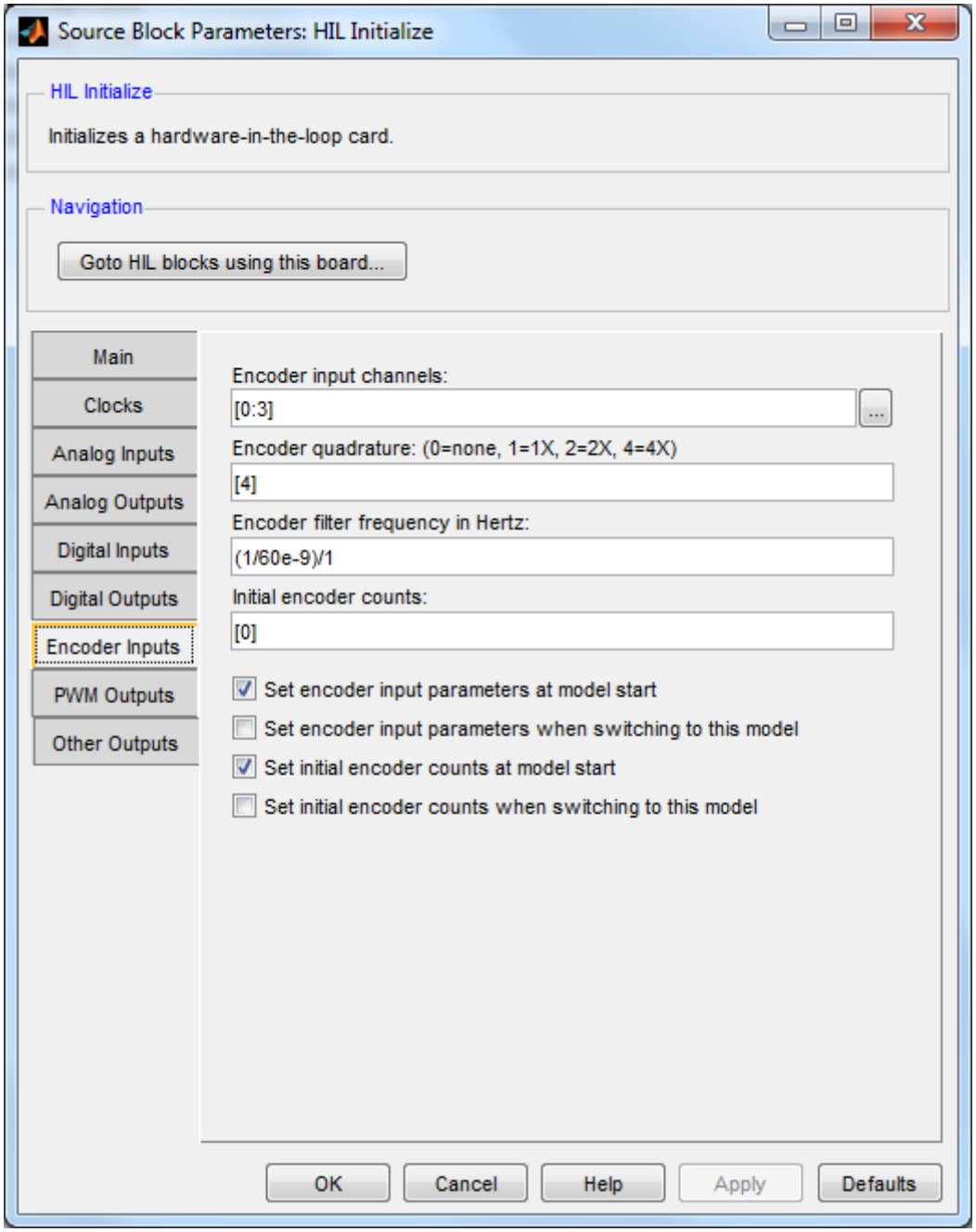

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Hardware clocks:
[0:1]
Clock mode: (0=timebase, 1=PWM output, 2=encoder input)
[0 0]
Initial clock frequencies (specify zero to disable a clock initially):
[]
Set clock parameters at model start
Set clock parameters when switching to this model
Set initial clock frequencies at model start
Set initial clock frequencies when switching to this model
OK
Cancel
Help
Apply
Defaults

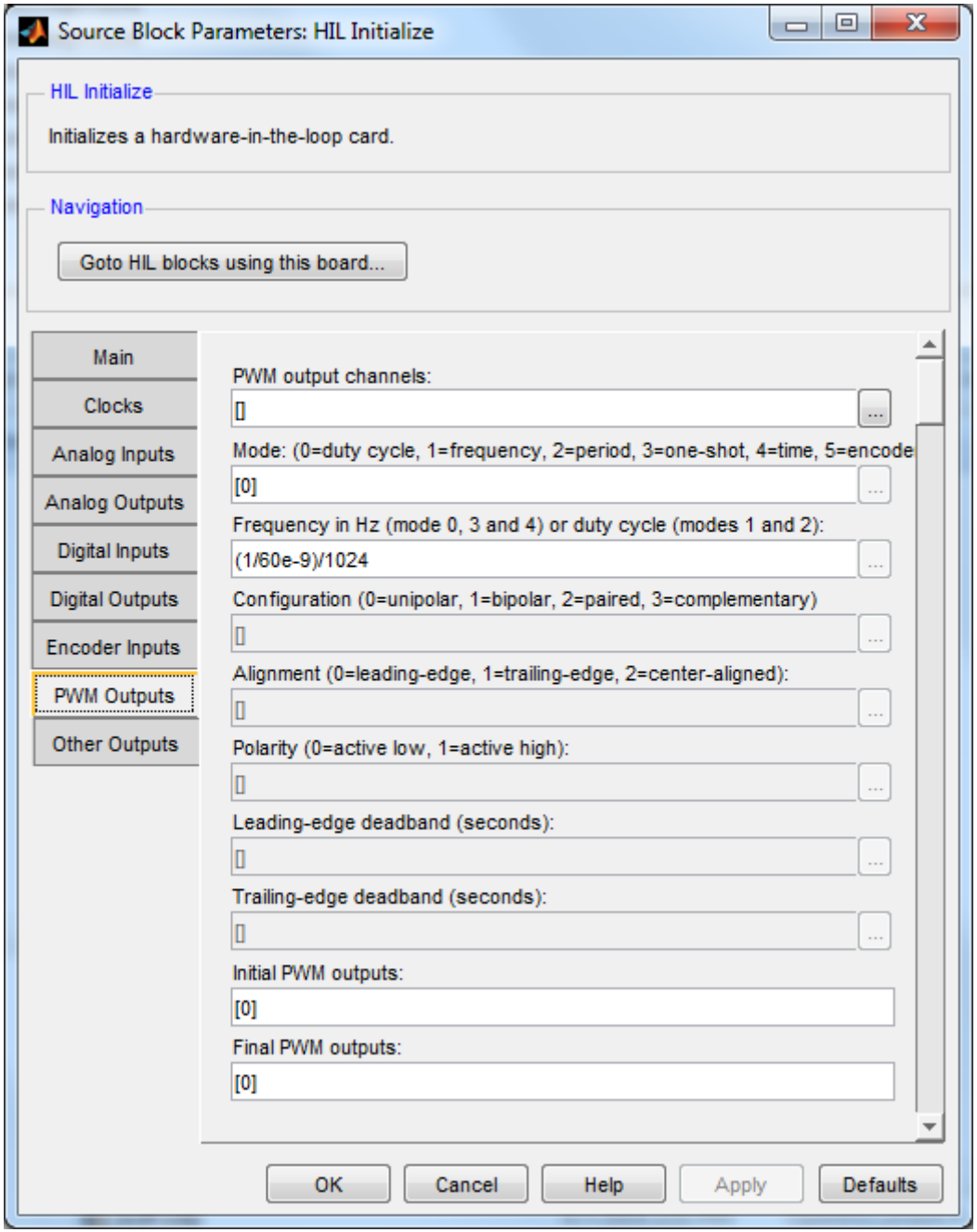

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Analog input channels:
[0:3]
Analog input maximums:
10
Analog input minimums:
-10
Set analog input parameters at model start
Set analog input parameters when switching to this model
OK
Cancel
Help
Apply
Defaults

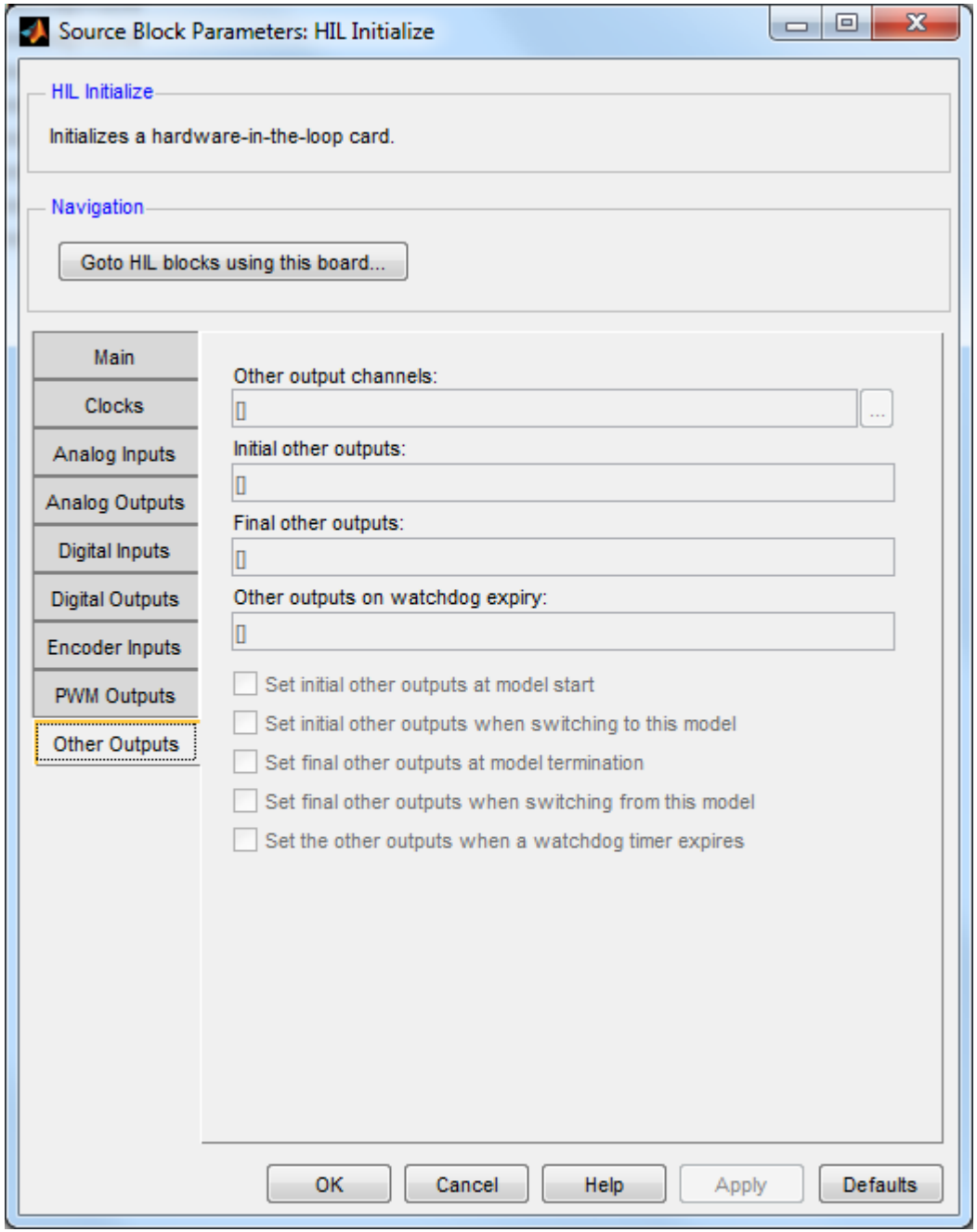

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Analog output channels:
[0:3]
Analog output maximums:
[10]
Analog output minimums:
[-10]
Initial analog outputs:
[0]
Final analog outputs:
[0]
Analog outputs on watchdog expiry:
0
Set analog output parameters at model start
Set analog output parameters when switching to this model
Set initial analog outputs at model start
Set initial analog outputs when switching to this model
Set final analog outputs at model termination
Set final analog outputs when switching from this model
Set the analog outputs when a watchdog timer expires
OK
Cancel
Help
Apply
Defaults

