1 Modelica Visualization Installation Guide

The following steps will guide us through the installation process for Modelica3D. This process will require a recent version of Windows and a recent version of OpenModelica. Nightly builds for OpenModelica are highly recommended for improved performance. This section will explain the setup procedure and introduce OMNotebook to visualize the model but other visualization methods will be explained in the following sections.

1. Download and install Python 2.7 here: `https://www.python.org/download/releases/2.7.3/`. Any 2.7 distribution should work but make sure to download a 32 bit version of Python because PyGTK only supports Python32.
2. Add Python as a system environment variable.
   - Go to "System Properties" by searching your computer for "sysdm.cpl". Select the "Advanced" tab in the System Properties dialog box as shown in Figure 1.

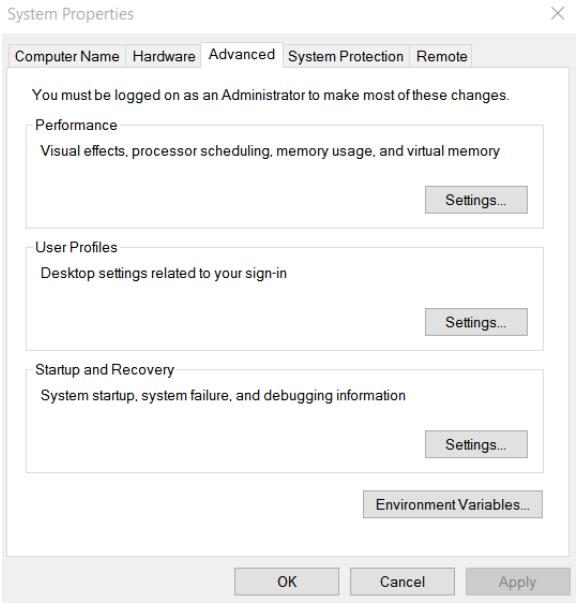

Figure 1: System Properties Dialog Box

   - Click on the "Environment Variables" button and edit user variables. You should see a dialog box similar to the one shown in Figure 2.
   - In the user variables section, select and edit "Path". If no Path variable exists, create a new variable named Path. The selection is highlighted in Figure 3.
   - Add or append ";C:\Python27;" to the path value. Semicolons separate each value for the Path variable.
   - Open up CMD, the Command Prompt, by searching your computer for "CMD".
   - Enter "python" into the open Command Prompt. This should allow you to access the Python programming environment. The Command Prompt is shown in Figure 4.
3. Download and install PyGTK, a graphics package for Python, here: `http://ftp.gnome.org/pub/GNOME/binaries/win32/pygtk/2.24/` (Select pygtk-all-in-one-2.24.2.win32-py2.7.msi). Note: If your computer has multiple Python distributions, PyGTK may attempt to install into another python folder. If this is the case, perform a custom install using the command prompt,

