

Neuroengineering Lab

Virtual Modular Prosthetic Limb (vMPL) Software Setup

This lab will require the installation and setup of multiple software programs onto your computer. This document will provide detailed steps for setting up the vMPL Software, which is one of the software programs required for this lab. Another document will provide instructions for installing and setting up MATLAB and the miniVIE.

NOTE: As of a recent Mac OS update, which changes some security settings and forces app installation through the Apple Store, **unfortunately this vMPL software (which is not available on the Apple Store) cannot be readily installed and set up on an Apple computer** - we highly recommend that you pair with another student that has a Windows (or Linux) PC. Linux installation is similar to Windows installation, please let us know if you need help or an updated version of the software to ensure compatibility with your operating system.

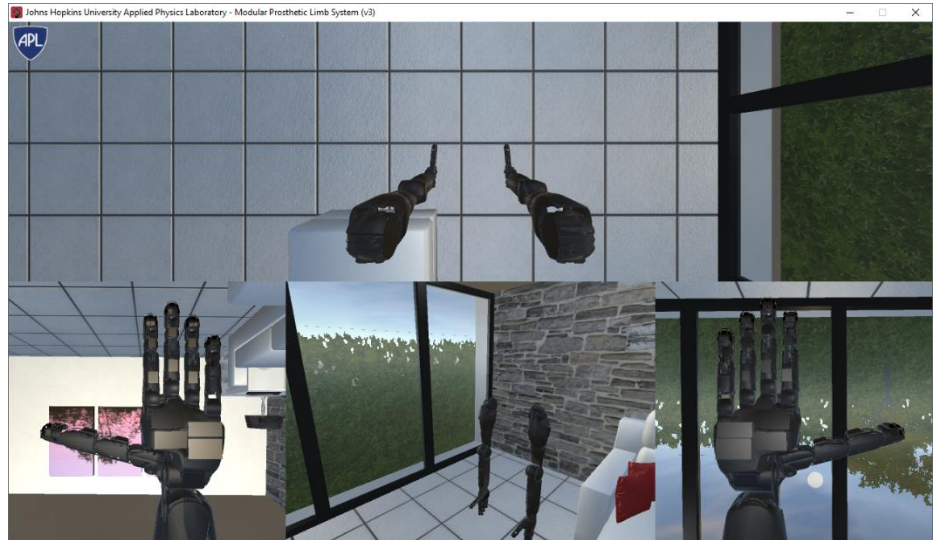
The software will send and receive UDP ([User Datagram Protocol](#)) commands.

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Virtual Modular Prosthetic Limb (vMPL) Software

The virtual Modular Prosthetic Limb (vMPL) simulation software is a standalone application that will allow you to control and visualize simulated prosthetic limbs in real time.



vMPL Software Setup:

The vMPL software is included on the Blackboard site. Download the Zip file with this software to a location on your hard drive where you are keeping files for this course. Versions for multiple operating systems are provided.

The vMPL software does not need to be installed, per se as it is a standalone executable application that can be run from any location on your hard drive – the Windows executable file is “JHUAPL vMPL.exe” (the executable file will use library and config files in the same directory as the executable file), and the Mac application file is “MacOS-vMPL.app”. We recommend that you pin this application to your task bar in the case that you have to restart the software.

vMPL Setup – Windows:

Download the “Win – vMPL.zip” file from the Blackboard website.

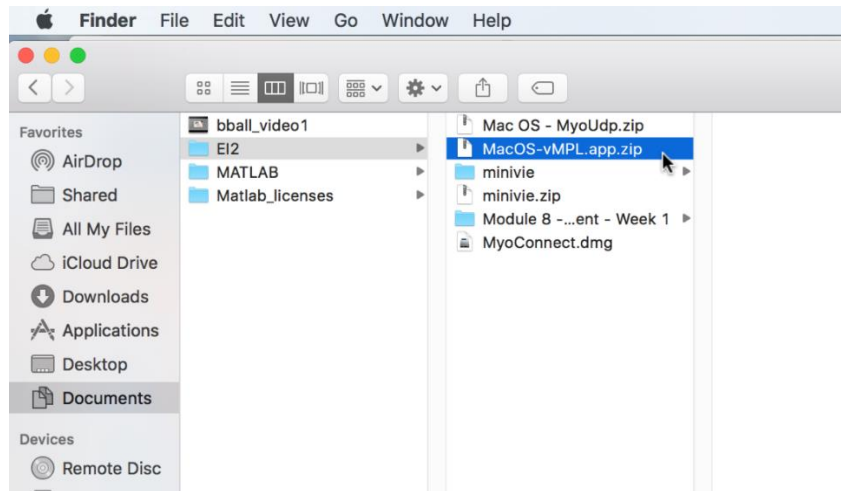
Unpack the Zip file. The Windows zip file will include a number of configuration files – keep these in the same folder as the executable file.

When first running this application, you may be prompted to allow it to send UDP packets on either the private or public networks – make sure to **allow** on both as allowing communication on the network is required for this software to function properly.