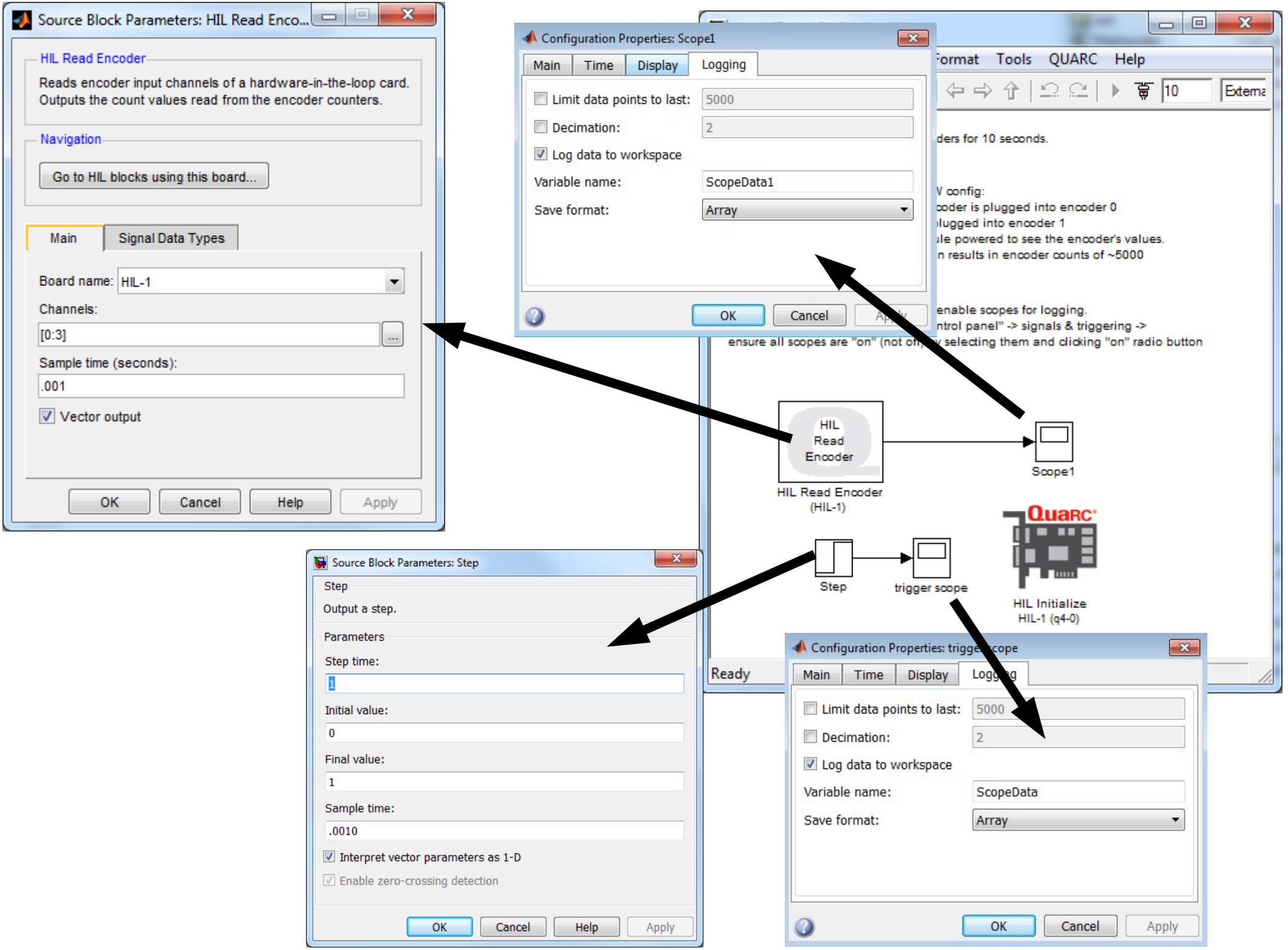

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Digital input channels:
[]
OK
Cancel
Help
Apply
Defaults

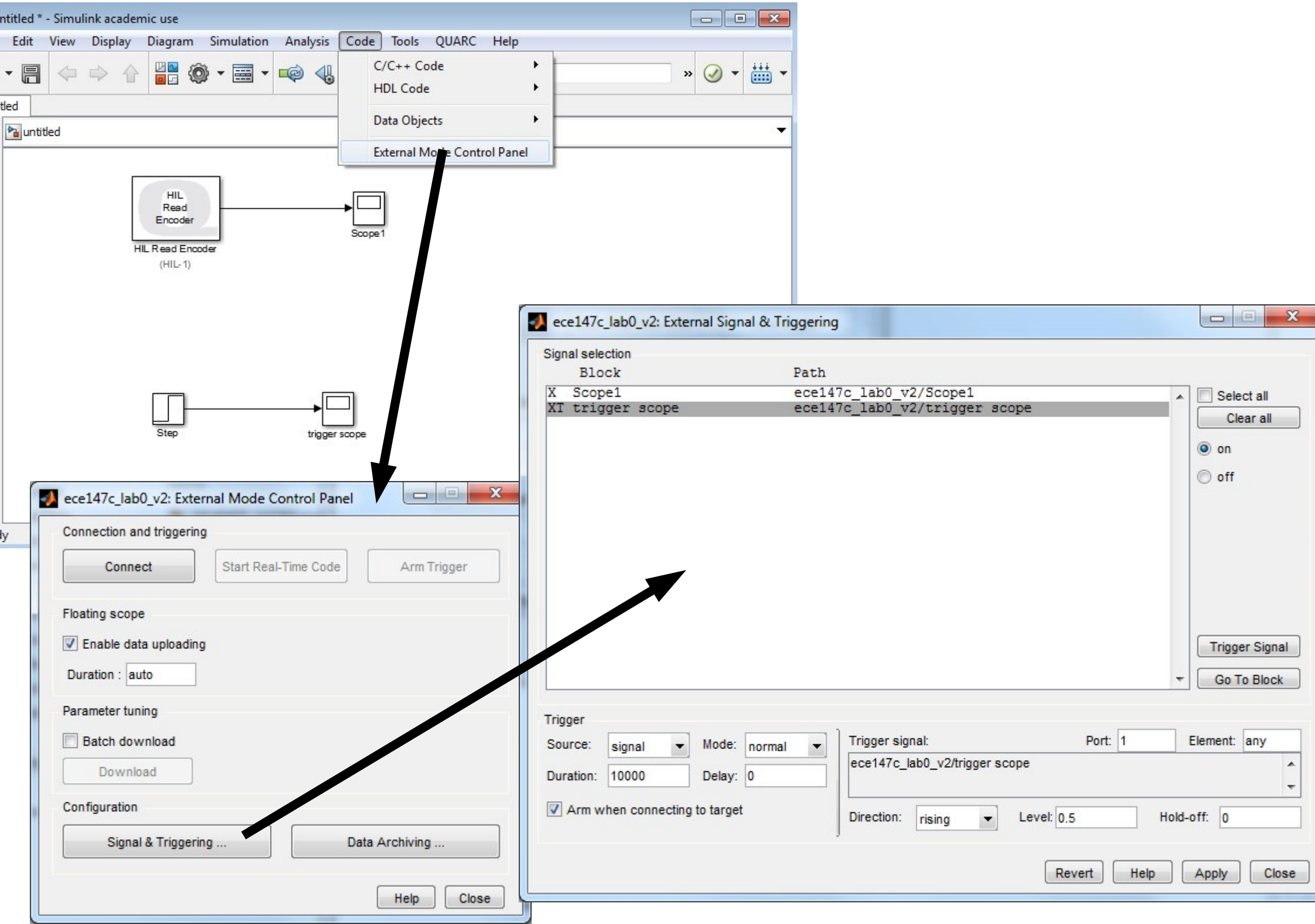

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Digital output channels:
[]
Digital output configuration (0=open-collector, 1=totem-pole):
[]
Initial digital outputs:
[1]
Final digital outputs:
[1]
Digital outputs on watchdog expiry (0=low, 1=high, 2=tristate, 3=same):
[2]
Set digital output parameters at model start
Set digital output parameters when switching to this model
Set initial digital outputs at model start
Set initial digital outputs when switching to this model
Set final digital outputs at model termination
Set final digital outputs when switching from this model
Set the digital outputs when a watchdog timer expires
OK
Cancel
Help
Apply
Defaults

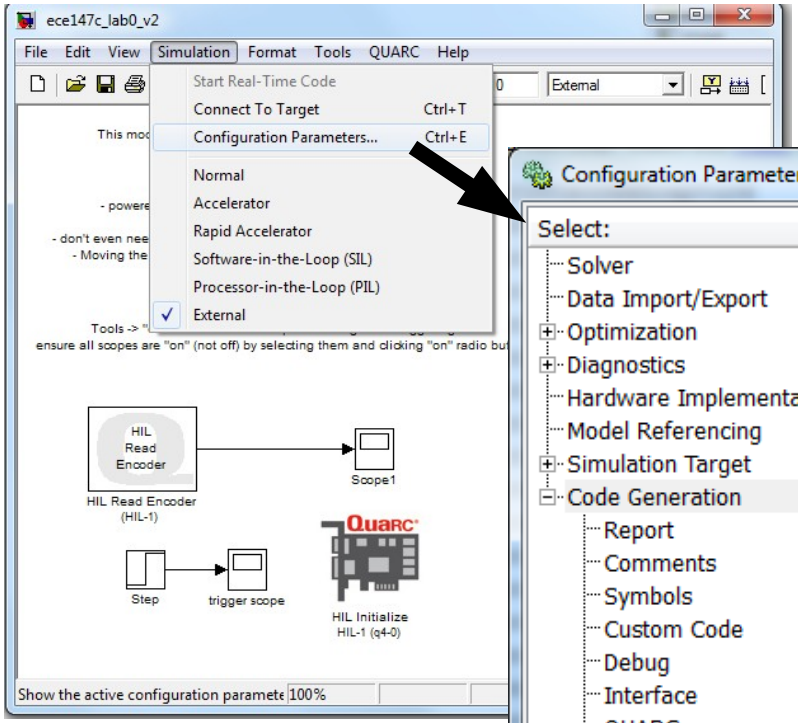

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Encoder input channels:
[0:3]
Encoder quadrature: (0=none, 1=1X, 2=2X, 4=4X)
[4]
Encoder filter frequency in Hertz:
(1/60e-9)/1
Initial encoder counts:
[0]
Set encoder input parameters at model start
Set encoder input parameters when switching to this model
Set initial encoder counts at model start
Set initial encoder counts when switching to this model
OK
Cancel
Help
Apply
Defaults

