JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Neuroengineering Lab

MATLAB, MiniVIE Installation and Setup

Most of the work for this lab will be performed within the MATLAB coding environment. MATLAB will be used to send commands to the virtual Modular Prosthetic Limb (vMPL) simulation software. The MATLAB scripts that we develop in this lab will be used to process muscle activity signals, and convert those signals into real time control commands for the virtual prosthetic limbs within the vMPL simulation environment.

MATLAB will first have to be installed – it takes a considerable amount of time (and some students have to troubleshoot the license-setup part), so we recommend that you start this process well in advance of the lab. After installation, MATLAB will then have to be setup with some provided software scripts and libraries that allow communication with the virtual Modular Prosthetic Limb (vMPL) system – this will include a portion of the Virtual Integration Environment (VIE) software suite, called the "MiniVIE".

The process steps to install MATLAB and the MiniVIE in preparation for the lab are detailed below.

Contents – MATLAB, MiniVIE Software Installation & Setup

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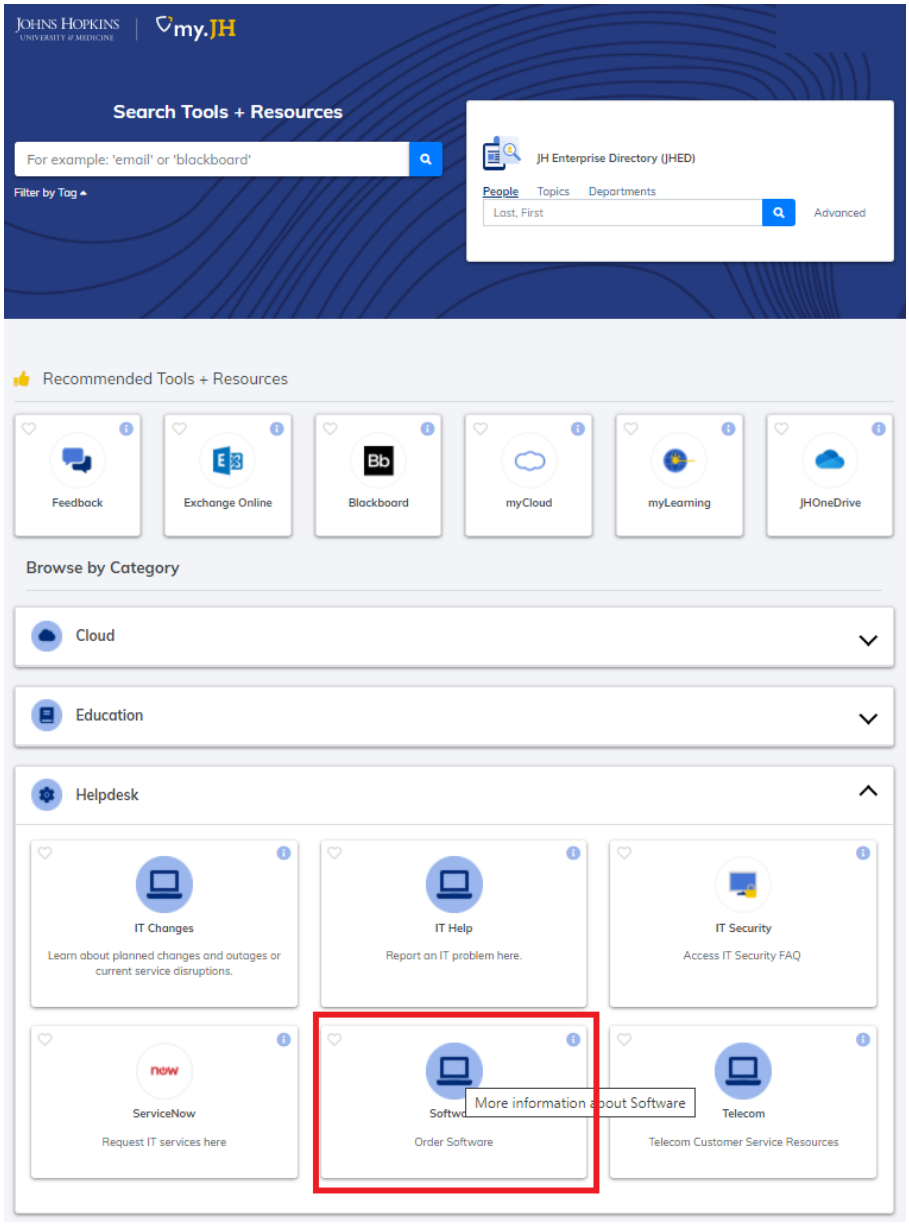
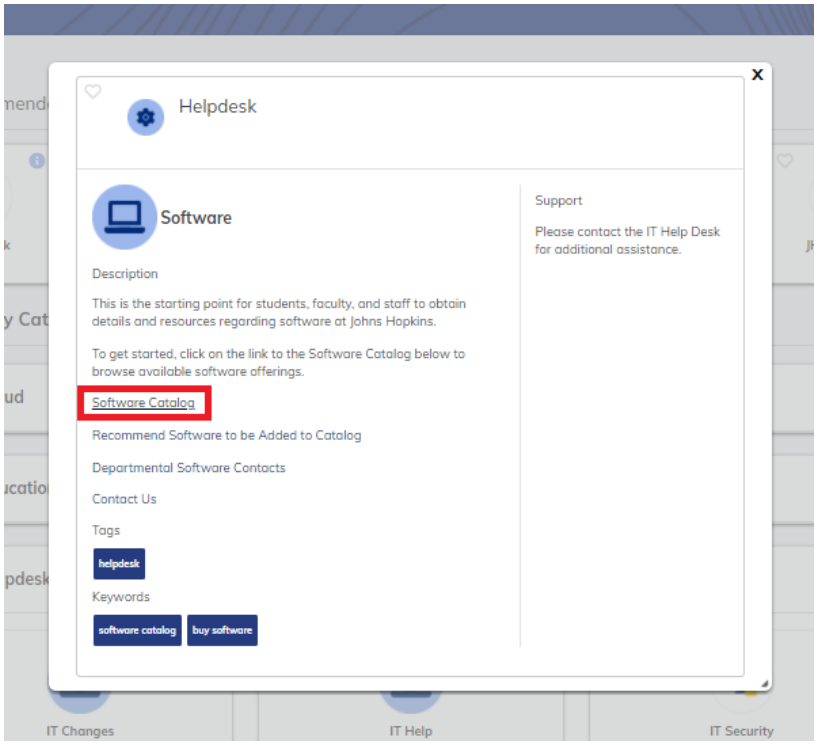
MATLAB Download and Installation