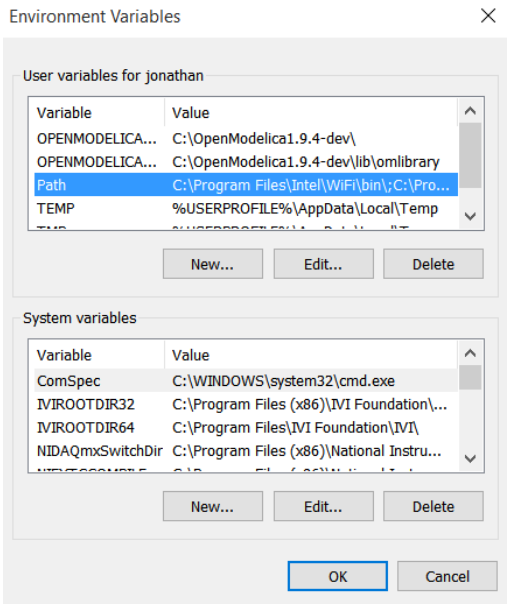

Figure 2: Environment Variables Dialog Box

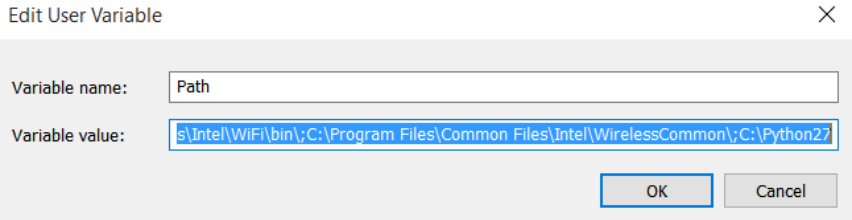

Figure 3: Edit User Variable Dialog Box

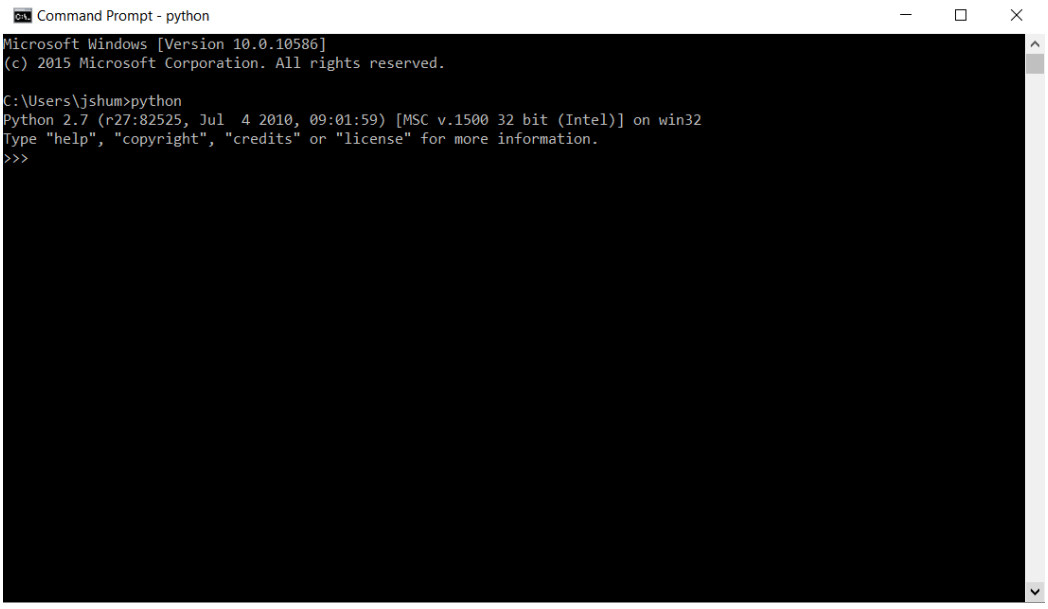

Figure 4: Command Prompt Dialog Box

CMD: msiexec /i pygtk-all-in-one-2.24.2.win32-py2.7.msi TARGETDIR=C:\Python27Win32 (the directory Python was installed into).

4. Open a Modelica3D listener. This is required for the visualizer to know that a Modelica simulation has completed by another program and initiate the visualization procedure.

   - Find dbus-server.py in the Modelica directory, which should be located here: OPENMODELICAHOME/lib/omlibrary-modelica3d/osg-gtk. OPENMODELICAHOME is the root directory of your OpenModelica installation.
   - Open a command window for this folder. This can be done by holding down shift and right clicking in the folder or navigating to the folder using the command prompt by entering
     "cd OPENMODELICAHOME/lib/omlibrary-modelica3d/osg-gtk". The shift right command is shown in Figure 5.