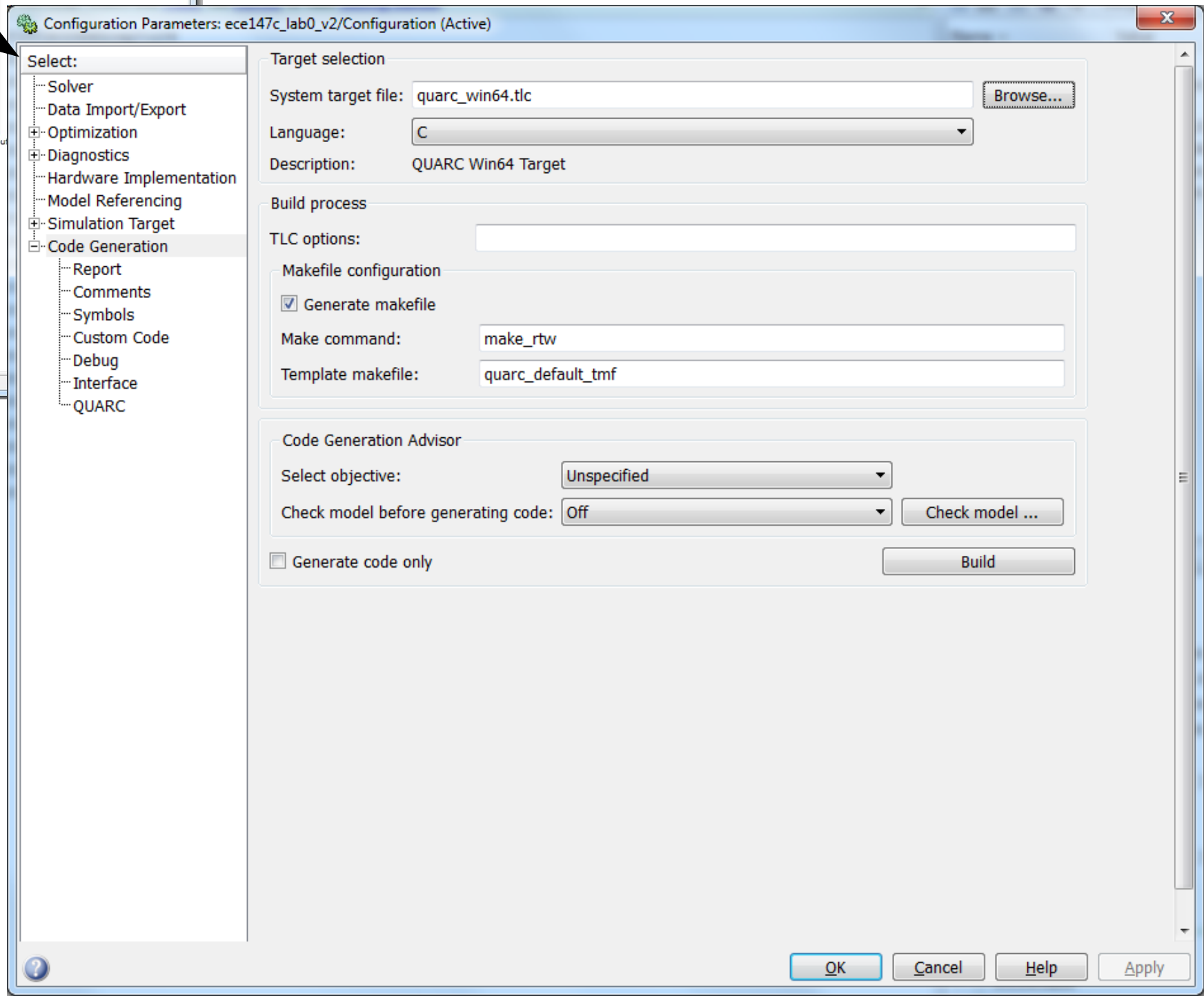

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
PWM output channels:
[]
Mode: (0=duty cycle, 1=frequency, 2=period, 3=one-shot, 4=time, 5=encode
[0]
Frequency in Hz (mode 0, 3 and 4) or duty cycle (modes 1 and 2):
(1/60e-9)/1024
Configuration (0=unipolar, 1=bipolar, 2=paired, 3=complementary)
[]
Alignment (0=leading-edge, 1=trailing-edge, 2=center-aligned):
[]
Polarity (0=active low, 1=active high):
[]
Leading-edge deadband (seconds):
[]
Trailing-edge deadband (seconds):
[]
Initial PWM outputs:
[0]
Final PWM outputs:
[0]
OK
Cancel
Help
Apply
Defaults

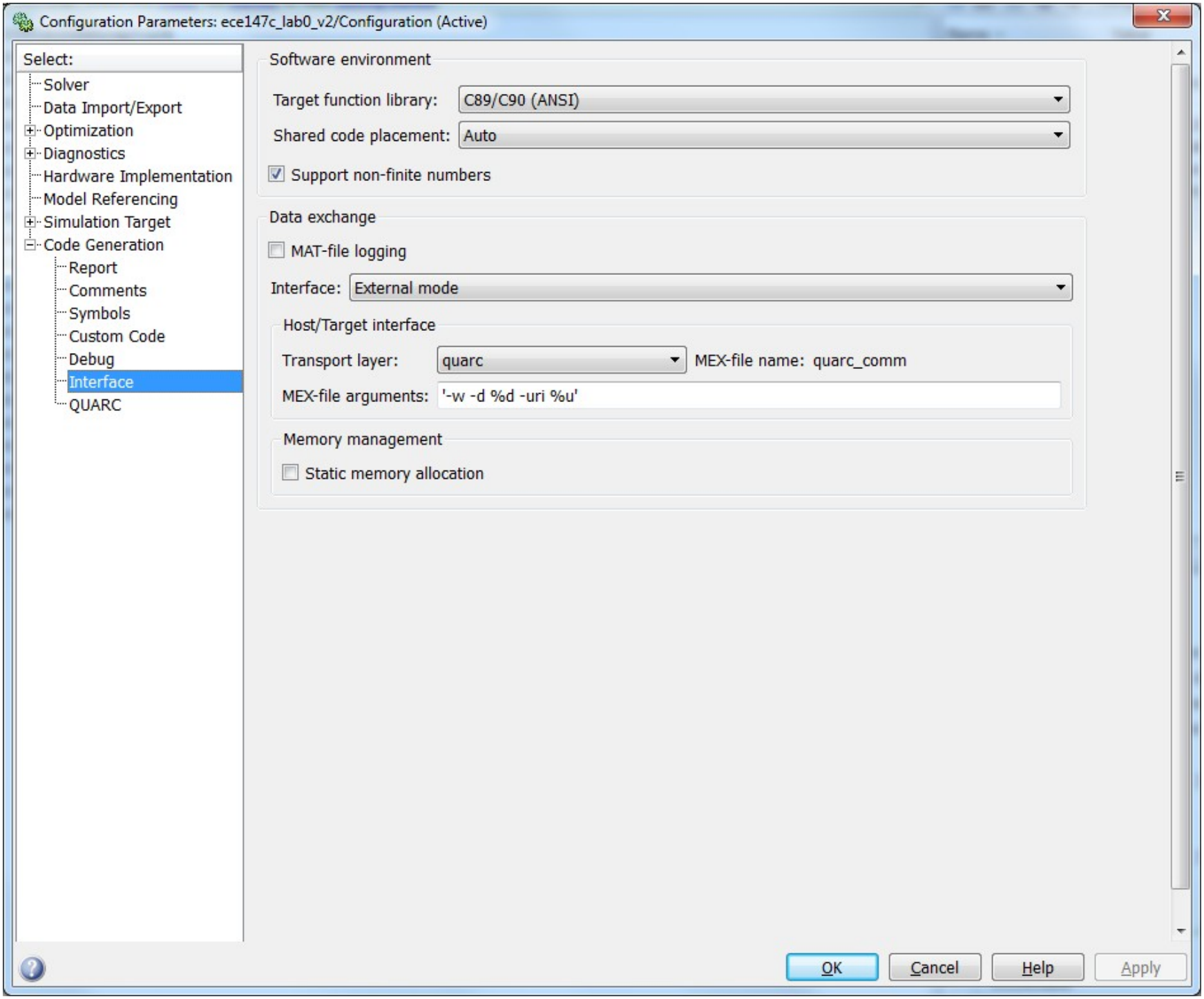

Source Block Parameters: HIL Initialize
HIL Initialize
Initializes a hardware-in-the-loop card.
Navigation
Goto HIL blocks using this board...
Main
Clocks
Analog Inputs
Analog Outputs
Digital Inputs
Digital Outputs
Encoder Inputs
PWM Outputs
Other Outputs
Other output channels:
[]
Initial other outputs:
[]
Final other outputs:
[]
Other outputs on watchdog expiry:
[]
Set initial other outputs at model start
Set initial other outputs when switching to this model
Set final other outputs at model termination
Set final other outputs when switching from this model
Set the other outputs when a watchdog timer expires
OK
Cancel
Help
Apply
Defaults


Source Block Parameters: HIL Read Enco...
HIL Read Encoder
Reads encoder input channels of a hardware-in-the-loop card.
Outputs the count values read from the encoder counters.
Navigation
Go to HIL blocks using this board...
Main
Signal Data Types
Board name: HIL-1
Channels:
[0:3]
Sample time (seconds):
.001
Vector output
OK
Cancel
Help
Apply
Configuration Properties: Scope1
Main
Time
Display
Logging
Limit data points to last: 5000
Decimation: 2
Log data to workspace
Variable name: ScopeData1
Save format: Array
OK
Cancel
Apply
Format
Tools
QUARC
Help
ders for 10 seconds.
config:
coder is plugged into encoder 0
lugged into encoder 1
le powered to see the encoder's values.
n results in encoder counts of ~5000
enable scopes for logging.
ntrol panel" -> signals & triggering ->
ensure all scopes are "on" (not
selecting them and clicking "on" radio button
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
Step
trigger scope
HIL Initialize HIL-1 (q4-0)
Ready
Source Block Parameters: Step
Step
Output a step.
Parameters
Step time: 1
Initial value: 0
Final value: 1
Sample time: .0010
Interpret vector parameters as 1-D
Enable zero-crossing detection
OK
Cancel
Help
Apply
Configuration Properties: trigger scope
Main
Time
Display
Logging
Limit data points to last: 5000
Decimation: 2
Log data to workspace
Variable name: ScopeData
Save format: Array
OK
Cancel
Apply


untitled * - Simulink academic use
Edit View Display Diagram Simulation Analysis Code Tools QUARC Help
C/C++ Code
HDL Code
Data Objects
External Mode Control Panel
untitled
HIL Read Encoder
HIL Read Encoder
(HIL-1)
Scope1
Step
trigger scope
ece147c_lab0_v2: External Mode Control Panel
Connection and triggering
Connect
Start Real-Time Code
Arm Trigger
Floating scope
Enable data uploading
Duration : auto
Parameter tuning
Batch download
Download
Configuration
Signal & Triggering ...
Data Archiving ...
Help
Close
ece147c_lab0_v2: External Signal & Triggering
Signal selection
Block
Path
X Scope1
ece147c_lab0_v2/Scope1
XT trigger scope
ece147c_lab0_v2/trigger scope
Select all
Clear all
on
off
Trigger Signal
Go To Block
Trigger
Source: signal
Mode: normal
Duration: 10000
Delay: 0
Arm when connecting to target
Trigger signal:
Port: 1
Element: any
ece147c_lab0_v2/trigger scope
Direction: rising
Level: 0.5
Hold-off: 0
Revert
Help
Apply
Close


ece147c_lab0_v2
File Edit View Simulation Format Tools QUARC Help
Start Real-Time Code
Connect To Target Ctrl+T
Configuration Parameters... Ctrl+E
Normal
Accelerator
Rapid Accelerator
Software-in-the-Loop (SIL)
Processor-in-the-Loop (PIL)
External
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
Step
trigger scope
HIL Initialize HIL-1 (q4-0)
Show the active configuration paramete
100%


