



Importing and Exporting Python Modules





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Introduction

It is sometimes useful to import external Python modules into Test Procedures developed within the Introspect ESP Software. Similarly, it might be useful to export test methods or entire Test Procedures from the Introspect ESP Software for use in external Python scripts. This Technical Insights brief describes ways to achieve both of these requirements.

Importing Modules into a Test Procedure

USING THE PYTHONMODULE COMPONENT CLASS

BASIC CONCEPT

The Introspect ESP Software has a built-in component class called **PythonModule**, and this is the recommended way of importing external Python functions or modules into Test Procedures being executed from within the Introspect ESP Software. This section describes the basic concept of this component class and illustrates real-life examples of how it is used.

A **PythonModule** component can be instantiated by adding it to the Introspect ESP Software Test Procedure using the "Add Component" menu. Note that this component class is listed under the "utility" category of the menu as shown in the following image.

Add Component			
→ VScan ⊕ - dvanced ⊕ - mipi ← Uit ← OcntrolPanel ← ControlPanel ← ControlPanel ← Controlator ← CovReader ← DataFile ← DataFile ← DataStore ← TraitMessage ← Function ← HrenReportWriter ← PassFallScript ← PlotCreator PlotCreator PoteratorBasic ← PythonModule ← Result FolderCreator Subprocess ← Subprocess ← TestAsPythonScript	<	<pre>Represents a Python module (file of Python code) that you want to use in the Test Procedure (or in other components). The '.py' file for this module should be named the same as this component (e.g. if the component is named 'fred', the file should be 'fred.py'). The '.py' file is expected to be in the Params folder of the Test. In the GUI, double-clicking on the component name will open an editor application allowing you to view and edit the Python code. The editor application is specified in the GUI ".in" file by the preference "preferredFythonCodeEditor". Attributes: fileName - name of the Python file Methods: run() - execute the Python code from the module file and import the names defined in that file. Attributes: fileName - Name of the Python file. Double-click the component name to edit thsditor") wantImportAll - auto-import all symbols from this module? Methods: run() - execute the Python code in the .py file</pre>	<
		Add Component Cancel	



When the **PythonModule** component is instantiated, the Introspect ESP Software takes a couple of automated actions. First, it adds the module to the Components tab as is the case with all other instantiated components. Second, it creates a blank .py file inside the Params sub-folder of the Test Procedure folder in Windows. The name of this file matches the name of the component class that was instantiated. That is, referring to the two following images, the software creates a module called pythonModule1 and creates a corresponding file called pythonModule1.py.

File	Edit	IESP/SV3C_32C12G	Wizards	ControlPanels	Tools	Results	Help	
		Params		Log			Results	
		Components				pythonModu	ile1 properties (d	lass: PythonModule)
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Ad	d	Remove Config	wan Shou wher	t Import All Id all of the symbols in the "run" method i	/names (fi s called?	unctions and	l classes) from th	is module be auto-imported into the global namespace





By default, the pythonModule1.py file is blank, and the Introspect ESP software typically launches a code editor to allow the user to edit this file. This is when external code can be added. In the following example, we show two function declarations: one to create a custom print method and the second to compute a Fibonacci sequence. As can be seen, any Python code can be placed in this file, including function declarations, function calls, and library imports.

```
pythonModule1.py
#!/usr/bin/env python

def myprint():
    print("hello")

def myFibonacciSeries(n):
    a, b = 0, 1
    while a < n:
        print(a, end=' ')
        a, b = b, a+b
    print()</pre>
```

After saving the pythonModule1.py file, we can go back to the Introspect ESP Software and never have to worry about the source code anymore. Instead, we import the file's contents by adding the call pythonModule1.run() in the main Test Procedure pane. Once the file is imported this way, we can call any function that was declared inside it. For example, the following image shows how to call the Fibonacci Series calculator that was declared in the above example; and the image after it shows the execution log of the Test Procedure, confirming that the external Python file was indeed imported and that the Fibonacci Series function was executed.



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File	e Edit	IESP/SV2C_8C32G	Wizards	ControlPanels	Tools	Results	Help				
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0						Run					

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5tar 2019	ting -10-0	Test 'TestPyth 6_1635_34	onModule	2019-10-06	_1605'						
IESP 0 1 Fest 	1 2 3 fini took	used by Test P 5 8 13 21 34 shed 9 millisecond	s	14 233 377 é	510 987						
0						Run					



PLACING A PYTHON FILE IN THE PARAMS FOLDER

If you want to import an already existing Python file without having to paste its contents into a blank file, then you can simply place this file in the Params sub-folder of your target Introspect ESP Software folder. When you do so, the Introspect ESP Software automatically creates an instance of the **PythonModule** component class. In the following example, we place a file called mySecondPythonModule.py in the Params folder as shown in the following image.