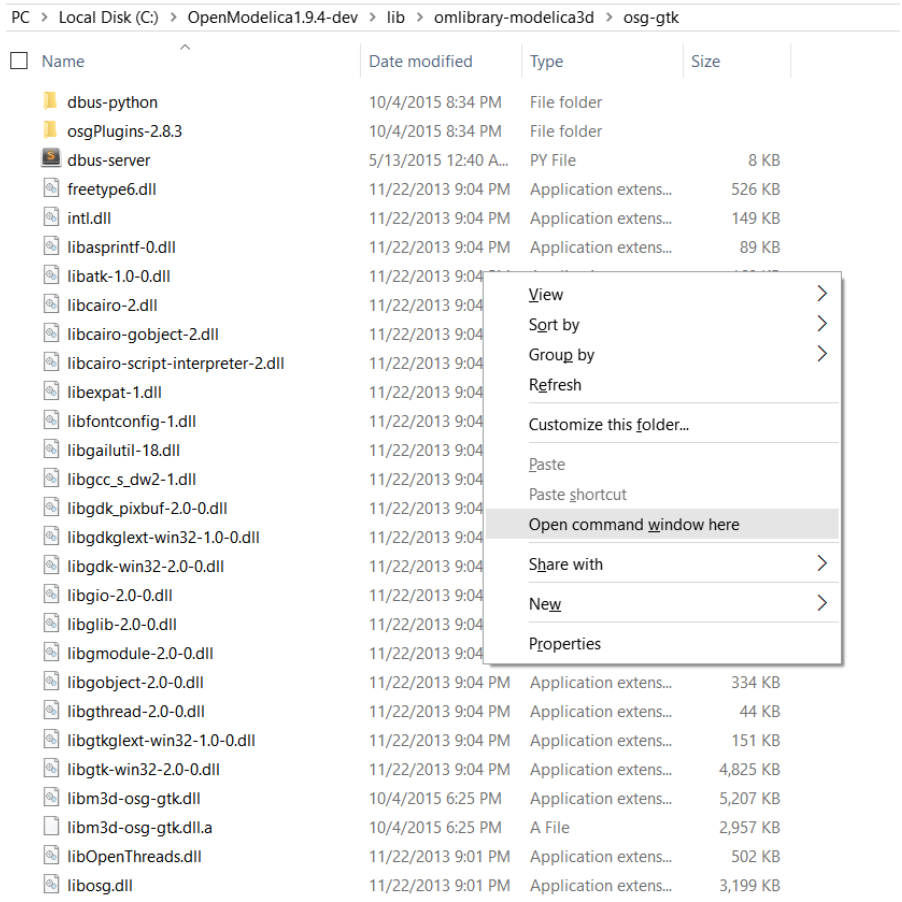

Figure 5: Opening a Command Window from a Folder

   - Activate the dbus-server by entering "python dbus-server.py" into the terminal.

5. Open OMNotebook (A Modelica "Notebook" environment) which can be found in the bin directory of the OpenModelica installation.

   - Open VisualizeFourBar2.onb
   - Run each cell in chronological order to satisfy model dependencies by pressing the check button from each section. Alternatively, we can click on the top bracket at the right of