Configuration Parameters: ece147c_lab0_v2/Configuration (Active)
Select:
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Code Generation
Report
Comments
Symbols
Custom Code
Debug
Interface
QUARC
Target selection
System target file: quarc_win64.tlc
Browse...
Language: C
Description: QUARC Win64 Target
Build process
TLC options:
Makefile configuration
Generate makefile
Make command: make_rtw
Template makefile: quarc_default_tmf
Code Generation Advisor
Select objective: Unspecified
Check model before generating code: Off
Check model ...
Generate code only
Build
OK
Cancel
Help
Apply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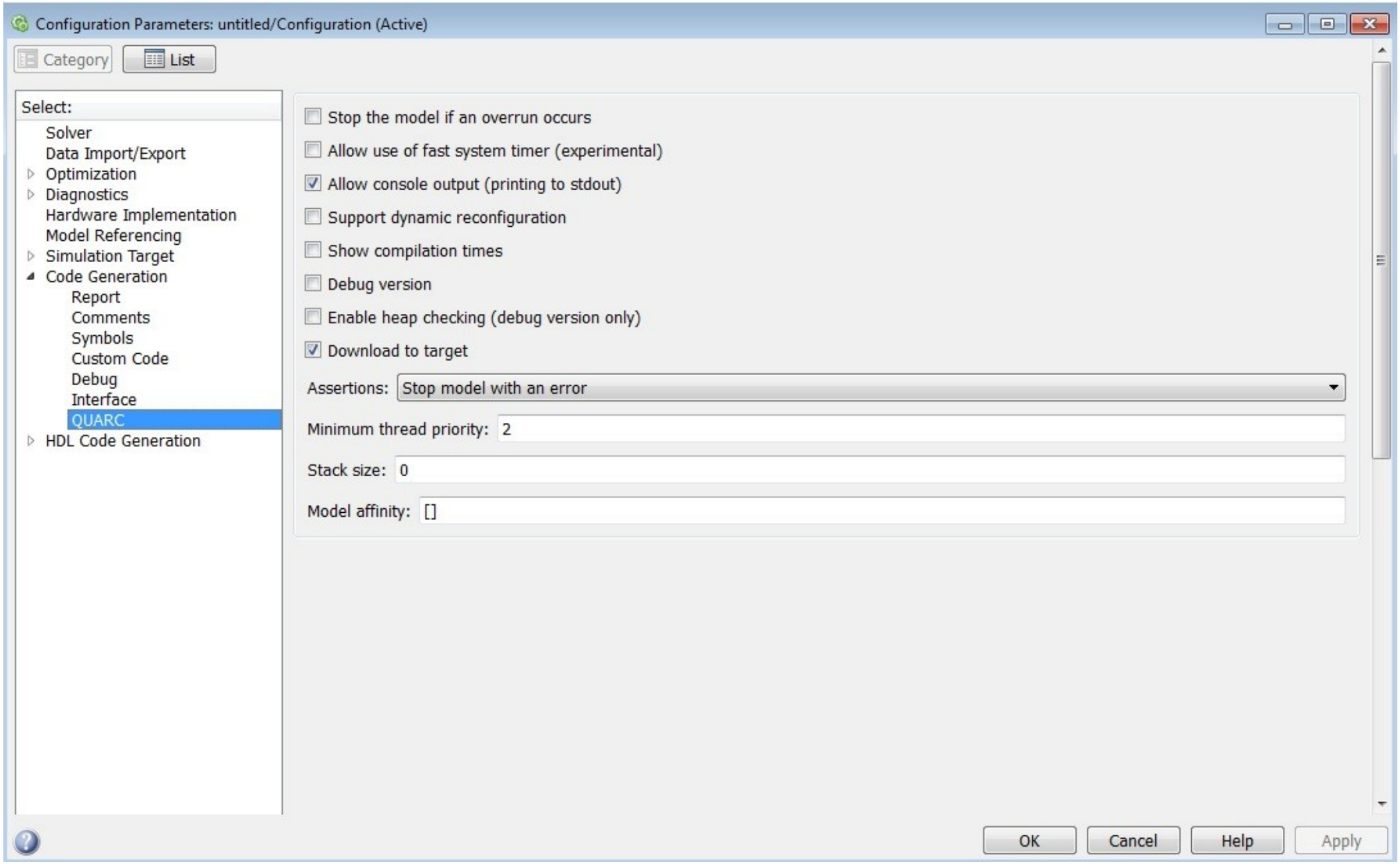
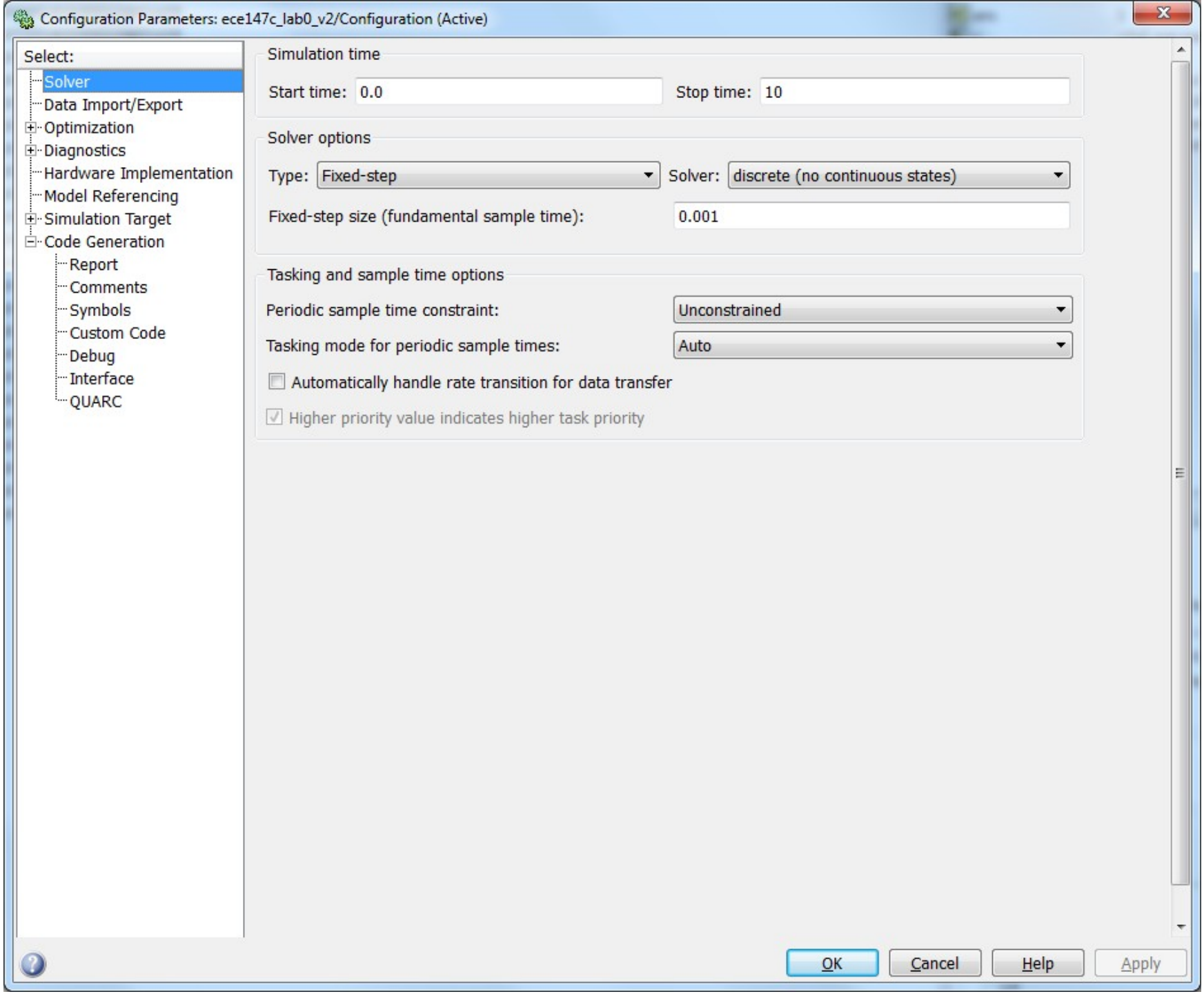
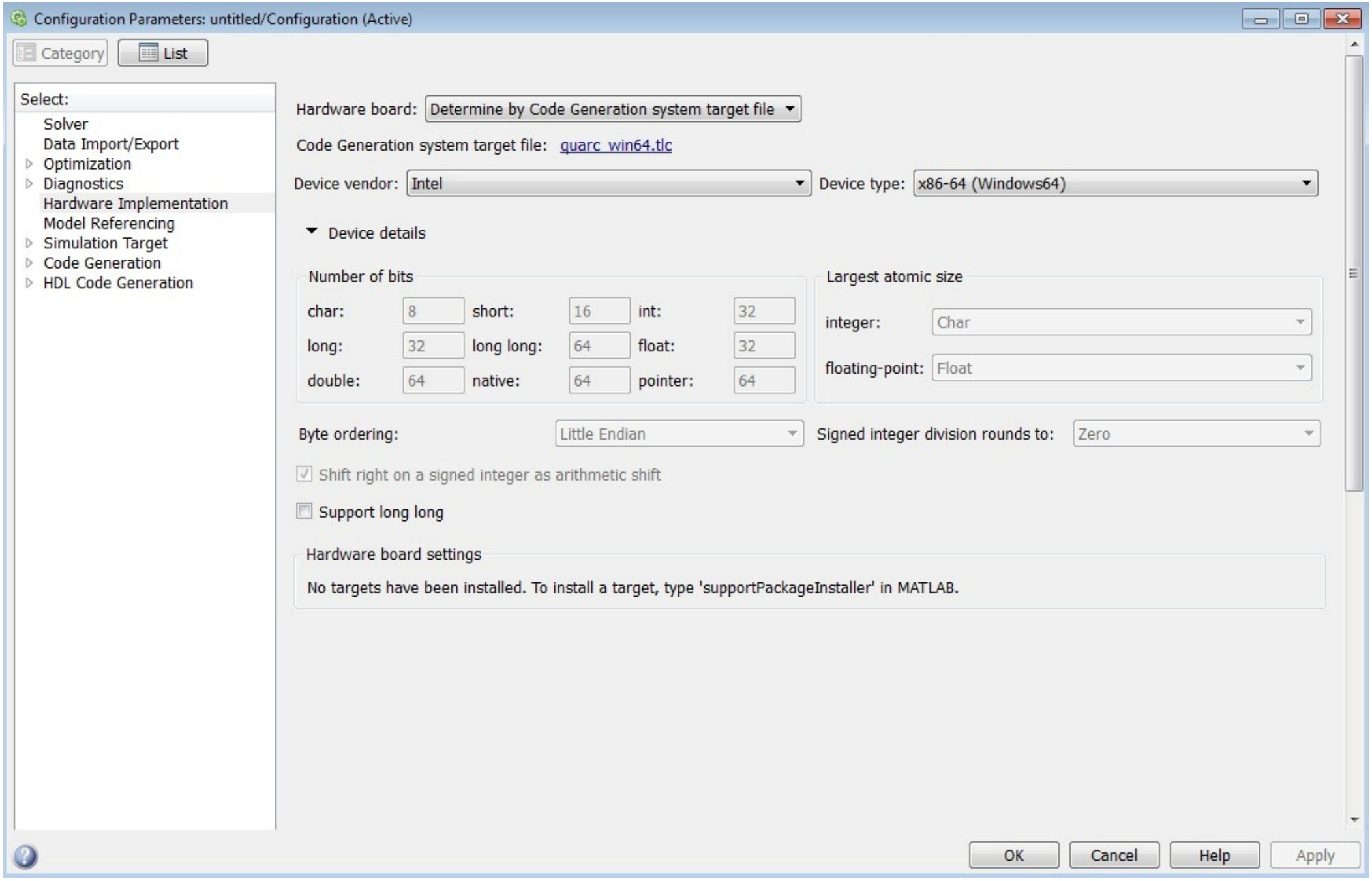
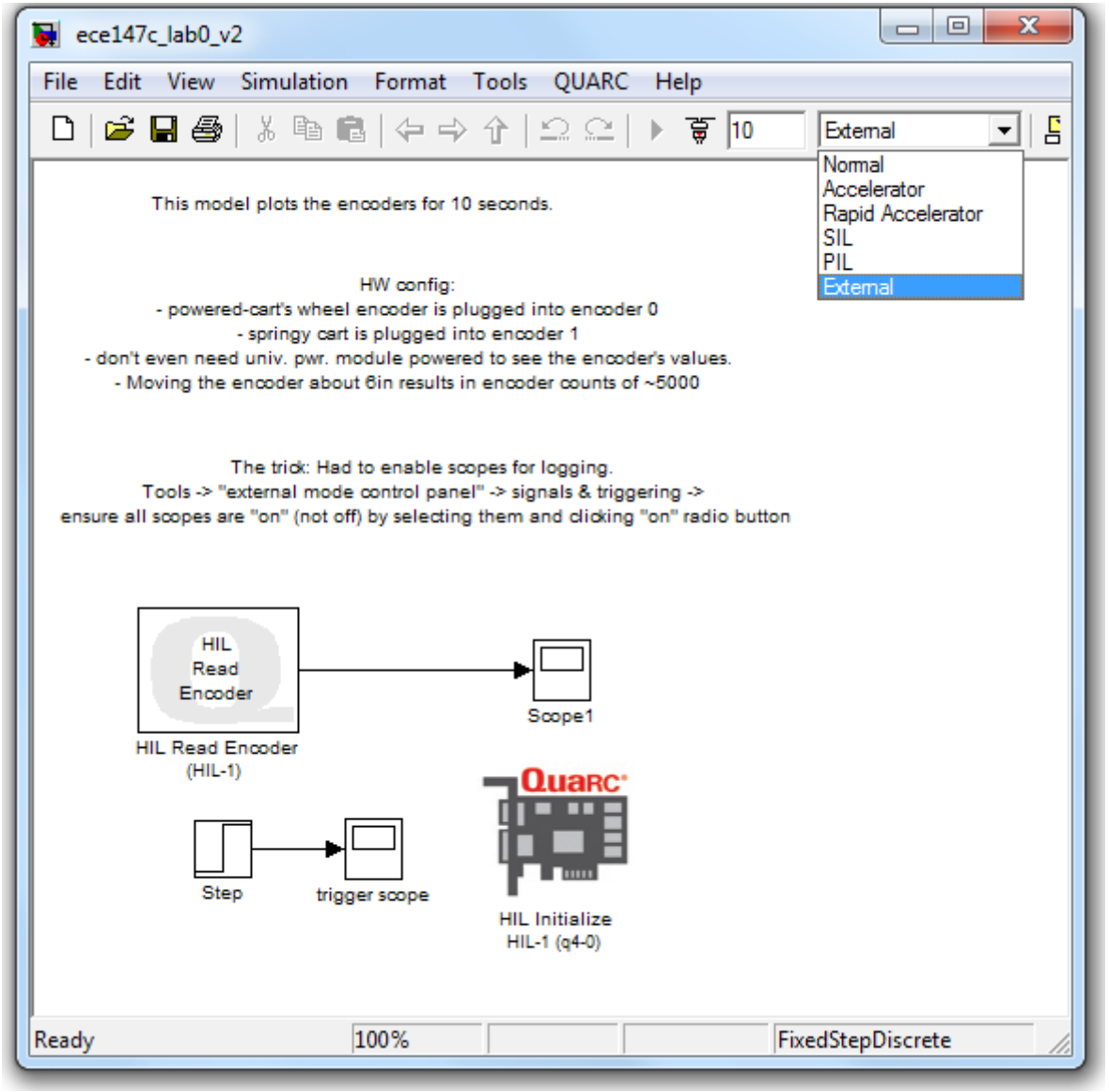
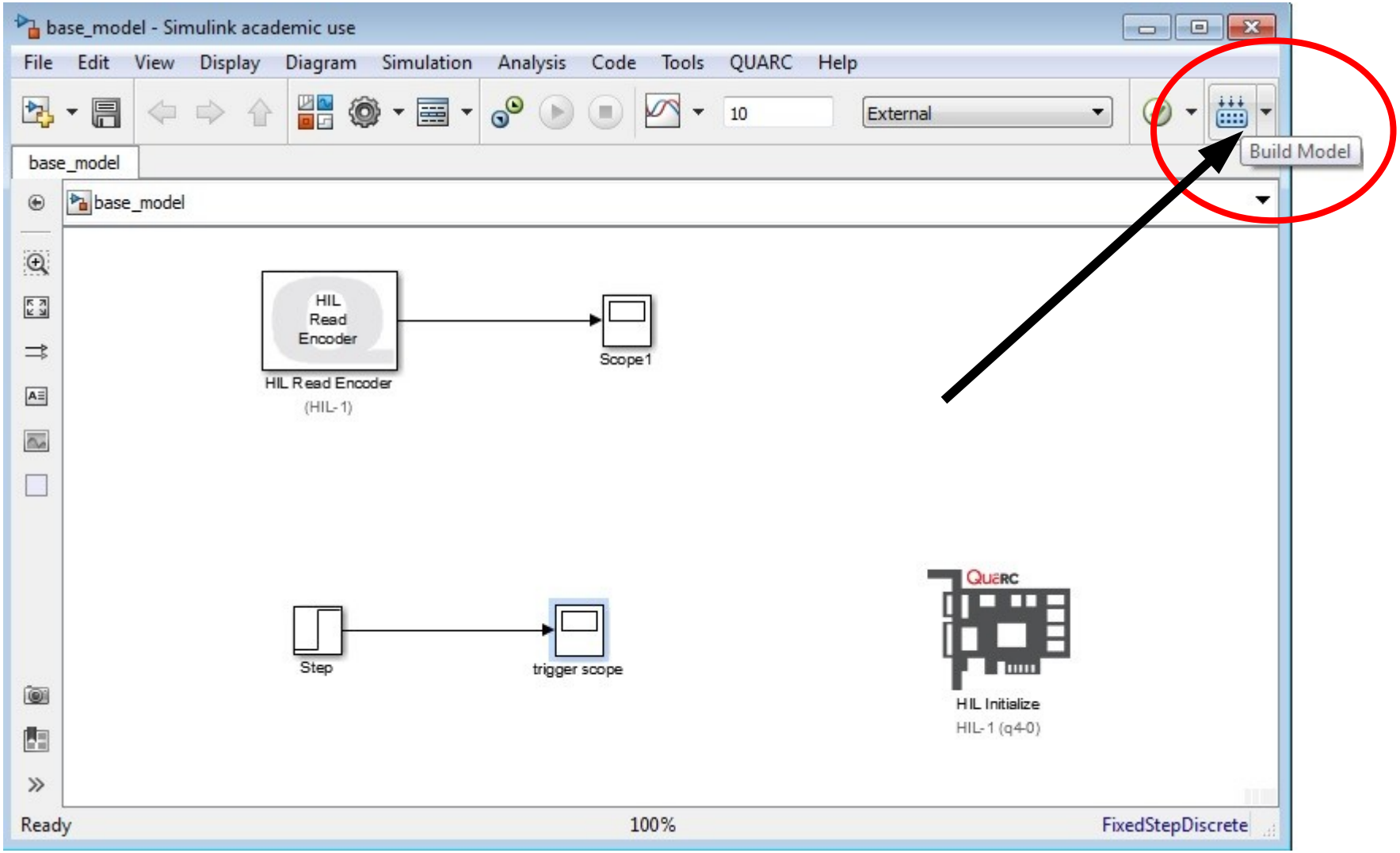
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Code Generation
Report
Comments
Symbols
Custom Code
Debug
Interface
QUARC
Software environment
Target function library:
C89/C90 (ANSI)
Shared code placement:
Auto
Support non-finite numbers
Data exchange
MAT-file logging
Interface:
External mode
Host/Target interface
Transport layer:
quarc
MEX-file name: quarc_comm
MEX-file arguments:
'-w -d %d -uri %u'
Memory management
Static memory allocation
OK
Cancel
Help
Apply