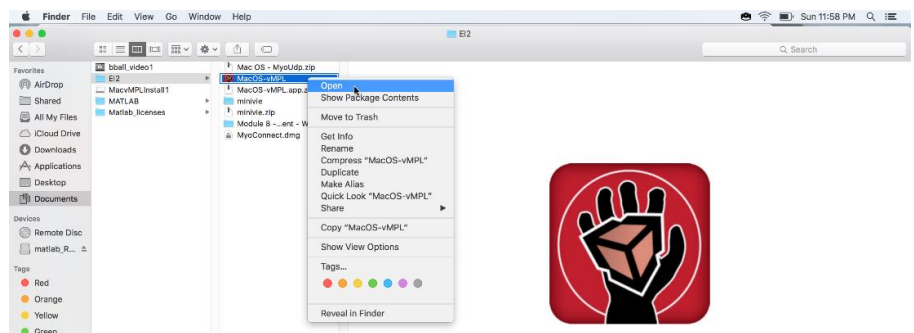
vMPL Setup – MacOS (versions prior to CatalinaOS):

Download the “MacOS–vMPL.app.zip” file from the Blackboard website.

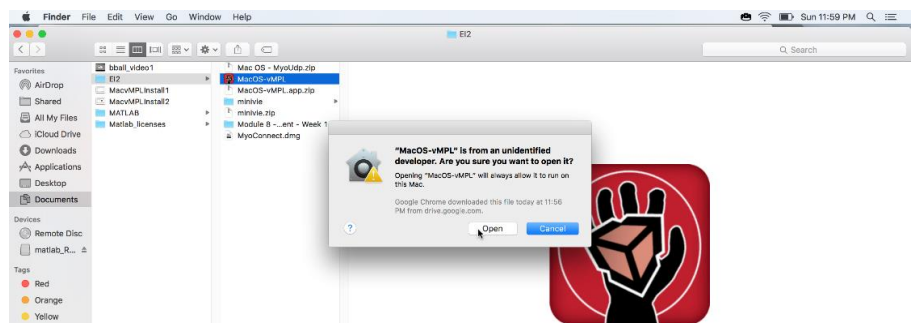
Unpack the Zip file. The Mac zip file should just include the one executable file:



Because this is a stand-alone software application, you will have to **Control+click** the executable file to allow the system to open it:



Click “Open” to run the software for the first time:



This should allow you to run the executable file in the future without additional approval.

Whitelisting applications to send UDP Commands

To allow a specific app to receive incoming connections, add it using Firewall Options:

1. Open System Preferences.
2. Click the Security or Security & Privacy icon.
3. Select the Firewall tab.
4. Click the lock icon in the preference pane, then enter an administrator name and password.
5. Click the Firewall Options button
6. Click the Add Application (+) button.
7. Select the app you want to allow incoming connection privileges for.
8. Click Add.
9. Click OK.

vMPL Setup – MacOS (CatalinaOS and moving forward):

NOTE: As we stated above, this is no longer a supported solution with recent Apple operating systems. Apple is moving toward mandating that software is installed through the Apple Store – this suggests that Apple’s posture is that copying executable applications to the File System is considered an insurmountable security risk, and depending on what version of CatalinaOS or later that you have, the process outlined below will not be successful.

Go to **Systems Preferences > Security & Privacy**. Under the General tab, make sure the “Allow apps downloaded from:” selection is “**App Store and identified developers**”

Download the “MacOSX-vMPL.app.zip” file from the Blackboard website.

Unpack the zip file (“MacOSX-vMPL.app.zip”) into the application file (“MacOSX-vMPL.app”).

Move the unpacked application file to the /Applications folder.

Open a **terminal window**.

Within the terminal window, **change directory to the /Application folder:**

Type “cd /Applications” in the terminal window and press enter

Within the terminal window, **change the execution permissions for the application file:**

Type...

```
chmod +x MacOSX-vMPL.app/Contents/MacOS/*
```

...and press enter

Note: if the filename for your unpacked application file is different from what is listed here (“MacOSX-vMPL.app”), then type...

```
chmod +x <insert filename here>/Contents/MacOS/*
```

...and press enter

Once the execution permissions have been updated, **right click on the application file and choose open.**

Launching the vMPL:

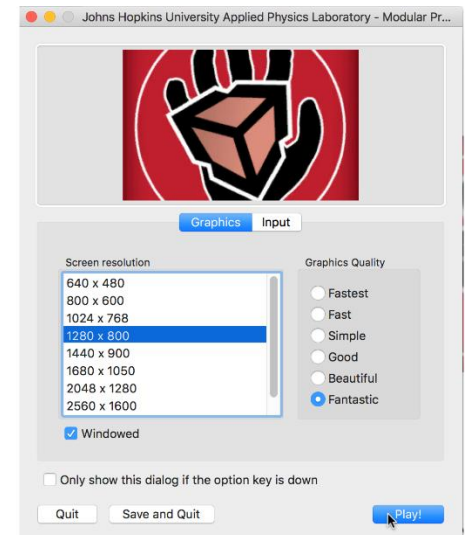
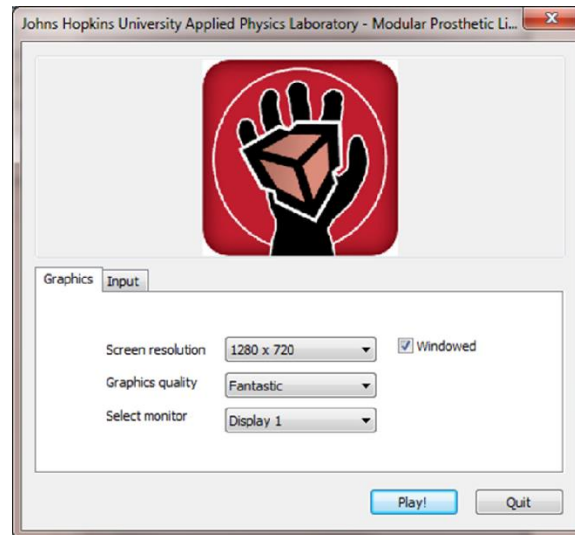
Double-click the vMPL executable file.

You will be prompted with some options for running the vMPL simulation software that will impact how smoothly the simulation will run (this will depend on the speed of your computer). We recommend the following settings to ensure good performance, but depending on your computer, you may select higher screen resolution and graphics settings:

Screen Resolution: 1280 x 720, Windowed

Graphics Quality: Fastest is the most dependable, but depending on the capabilities of your computer, higher graphics settings are available

Windows and Mac versions of the vMPL application settings dialog windows:

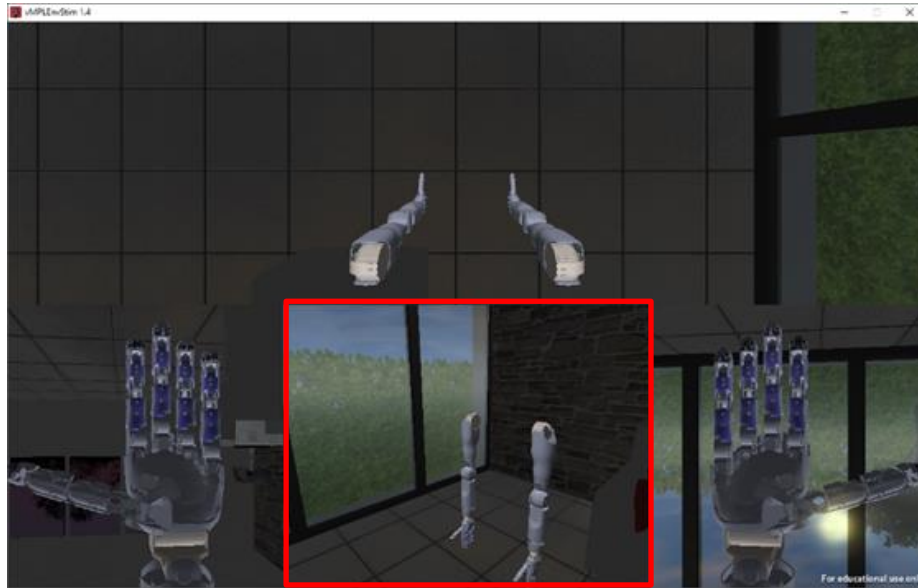


Once the vMPL software is launched, it can receive movement commands for the virtual prosthetic limbs that are in the simulation environment from MATLAB commands and scripts that are run. The vMPL application can be closed and re-opened at any point without any impact to other software that is running (e.g. MyoUdp, MATLAB).

Note: When first running this application, you may be prompted to allow it to send UDP packets on either the private or public networks – make sure to allow on both as allowing communication on the network is required for this software to function properly.

Changing the view of the vMPL (Windows version only):

Within the bottom, center vMPL window (highlighted in red below), you can change the isometric viewpoint of the camera that looks at the virtual prosthetic limbs. This can be accomplished by clicking on this camera view panel, and by using the directional keys on the keyboard (e.g. up, down, left, right) to move the camera, and the mouse by left-clicking on the window and moving the mouse to change the camera angle.



Note: if the camera is not movable, open the “camera_config.xml” file that is located in the same directory as the application file using a text editor, and then modify the parameter for “cameraFly” to “true”:

```
<cameraFly> true </cameraFly>
```

```
camera_config.xml - Notepad
File Edit Format View Help
<?xml version="1.0" encoding="utf-8"?>
<cameraConfig>
  <!--Camera configuration saved on 4/14/2011 at 2:25 PM-->
  <!--Near and far plane distances are in centimeters.-->
  <nearPlane>10</nearPlane>
  <farPlane>4000</farPlane>
  <!--Field of view is expressed in degrees.-->
  <fov>70</fov>
  <position>
    <!--Position is expressed in centimeters.-->
    <x>0</x>
    <y>15</y>
    <z>0</z>
  </position>
  <orientation>
    <!--Angles are in degrees. Rotation order is z => x => y.-->
    <zrot>0</zrot>
    <xrot>31.46</xrot>
    <yrot>-270</yrot>
  </orientation>
  <cameraFly>
    true
  </cameraFly>
</cameraConfig>
```