The file itself has one line, which is an import call for the built-in Python uuid library, included here only for exemplary reasons.

mySecondPythonModule.py
import uuid

Opening the Test Procedure in the Introspect ESP Software, we see that the **PythonModule** class is automatically instantiated as in the following image.



Params	Log	Results					
Components	mySecondPythonModule properties (class: PythonModule)						
globalClockConfig mySecondPythonModule pythonModule1	fileName wantImportAll	mySecondPythonM True	odule.py				
Add Remove Config	fileName Name of the Python file. Double-cli ".ini" file by the preference "preferm	ck the component name to edit this file. (Th edPythonCodeEditor'')	e editor application is specified in the				

We now proceed to using this module in the Test Procedure pane. Specifically, we import the module by executing the method mySecondPythonModule.run() as before. Then, we are able to use any built-in function within the uuid library that we have just imported. In the following example, we use it to create a unique user ID and then print this ID to the log window.

File Edit IESP/SV2C_8C326 Wizards ControlPanels Tools Results Components mySecondPythonModule properties (class: PythonModule) mySecondPythonModule.py mySecondPythonModule.py globalClockCorfig mySecondPythonModule mySecondPythonModule.py mySecondPythonModule.py pythonModule1 fileName mySecondPythonModule.py mySecondPythonModule.py fileName mySecondPythonModule.py mySecondPythonModule.py mySecondPythonModule.py fileName mySecondPythonModule.py mySecondPythonModule.py mySecondPythonModule.py fileName mySecondPythonModule.py mySecondPythonModule.py mySecondPythonModule.py fileName mySecondPythonModule.py mySecondPythonModule.py mySecondPythonModule.py Add Remove Config FileName Name of the Python file. Double-click the component name to edit this file. (The editor application is specified in the 'm'' file by the preference 'preferedPythonCodeEditor') Test Procedue 1 fpythonModule1.run () 2 fmyFibonacciSeries (1000) 3 4 mySecondPythonModule.run () 5 user_id = uuid.uuid4 () fiprint (user_id) fiprint (user_id)	Mintrospect ESP (v 3.6.79) - TestPythonN	lodule_2019-10-06_1605 (SV2						
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Test Procedure 1 fpythonModule1.run() 2 fmyFibonacciSeries(1000) 3 4 mySecondPythonModule.run() 5 user_id = uuid.uuid4() 6 print(user_id)	globalClockCorfig mySecondPythonModule pythonModule 1 Add Remove Config	fileName wantImportAll fileName Name of the Python file. Doub ".in" file by the preference "pr	my Second Pyth True e-click the component name to edit this fi ferredPythonCodeEditor")	ionModule.py				
Dur Dur	Test Procedure 1 #pythonModule1.run() 2 #myFibonacciSeries(1000 3 4 mySecondPythonModule.ru 5 user_id = uuid.uuid4() 6 print(user_id)) n ()	0-					



The result of executing the above Test Procedure is shown in the following image. As can be seen, the Python module was successfully imported without cluttering the Test Procedure window.

File	Edit	IESP/SV2C_8C32G	Wizards	ControlPanels	Tools	Results	Heln				
· ···c	Luit	Params	Theat do	Log	10013	Resolution	Results				
*** I \Test *** Auto-	Loggi tPyth -conn	ng to file: C: onModule_2019- ect disabled.	\Users\n 10-06_16 Will nee	umhaf\Docume 305\Logs\log ed a manual	ents\In 2019- connec	trospec 10-06_1 tion	t\Tests\Sc 649.txt	ripts\Int	ernalTes	t\Pinetree	
Start 2019-	ting -10-0	Test 'TestPyth 6_1649_35	onModule	2019-10-06	1605'						
IESP eab20 Test Test	not 07bc- fini took	used by Test F f601-4423-981b shed 13 millisecon	rocedure -c272359 ds	99a07f							



MANUALLY IMPORTING PYTHON FILES

Apart from the **PythonModule** class, it is possible to manually import files into Test Procedures created within the Introspect ESP Software. This is done using common Python language constructs. For example, the following image illustrates importing the unid library directly from within the Test Procedure.

Note that the Introspect ESP Software automatically searches the following path for external Python files:

<User Account>\Documents\Introspect\PythonCode

Any file stored in this directory can simply be imported using the call

import fileName





Exporting a Test Procedure

USING THE TESTASPYTHONSCRIPT COMPONENT CLASS

The Introspect ESP Software has a built-in component class called **TestAsPythonScript**, and this is an automated code-generation utility that allows you to export algorithms developed inside the Introspect ESP Software for use in external Python scripts. The advantage of this tool is that it automatically takes care of initializing form factors, creating component contexts, and connecting to the hardware. This section describes the basic concept of this component class.