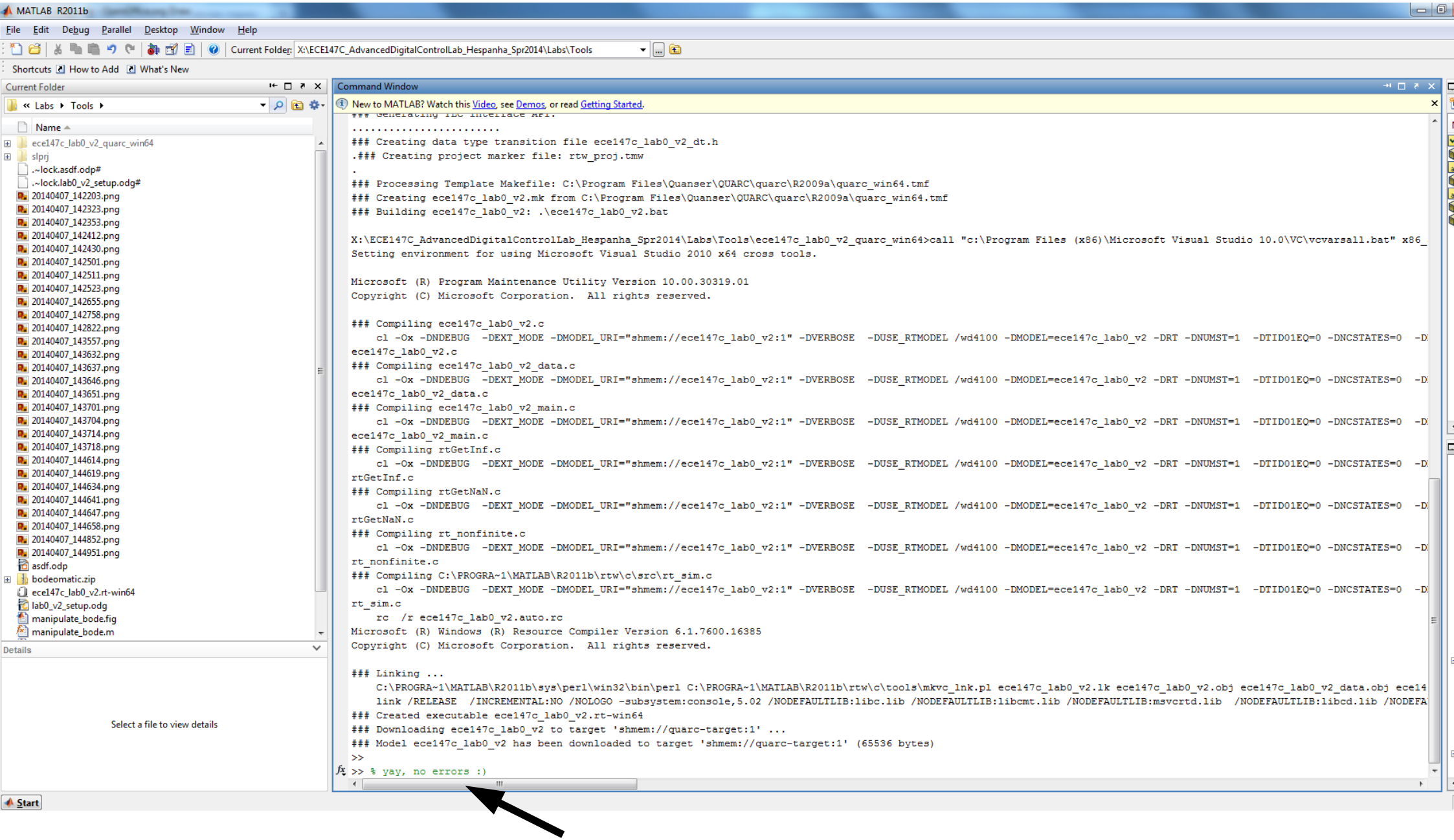

Configuration Parameters: untitled/Configuration (Active)
Category
List
Select:
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Code Generation
Report
Comments
Symbols
Custom Code
Debug
Interface
QUARC
HDL Code Generation
Stop the model if an overrun occurs
Allow use of fast system timer (experimental)
Allow console output (printing to stdout)
Support dynamic reconfiguration
Show compilation times
Debug version
Enable heap checking (debug version only)
Download to target
Assertions:
Stop model with an error
Minimum thread priority:
2
Stack size:
0
Model affinity:
[]
OK
Cancel
Help
Apply

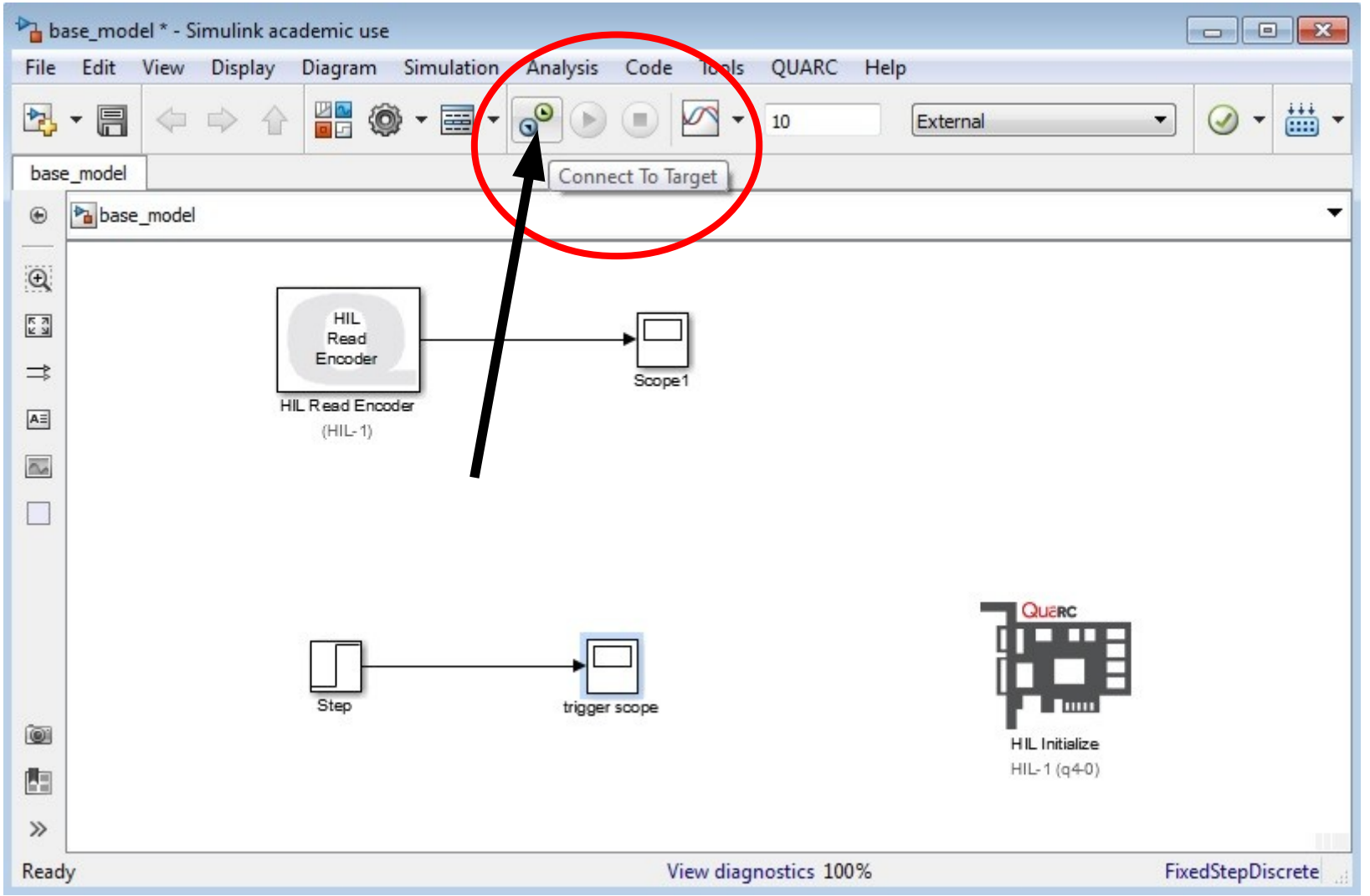

Configuration Parameters: ece147c_lab0_v2/Configuration (Active)
Select:
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Code Generation
Report
Comments
Symbols
Custom Code
Debug
Interface
QUARC
Simulation time
Start time: 0.0
Stop time: 10
Solver options
Type: Fixed-step
Solver: discrete (no continuous states)
Fixed-step size (fundamental sample time): 0.001
Tasking and sample time options
Periodic sample time constraint: Unconstrained
Tasking mode for periodic sample times: Auto
Automatically handle rate transition for data transfer
Higher priority value indicates higher task priority
OK
Cancel
Help
Apply