We will be utilizing **MATLAB**, which is provided by Johns Hopkins University to all students, along with some libraries (Image Processing Toolbox, Signal Processing Toolbox) developed for sending commands to various software applications. Please follow the steps below to access the files necessary to install MATLAB on your computer.

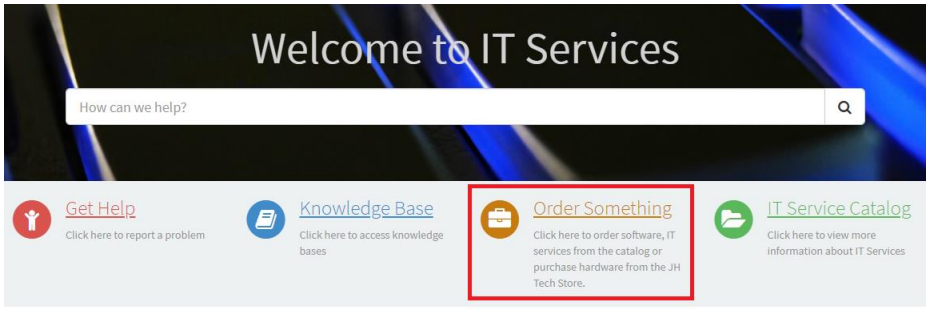
Navigate to https://my.jh.edu/, log in, and then navigate to “Helpdesk”->”Software”:



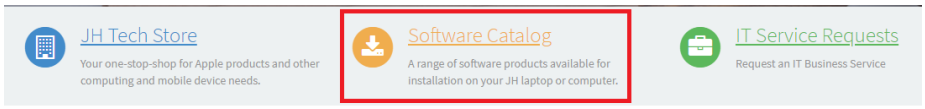
Navigate to “Software Catalog”:



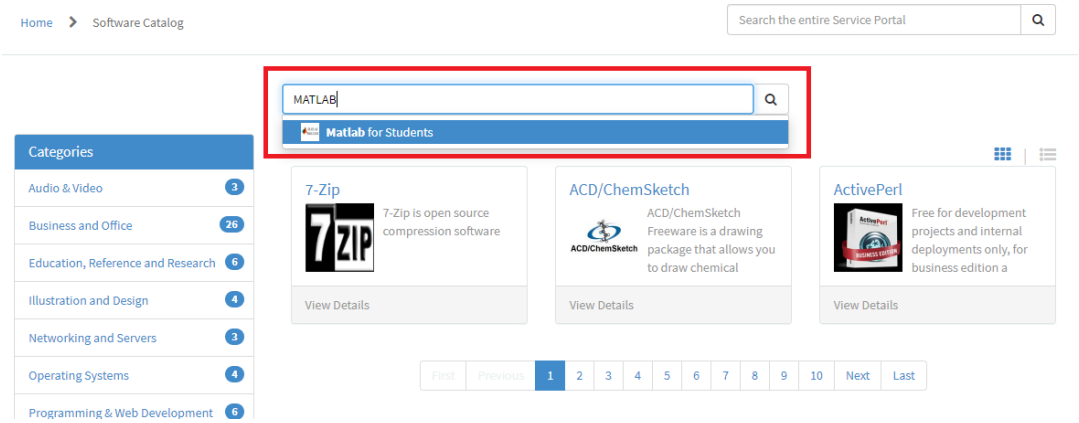
Navigate to “Order Something”:



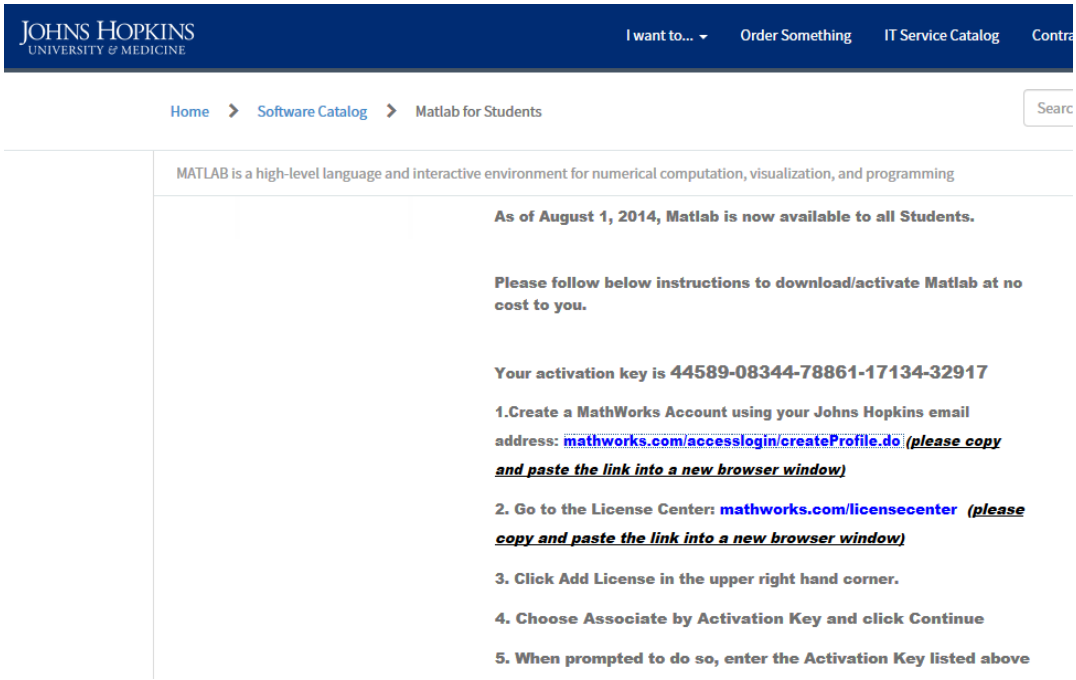
Navigate to “Software Catalog”:



Type in “MATLAB” into the Search Bar for the Software Catalog – a link to MATLAB might appear during the process, clicking on this or reviewing the search results will lead you to the MATLAB Software page:



Once on the MATLAB Software page, **follow the directions below to set up a MathWorks account** (the developer of the MATLAB application), **download the license**, and then proceed to the download page for the MATLAB Installer:



While the process for installing MATLAB will use your Mathworks account setup with a license, the website does provide an activation key: **44589-08344-78861-17134-32917**

As directed, make sure to copy the text for the links and past into a web browser instead of clicking on the links!