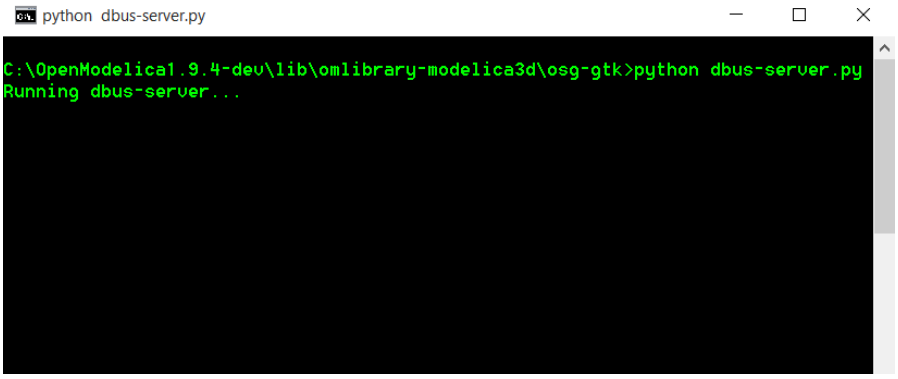

Figure 6: Activating the DBUS Server

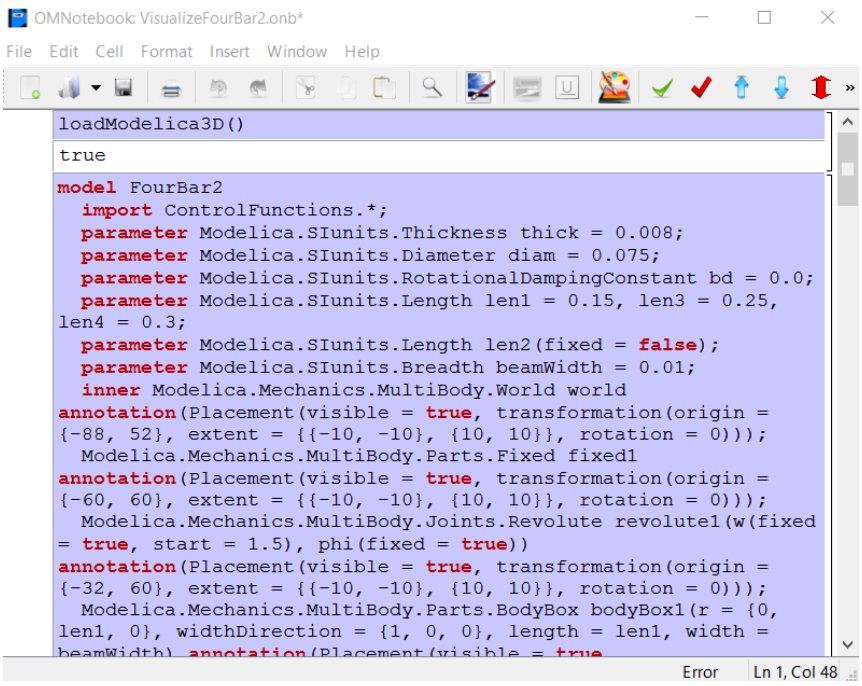

Figure 7: OMNotebook Environment

each cell and shift-click the last cell to highlight all cells. Then, shift-enter will execute all cells in order.

- After running the simulation, a visualization window should pop up and display a visual model of the four bar system. Press run to visualize the simulation of the mechanism.