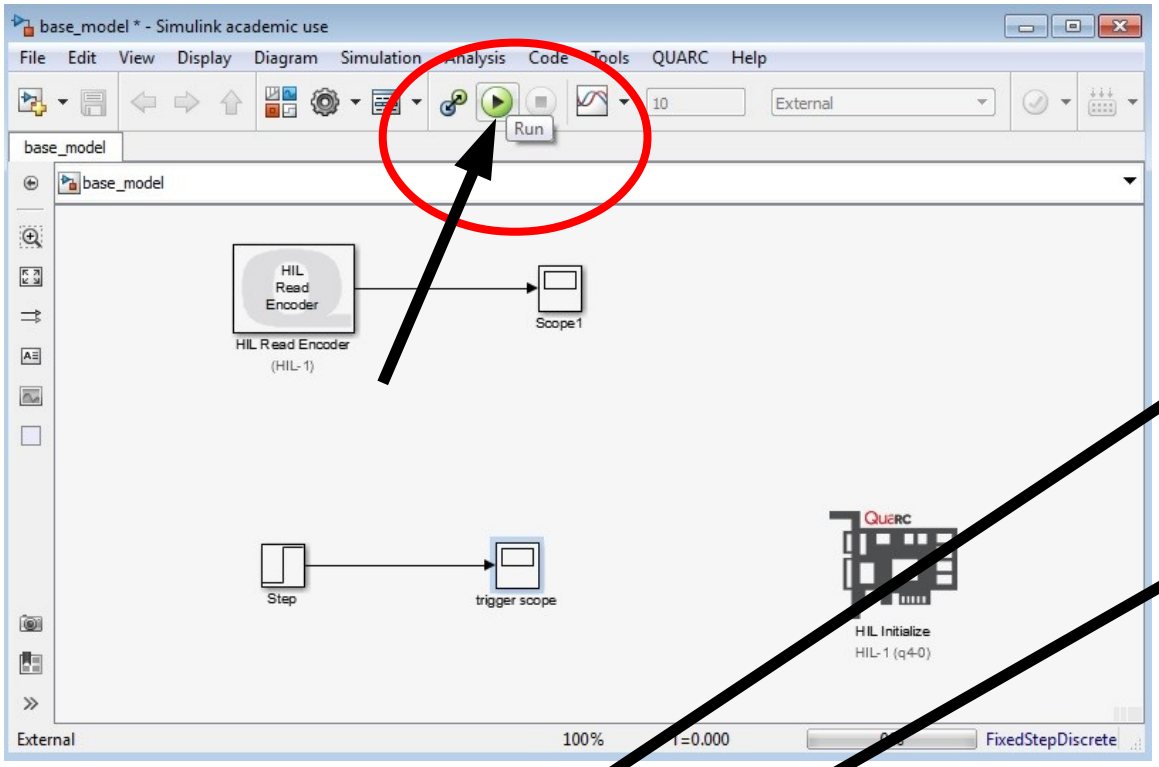

Configuration Parameters: untitled/Configuration (Active)
Category
List
Select:
Solver
Data Import/Export
Optimization
Diagnostics
Hardware Implementation
Model Referencing
Simulation Target
Code Generation
HDL Code Generation
Hardware board: Determine by Code Generation system target file
Code Generation system target file: quarc_win64.tlc
Device vendor: Intel
Device type: x86-64 (Windows64)
Device details
Number of bits
char: 8
short: 16
int: 32
long: 32
long long: 64
float: 32
double: 64
native: 64
pointer: 64
Largest atomic size
integer: Char
floating-point: Float
Byte ordering: Little Endian
Signed integer division rounds to: Zero
Shift right on a signed integer as arithmetic shift
Support long long
Hardware board settings
No targets have been installed. To install a target, type 'supportPackageInstaller' in MATLAB.
OK
Cancel
Help
Apply


ece147c_lab0_v2
File Edit View Simulation Format Tools QUARC Help
10
External
Normal
Accelerator
Rapid Accelerator
SIL
PIL
External
This model plots the encoders for 10 seconds.
HW config:
- powered-cart's wheel encoder is plugged into encoder 0
- springy cart is plugged into encoder 1
- don't even need univ. pwr. module powered to see the encoder's values.
- Moving the encoder about 6in results in encoder counts of ~5000
The trick: Had to enable scopes for logging.
Tools -> "external mode control panel" -> signals & triggering ->
ensure all scopes are "on" (not off) by selecting them and clicking "on" radio button
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
Step
trigger scope
QuaRC
HIL Initialize HIL-1 (q4-0)
Ready
100%
FixedStepDiscrete


base_model - Simulink academic use
File Edit View Display Diagram Simulation Analysis Code Tools QUARC Help
10
External
Build Model
base_model
base_model
HIL Read Encoder
HIL Read Encoder
(HIL-1)
Scope1
Step
trigger scope
QUARC
HIL Initialize
HIL-1 (q4-0)
Ready
100%
FixedStepDiscrete


MATLAB R2011b
File Edit Debug Parallel Desktop Window Help
Current Folder: X:\ECE147C_AdvancedDigitalControlLab_Hespanha_Spr2014\Labs\Tools
Shortcuts How to Add What's New
Current Folder
« Labs ▸ Tools ▸
Name
ece147c_lab0_v2_quarc_win64
slprj
.~lock.asdf.odp#
.~lock.lab0_v2_setup.odg#
20140407_142203.png
20140407_142323.png
20140407_142353.png
20140407_142412.png
20140407_142430.png
20140407_142501.png
20140407_142511.png
20140407_142523.png
20140407_142655.png
20140407_142758.png
20140407_142822.png
20140407_143557.png
20140407_143632.png
20140407_143637.png
20140407_143646.png
20140407_143651.png
20140407_143701.png
20140407_143704.png
20140407_143714.png
20140407_143718.png
20140407_144614.png
20140407_144619.png
20140407_144634.png
20140407_144641.png
20140407_144647.png
20140407_144658.png
20140407_144852.png
20140407_144951.png
asdf.odp
bodeomatic.zip
ece147c_lab0_v2.rt-win64
lab0_v2_setup.odg
manipulate_bode.fig
manipulate_bode.m
Details
Select a file to view details
Command Window
New to MATLAB? Watch this Video, see Demos, or read Getting Started.
Generating TLC interface API.
....
Creating data type transition file ece147c_lab0_v2_dt.h
.### Creating project marker file: rtw_proj.tmw
.
Processing Template Makefile: C:\Program Files\Quanser\QUARC\quarc\R2009a\quarc_win64.tmf
Creating ece147c_lab0_v2.mk from C:\Program Files\Quanser\QUARC\quarc\R2009a\quarc_win64.tmf
Building ece147c_lab0_v2: .\ece147c_lab0_v2.bat
X:\ECE147C_AdvancedDigitalControlLab_Hespanha_Spr2014\Labs\Tools\ece147c_lab0_v2_quarc_win64>call "c:\Program Files (x86)\Microsoft Visual Studio 10.0\VC\vcvarsall.bat" x86_
Setting environment for using Microsoft Visual Studio 2010 x64 cross tools.
Microsoft (R) Program Maintenance Utility Version 10.00.30319.01
Copyright (C) Microsoft Corporation. All rights reserved.
Compiling ece147c_lab0_v2.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
ece147c_lab0_v2.c
Compiling ece147c_lab0_v2_data.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
ece147c_lab0_v2_data.c
Compiling ece147c_lab0_v2_main.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
ece147c_lab0_v2_main.c
Compiling rtGetInf.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
rtGetInf.c
Compiling rtGetNaN.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
rtGetNaN.c
Compiling rt_nonfinite.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
rt_nonfinite.c
Compiling C:\PROGRA~1\MATLAB\R2011b\rtw\c\src\rt_sim.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab0_v2:1" -DVERBOSE -DUSE_RTMODEL /wd4100 -DMODEL=ece147c_lab0_v2 -DRT -DNUMST=1 -DTID01EQ=0 -DNCSTATES=0 -D
rt_sim.c
rc /r ece147c_lab0_v2.auto.rc
Microsoft (R) Windows (R) Resource Compiler Version 6.1.7600.16385
Copyright (C) Microsoft Corporation. All rights reserved.
Linking ...
C:\PROGRA~1\MATLAB\R2011b\sys\perl\win32\bin\perl C:\PROGRA~1\MATLAB\R2011b\rtw\c\tools\mkvc_lnk.pl ece147c_lab0_v2.lk ece147c_lab0_v2.obj ece147c_lab0_v2_data.obj ece14
link /RELEASE /INCREMENTAL:NO /NOLOGO -subsystem:console,5.02 /NODEFAULTLIB:libc.lib /NODEFAULTLIB:libcmt.lib /NODEFAULTLIB:msvcrtd.lib /NODEFAULTLIB:libcd.lib /NODEFA
Created executable ece147c_lab0_v2.rt-win64
Downloading ece147c_lab0_v2 to target 'shmem://quarc-target:1' ...
Model ece147c_lab0_v2 has been downloaded to target 'shmem://quarc-target:1' (65536 bytes)
>>
>> % yay, no errors :)
Start

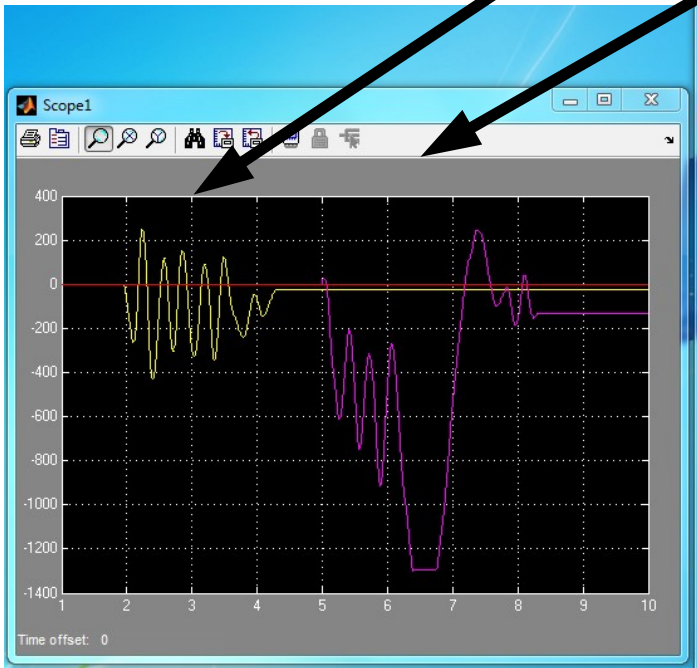

base_model * - Simulink academic use
File Edit View Display Diagram Simulation Analysis Code Tools QUARC Help
10
External
Connect To Target
base_model
base_model
HIL Read Encoder
HIL Read Encoder
(HIL-1)
Scope1
Step
trigger scope
QUARC
HIL Initialize
HIL-1 (q4-0)
Ready
View diagnostics 100%
FixedStepDiscrete