Links for convenience:

Setting up a MathWorks Account:

mathworks.com/accesslogin/createProfile.do

Accessing the License Center:

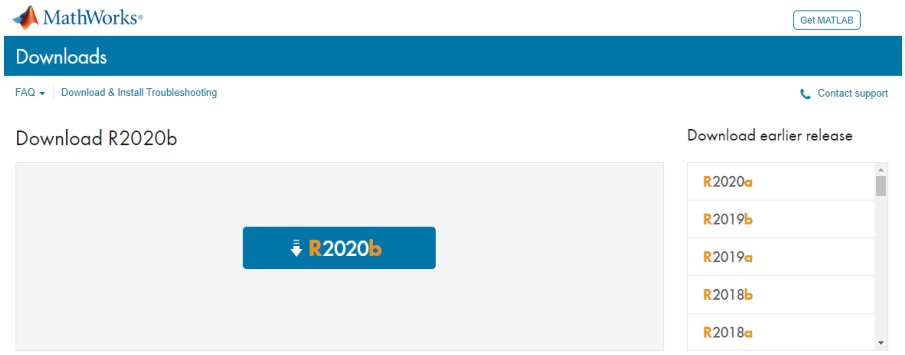
mathworks.com/licensecenter

Associating your Access Key:

mathworks.com/downloads/web_downloads/select_release

MATLAB Download & Install Page:

Accessing the Software Download site:



To install the software, this will require the downloading and running of an installer program (and sometimes followed by the downloading and running of an update file, as prompted or directed in the lab).

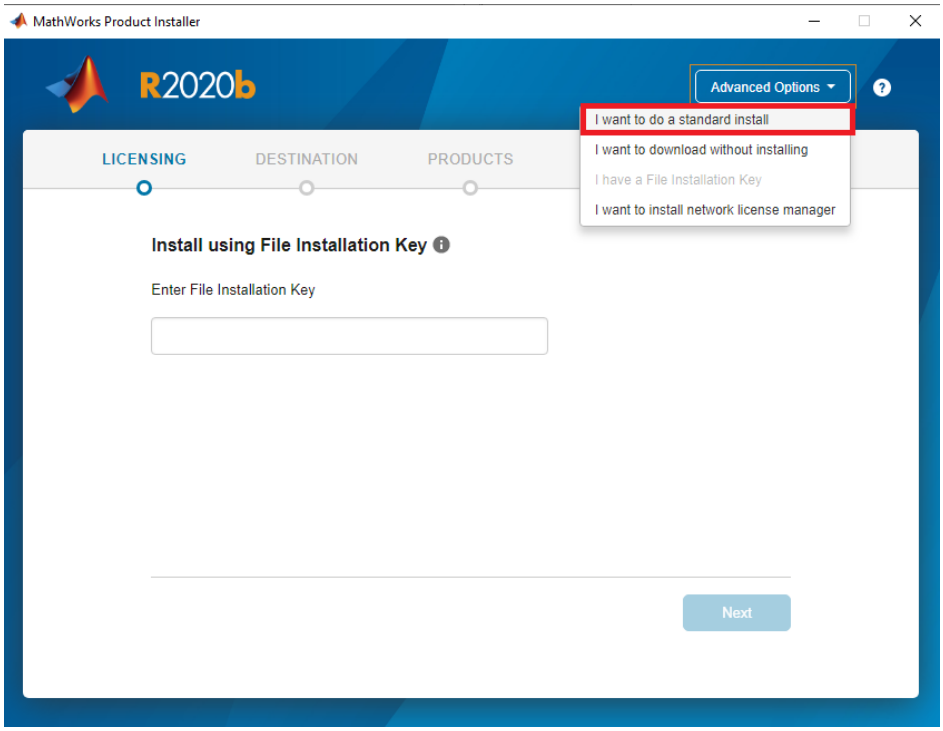
Detailed instructions are provided below.