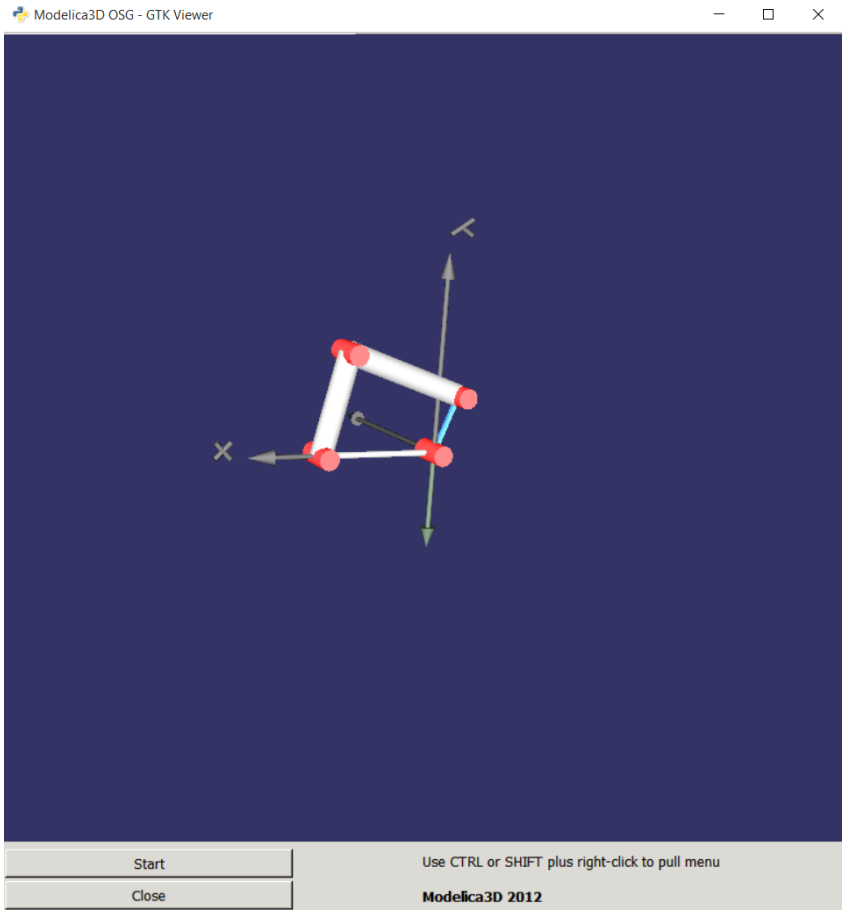

Figure 8: FourBar Visualization

The file for this example is **VisualizeFourBar2.onb**.

2 Modelica Visualization for Custom Models

This section will introduce a visualization tool developed specifically for the OpenModelica environment to visualize custom models using the Modelica3D interface. Most components in the Modelica MultiBody library come with visualization elements built-in.

2.1 Custom Models

Using the process explained in the installation guide and the code shown below, simply replace the model name and Visualize_MyModel's inherited class with the name of the custom model. The model name is denoted as XXX below. Additional cells can be used if the model has additional dependencies. The following code will allow you to visualize arbitrary models. OMNotebook may

run into problems simulating models for extended periods of time, and is not well integrated with OMEdit. As a result, we will explore an alternative method to automate the visualization process.

```
loadModelica3D()

model XXX
endmodel XXX;

model Visualize_MyModel
inner ModelicaServices.Modelica3D.Controller m3d_control;
extends XXX;
end Visualize_MyModel;

simulate(Visualize_MyModel, startTime=0,endTime=10)
```

2.2 Automating the Visualization Process

A program has been created to automate the visualization process and allow users to quickly and efficiently run Modelica visualizations while using OMEdit. After completing the installation process described in the previous section, run OMVisualization.exe from the OpenModelica Visualization Tool folder provided. Two pop-up should appear once executed, a terminal window and an input field. The terminal allows users to see important error messages to debug their programs. The input field includes 5 fields for the user to locate their Modelica directory, appropriate Modelica models, and simulation time.

For the first field, find and enter your Modelica directory. If using a nightly build, find the folder for the nightly build. Next, find the Modelica model to visualize. In the dependencies section, include additional Modelica models that may be required to simulate the Modelica model provided. Hold ctrl and click to add multiple files when selecting using the tool or include file locations separated by semi-colons. Finally, enter the desired simulation start and end times. Click run to activate the program and produce the visualization.

The program will save your configurations after each run. An example is shown in Figure 9.

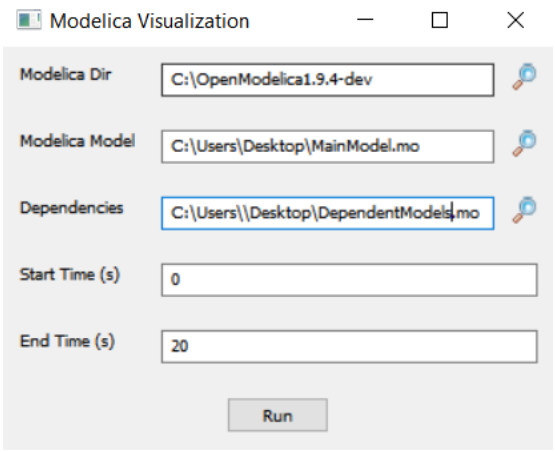

Figure 9: OpenModelica Visualization Tool

Note that the simulation may not compile correctly there are too many visualization components in the model. If the visualization is running slowly, minimize the terminal to stop the program from printing error messages while simulating and set your computer to performance mode.

The files for this example are located in the **OpenModelica Visualization Tool** folder.

2.3 Recording

Currently the visualization tool does not support automatic recordings and requires us to use external screen capture software. Here are a few recommended recording software tools. Jing is a free program from Techsmith that can generate Flash video files. CamStudio is another free program that can record the visualization and produce an mp4 video file. After recording the visualization, Windows Movie Maker is a great way to split videos, and YouTube can be used to convert file types and share with others.