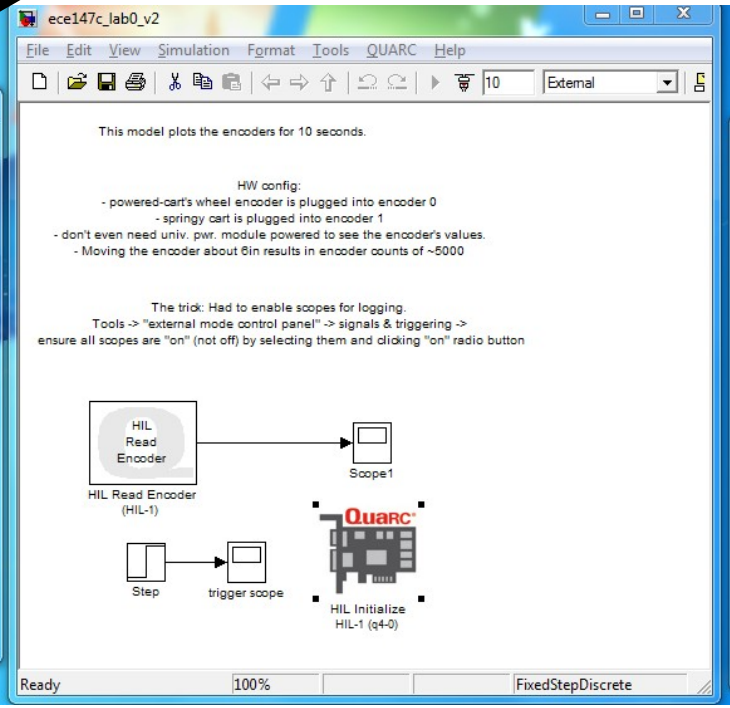


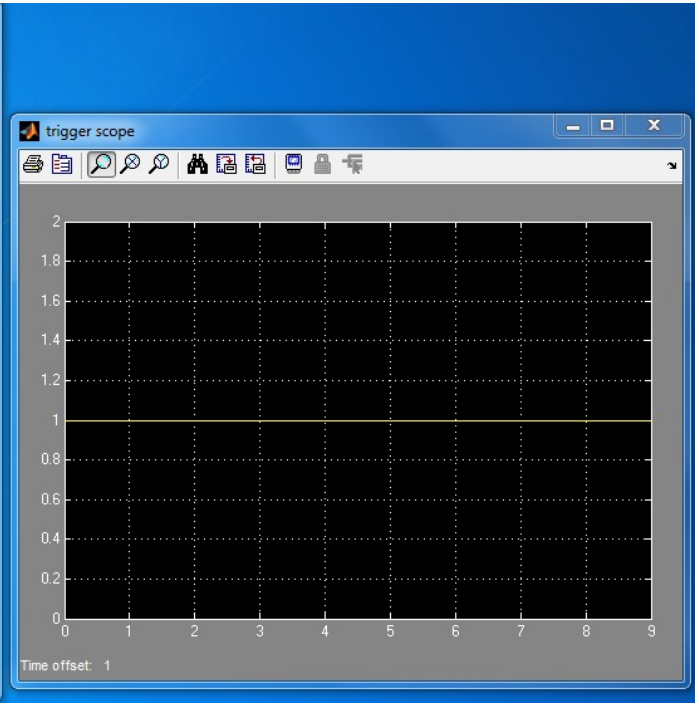
Wiggle motor-cart's wheel encoder

Wiggle springy-cart's wheel encoder

Note: doesn't show 3 encoders??



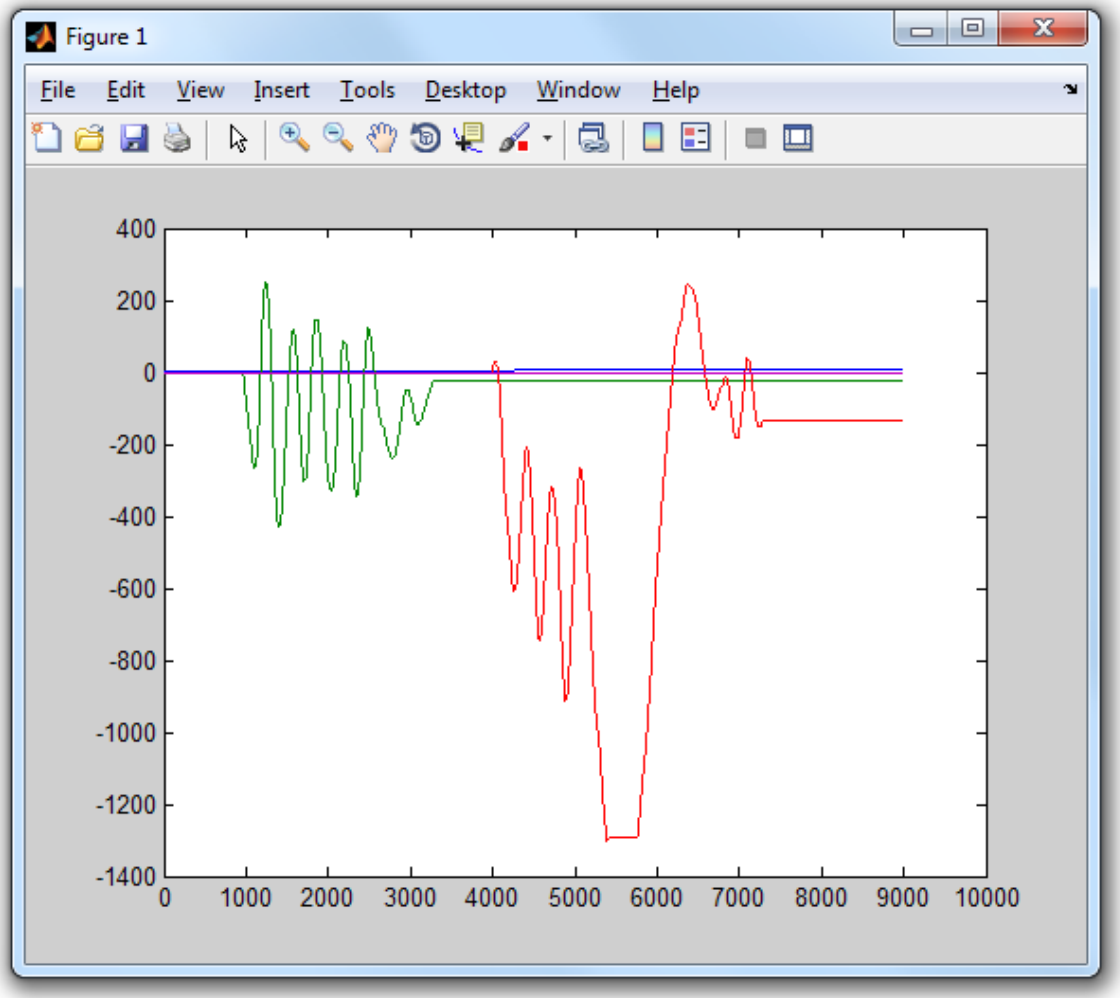




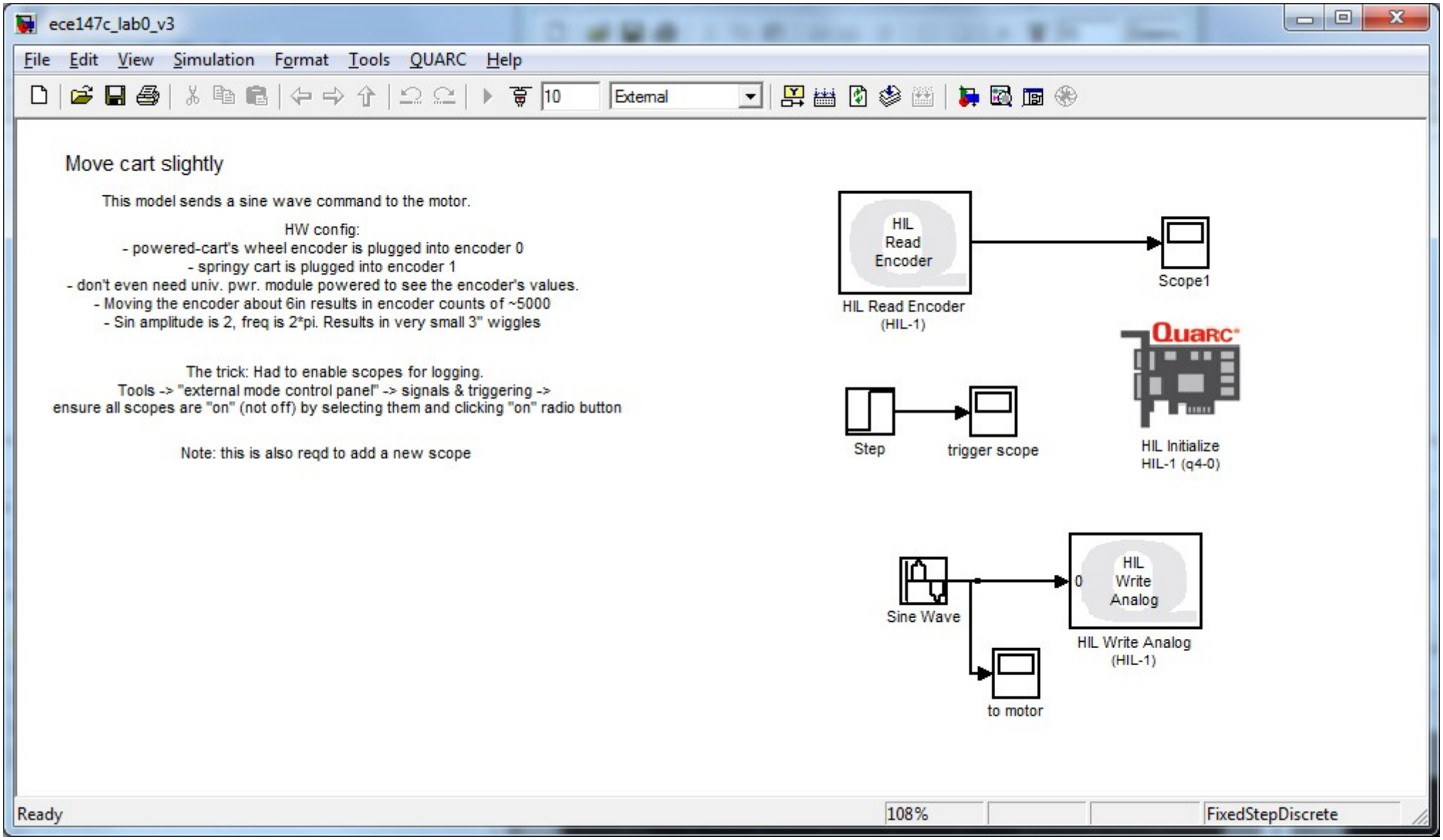
Command Window

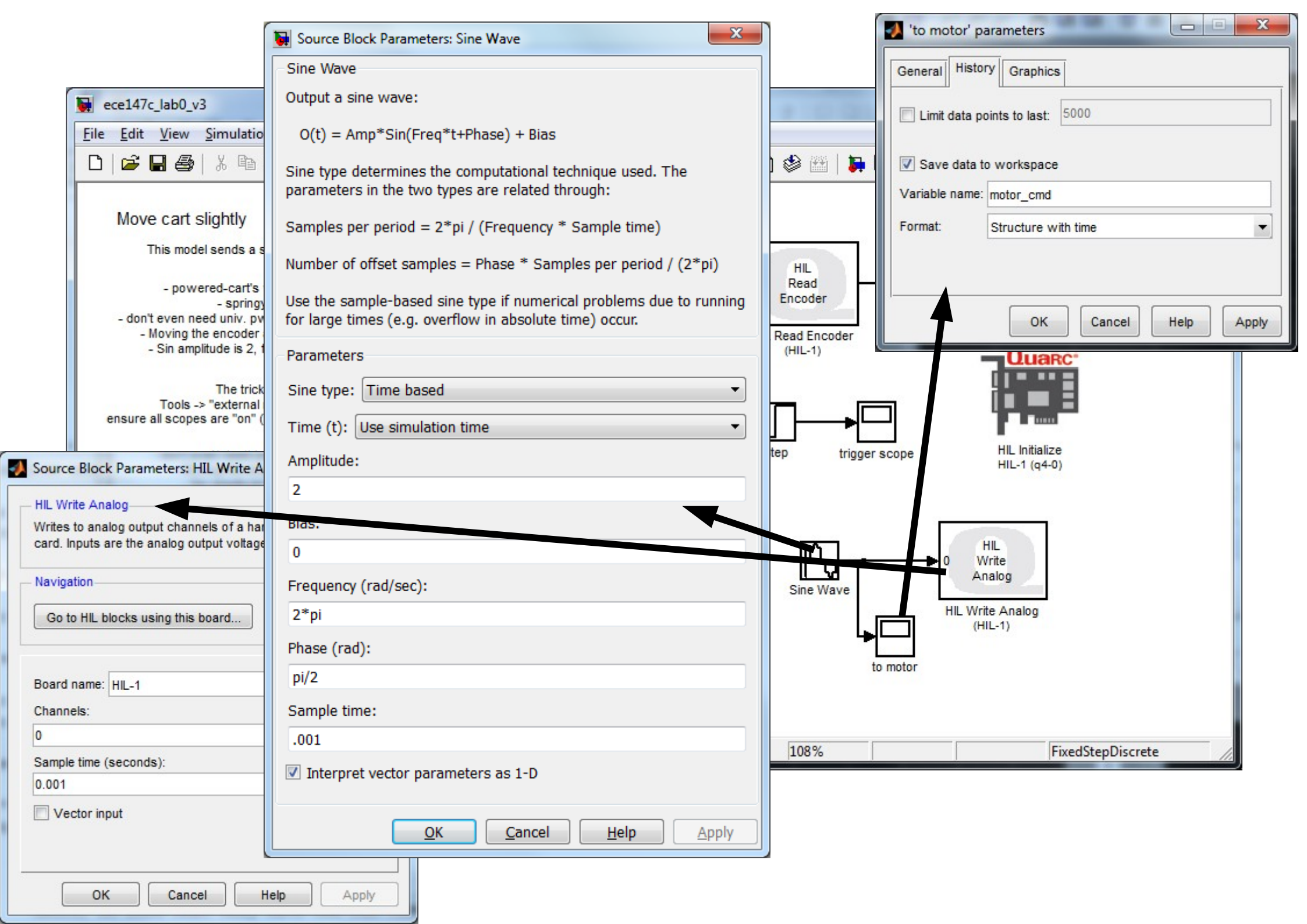
New to MATLAB? Watch this Video, see Demos, or read Getting Started.