A **TestAsPythonScript** component can be instantiated by adding it to the Introspect ESP Software Test Procedure using the "Add Component" menu. Note that this component class is listed under the "utility" category of the menu as shown in the following image.

Add Component	
SlaveParameters SlaveParameters Gui Ut Ut CommandFileRunner CovReader DataFlee DataFlee DataFlee DataRecord DataRecord DataRecord DataRecord DataRecord DataRecord DataRecord DataRecord Pathersage Function HmiRepotWriter PasaFalScript PlotCreator PlotCreator PlotCreator Subprocess TestAcComponent TestCaseSuite TestCaseSuite TestExpoter Time t TinyAtematives ✓	This class provides the ability to create a standalone Python script from a Test. When you save a Test that includes an instance of this class, a Python script's sub-folder of the Test folder. This script performs the operations that are done by the Test Procedure. Attributes: scriptName - name of the Python script notes - notes to be put in comments at the top of the script usesIespHardware - does this Test use the IESP hardware? V
	Add Component Cancel

NOTE

The **TestAsPythonScript** has been introduced in version 3.6.79 of the Introspect ESP Software and is not available in earlier releases.



When the **TestAsPythonScript** component is instantiated, it is added to the Components pane just like any other component class. However, unlike other component classes, this class does not have any callable methods. As such, the Test Procedure pane is not modified as shown in the following screen shot. Instead, the Introspect ESP Software uses the existence of the testAsPythonScript1 component as a trigger to save an output Python file that can be used in external scripts. This output file is an exact representation of the Test Procedure that was edited from within the Software.

🔯 Introspect ESP (v 3.6.79) - TestAsPytho	onScript_2019-10-05_2241 (SV4E_	2L2G_MIPI_I3C_EXERCISER)	
File Edit IESP/MIPI_I3C_EXERCISEF	R Wizards ControlPanels	Tools Results Help	
Params	Log	Results	
Components	tes	tAsPythonScript1 properties (class: TestAs	PythonScript)
i3cDataCapture1 masterDevice	scriptName	myscript.py	
masterParams1	notes	Tale	
slaveParams1 testAsPythonScript1	usesiesphardware	True	
tour of juliancouper			
	scriptName		
	Desired name for the Python scri	pt	
Add Remove Config			
Test Procedure			
1 masterDevice setup()			
2 i3cDataCapturel.start())		
O MIPI		Run	
	_		

The automatically generated code for the above Test Procedure is shown in the next page. As can be seen, all aspects of external instantiation of Introspect components are taken care of automatically.



```
myScript.py
# Generated via SvtTestAsPythonScript from Test 'TestAsPythonScript 2019-10-
05 2241'
# 2019-10-05 2241
from dftm.svt import initFormFactor, createComponentContext, errorMsg
import dftm.fileUtil as fileUtil
formFactorName = 'SV4E 2L2G MIPI I3C EXERCISER'
iesp = initFormFactor(formFactorName)
currentFolder = fileUtil.getCurrentFolder()
svtContextFolderName = 'myscriptFolder'
svtContextFolderPath = fileUtil.joinPaths(currentFolder, svtContextFolderName)
svtContext = createComponentContext(svtContextFolderPath)
svtNamesDict = svtContext.getNamesDict()
globalsDict = globals()
globalsDict.update(svtNamesDict)
connected = iesp.connectToHardware()
if not connected:
   errorMsg('Failed to connect to IESP hardware')
#_____
# Components:
i3cDataCapture1 = svtContext.createComponent('SvtMipiI3cDataCapture')
masterParams1 = svtContext.createComponent('SvtMipiI3cMasterParameters')
slaveParams1 = svtContext.createComponent('SvtMipiI3cSlaveParameters')
masterDevice = svtContext.createComponent('SvtMipiI3cDevice')
masterDevice.masterModeParams = masterParams1
masterDevice.slaveModeParams = slaveParams1
masterDevice.startupState = 'master'
#______
def testProcedure():
   svtContext.initForRun() # re-init components for this run
   svtContext.createRunResultFolder() # create a dated sub-folder for results
   masterDevice.setup()
   i3cDataCapture1.start()
#-----
                    _____
if name == ' main ':
   testProcedure()
#_____
                      _____
```



MANUALLY EXPORTING COMPONENT CLASSES

Introspect ESP component classes can be instantiated in external Python scripts by following the instructions in the application note:

UsingComponentsInExternalPythonScripts.pdf

This application note is included in the Doc folder of the Introspect ESP Installation.



Revision Number	History	Date
1.0	Document Release	October 7, 2019

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