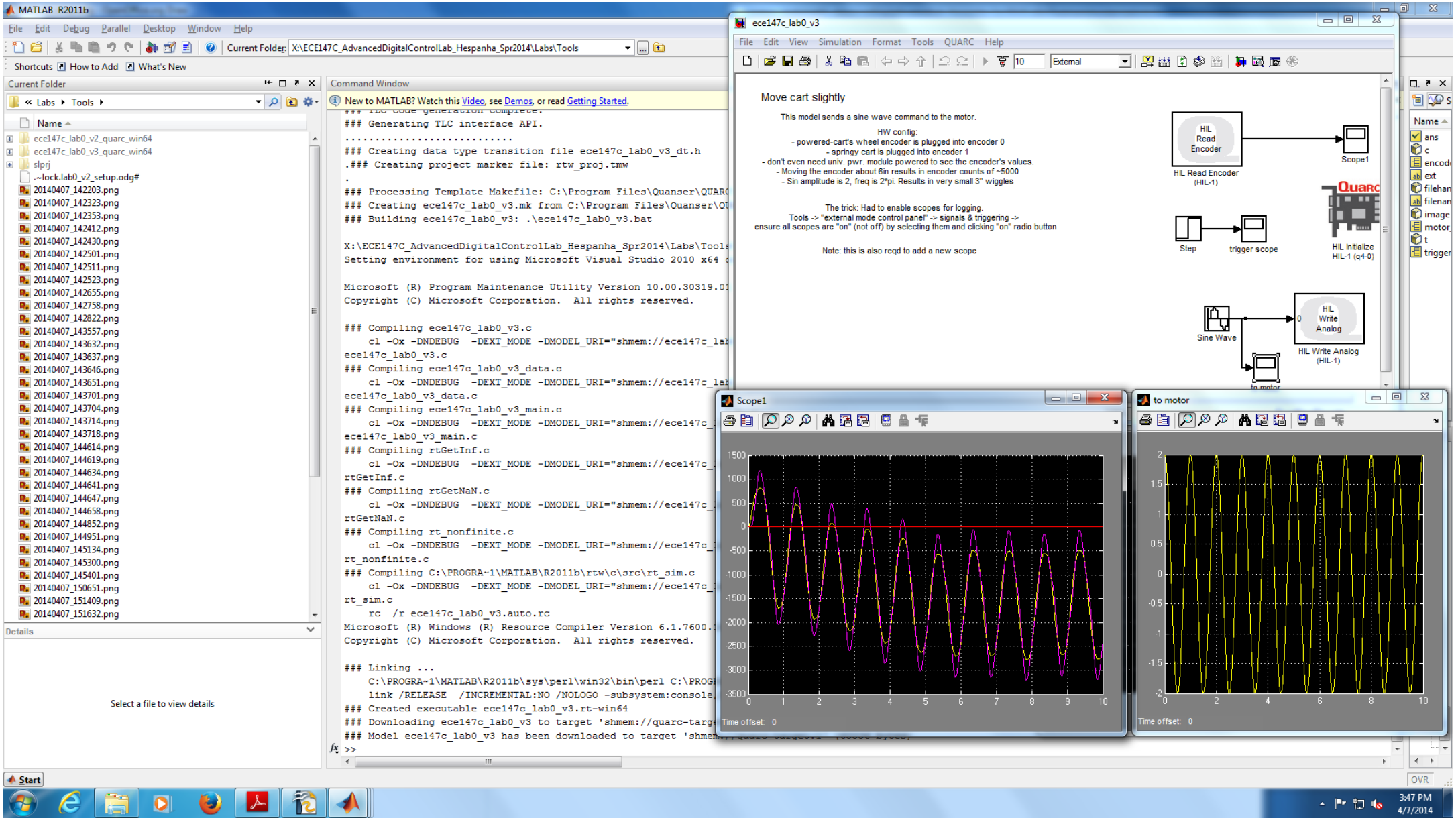
```
>> whos
  Name                Size              Bytes  Class     Attributes

  ScopeData        9001x2             144016  double
  ScopeData1       9001x5             360040  double

>> plot(ScopeData1)
>>
```



Next: move motor


ece147c_lab0_v3
File Edit View Simulation Format Tools QUARC Help
10
External
Move cart slightly
This model sends a sine wave command to the motor.
HW config:
- powered-cart's wheel encoder is plugged into encoder 0
- springy cart is plugged into encoder 1
- don't even need univ. pwr. module powered to see the encoder's values.
- Moving the encoder about 6in results in encoder counts of ~5000
- Sin amplitude is 2, freq is 2*pi. Results in very small 3" wiggles
The trick: Had to enable scopes for logging.
Tools -> "external mode control panel" -> signals & triggering ->
ensure all scopes are "on" (not off) by selecting them and clicking "on" radio button
Note: this is also reqd to add a new scope
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
QUARC
HIL Initialize HIL-1 (q4-0)
Step
trigger scope
Sine Wave
0
HIL Write Analog
HIL Write Analog (HIL-1)
to motor
Ready
108%
FixedStepDiscrete


ece147c_lab0_v3
File Edit View Simulatio
Move cart slightly
This model sends a s
- powered-cart's
- springy
- don't even need univ. pw
- Moving the encoder
- Sin amplitude is 2,
The trick
Tools -> "external
ensure all scopes are "on"
Source Block Parameters: HIL Write A
HIL Write Analog
Writes to analog output channels of a ha
card. Inputs are the analog output voltage
Navigation
Go to HIL blocks using this board...
Board name: HIL-1
Channels:
0
Sample time (seconds):
0.001
Vector input
OK Cancel Help Apply
Source Block Parameters: Sine Wave
Sine Wave
Output a sine wave:
O(t) = Amp*Sin(Freq*t+Phase) + Bias
Sine type determines the computational technique used. The parameters in the two types are related through:
Samples per period = 2*pi / (Frequency * Sample time)
Number of offset samples = Phase * Samples per period / (2*pi)
Use the sample-based sine type if numerical problems due to running for large times (e.g. overflow in absolute time) occur.
Parameters
Sine type: Time based
Time (t): Use simulation time
Amplitude:
2
Bias:
0
Frequency (rad/sec):
2*pi
Phase (rad):
pi/2
Sample time:
.001
Interpret vector parameters as 1-D
OK Cancel Help Apply
'to motor' parameters
General History Graphics
Limit data points to last: 5000
Save data to workspace
Variable name: motor_cmd
Format: Structure with time
OK Cancel Help Apply
HIL Read Encoder
Read Encoder (HIL-1)
tep
trigger scope
QuaRC
HIL Initialize HIL-1 (q4-0)
Sine Wave
0
HIL Write Analog
HIL Write Analog (HIL-1)
to motor
108%
FixedStepDiscrete


MATLAB R2011b
File Edit Debug Parallel Desktop Window Help
Current Folder: X:\ECE147C_AdvancedDigitalControlLab_Hespanha_Spr2014\Labs\Tools
Shortcuts How to Add What's New
Current Folder
Labs ▸ Tools ▸
Name
ece147c_lab0_v2_quarc_win64
ece147c_lab0_v3_quarc_win64
slprj
.~lock.lab0_v2_setup.odg#
20140407_142203.png
20140407_142323.png
20140407_142353.png
20140407_142412.png
20140407_142430.png
20140407_142501.png
20140407_142511.png
20140407_142523.png
20140407_142655.png
20140407_142758.png
20140407_142822.png
20140407_143557.png
20140407_143632.png
20140407_143637.png
20140407_143646.png
20140407_143651.png
20140407_143701.png
20140407_143704.png
20140407_143714.png
20140407_143718.png
20140407_144614.png
20140407_144619.png
20140407_144634.png
20140407_144641.png
20140407_144647.png
20140407_144658.png
20140407_144852.png
20140407_144951.png
20140407_145134.png
20140407_145300.png
20140407_145401.png
20140407_150651.png
20140407_151409.png
20140407_151632.png
Details
Select a file to view details
Command Window
New to MATLAB? Watch this Video, see Demos, or read Getting Started.
Generating TLC interface API.
Creating data type transition file ece147c_lab0_v3_dt.h
Creating project marker file: rtw_proj.tmw
Processing Template Makefile: C:\Program Files\Quanser\QUARC
Creating ece147c_lab0_v3.mk from C:\Program Files\Quanser\QU
Building ece147c_lab0_v3: .\ece147c_lab0_v3.bat
X:\ECE147C_AdvancedDigitalControlLab_Hespanha_Spr2014\Labs\Tools
Setting environment for using Microsoft Visual Studio 2010 x64
Microsoft (R) Program Maintenance Utility Version 10.00.30319.01
Copyright (C) Microsoft Corporation. All rights reserved.
Compiling ece147c_lab0_v3.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab
ece147c_lab0_v3.c
Compiling ece147c_lab0_v3_data.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_lab
ece147c_lab0_v3_data.c
Compiling ece147c_lab0_v3_main.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_
ece147c_lab0_v3_main.c
Compiling rtGetInf.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_
rtGetInf.c
Compiling rtGetNaN.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_
rtGetNaN.c
Compiling rt_nonfinite.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_
rt_nonfinite.c
Compiling C:\PROGRA~1\MATLAB\R2011b\rtw\c\src\rt_sim.c
cl -Ox -DNDEBUG -DEXT_MODE -DMODEL_URI="shmem://ece147c_
rt_sim.c
rc /r ece147c_lab0_v3.auto.rc
Microsoft (R) Windows (R) Resource Compiler Version 6.1.7600.
Copyright (C) Microsoft Corporation. All rights reserved.
Linking ...
C:\PROGRA~1\MATLAB\R2011b\sys\perl\win32\bin\perl C:\PROG
link /RELEASE /INCREMENTAL:NO /NOLOGO -subsystem:console
Created executable ece147c_lab0_v3.rt-win64
Downloading ece147c_lab0_v3 to target 'shmem://quarc-targ
Model ece147c_lab0_v3 has been downloaded to target 'shmem
>>
ece147c_lab0_v3
File Edit View Simulation Format Tools QUARC Help
Move cart slightly
This model sends a sine wave command to the motor.
HW config:
- powered-cart's wheel encoder is plugged into encoder 0
- springy cart is plugged into encoder 1
- don't even need univ. pwr. module powered to see the encoder's values.
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Note: this is also reqd to add a new scope
HIL Read Encoder
HIL Read Encoder (HIL-1)
Scope1
Step
trigger scope
HIL Initialize HIL-1 (q4-0)
Sine Wave
HIL Write Analog
HIL Write Analog (HIL-1)
to motor
Scope1
Time offset: 0
to motor
Time offset: 0
Start
OVR
3:47 PM
4/7/2014

Troubleshooting:
- is Universal power module on?
- Is analog output cable connecting analog output 0 to UPM's "From D/A"?
- Is cable from UPM's "To Load" to motor-cart's motor plug?
- Is simulink "HIL Write Analog" block set to same channel as the board's analog output?