NOTE: for those that feel comfortable moving forward without the detailed instructions, ***please make sure to to install the following toolboxes when prompted:***

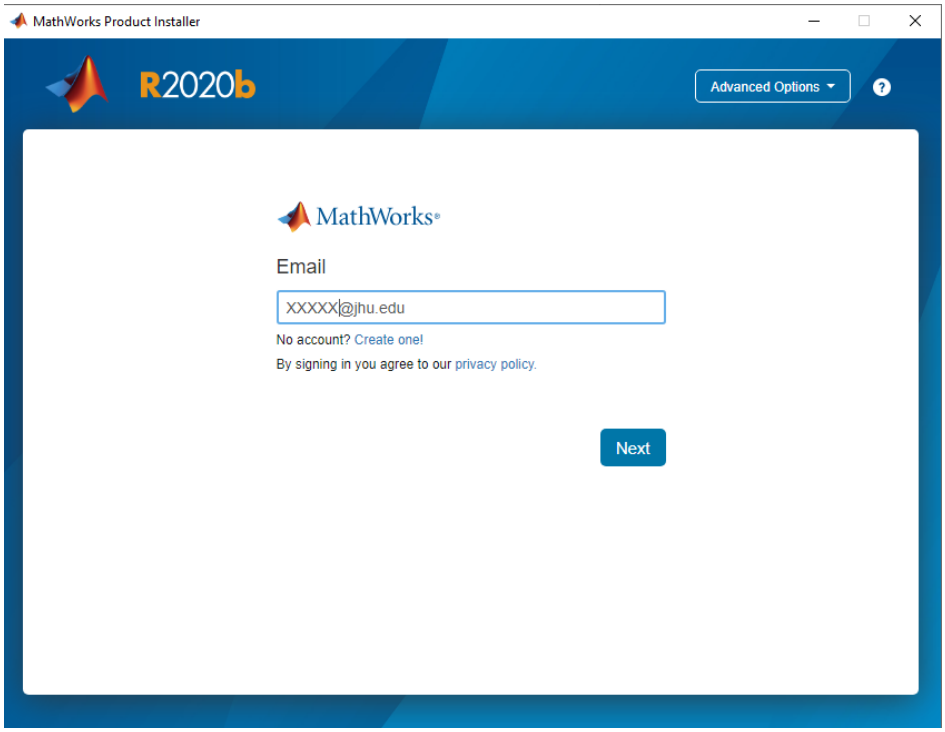
Signal Processing Toolbox

Image Processing Toolbox

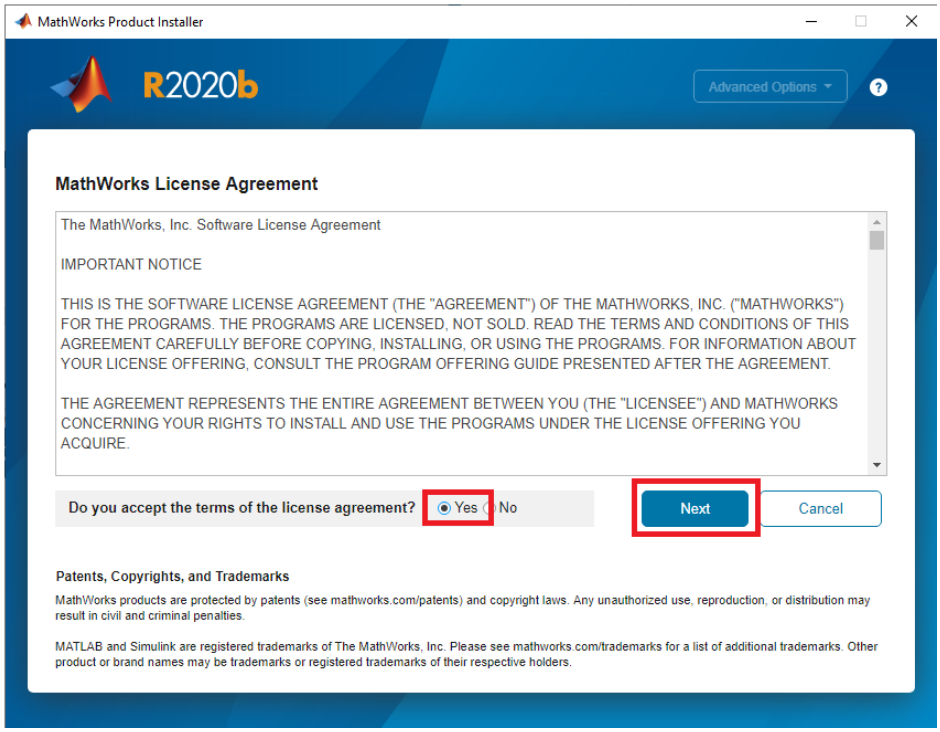
If prompted for an activation key change to “standard install”:



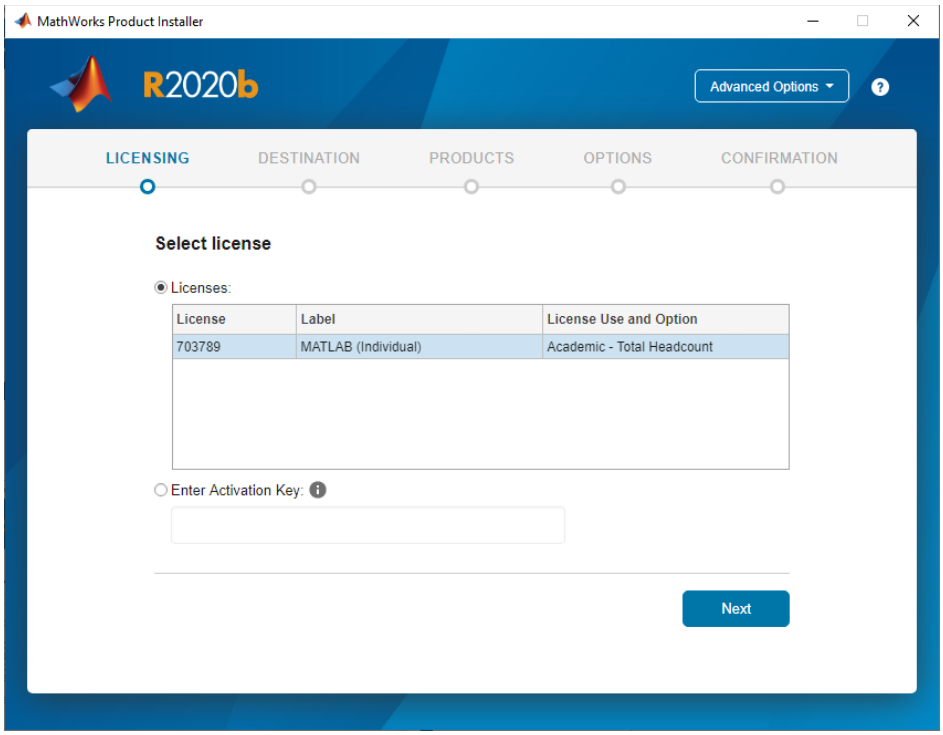
Then log in with your JHU email address (if you are on a VPN, then you might need to turn that off for the log-in):



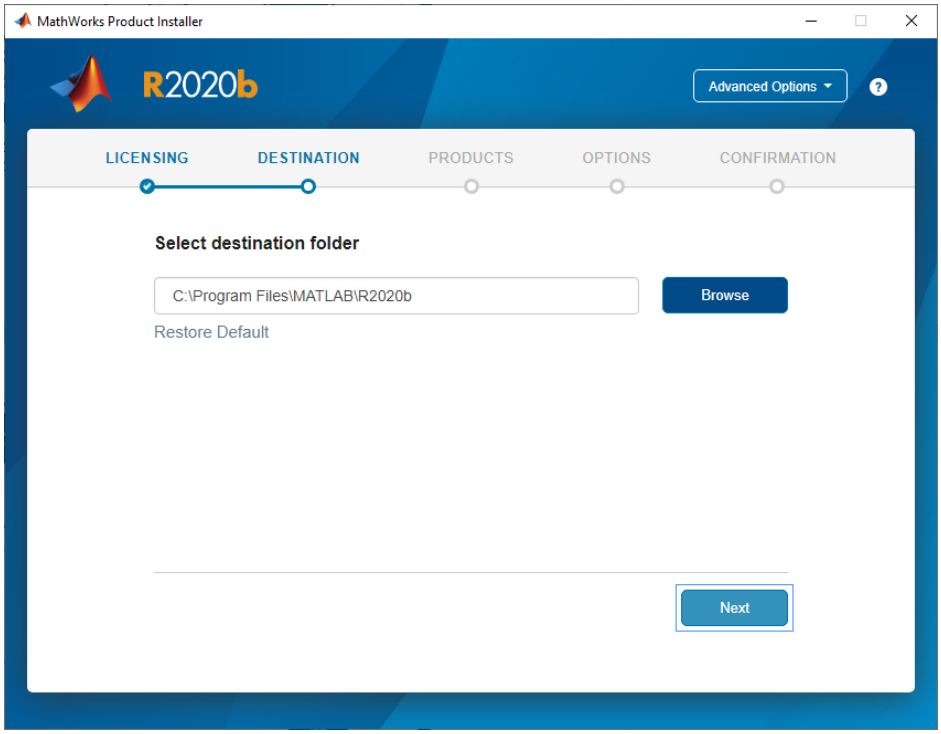
Agree to the terms and conditions:



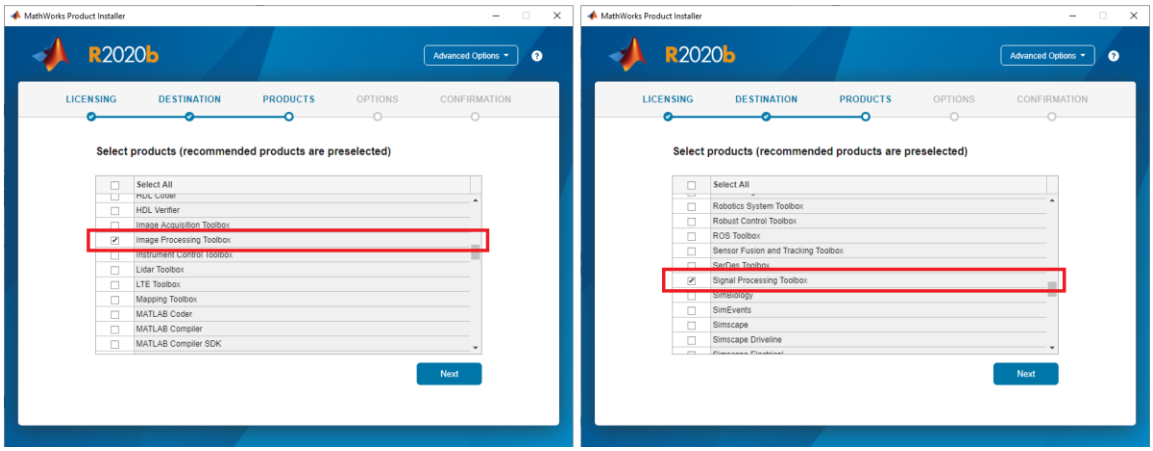
Use the academic license provided through JHU (which will appear if you set up your license correctly through your Mathworks account), and verify your account information on the next window:



Specify an installation location:



Make sure to include the **Image Processing Toolbox** and **Signal Processing Toolbox** upon installation:



Following installation, you'll have to activate the software, which should happen through an internet connection. Again, VPNs can affect this and might have to be turned off.

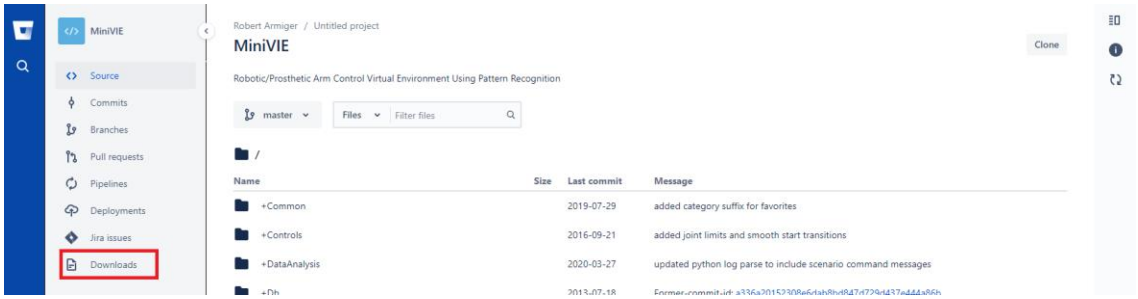
MATLAB Setup with MiniVIE

MATLAB will have to be setup with some provided software scripts and libraries that allow communication with the virtual Modular Prosthetic Limb (vMPL) system – this will include a portion of the Virtual Integration Environment (VIE) software suite, called the "**MiniVIE**".

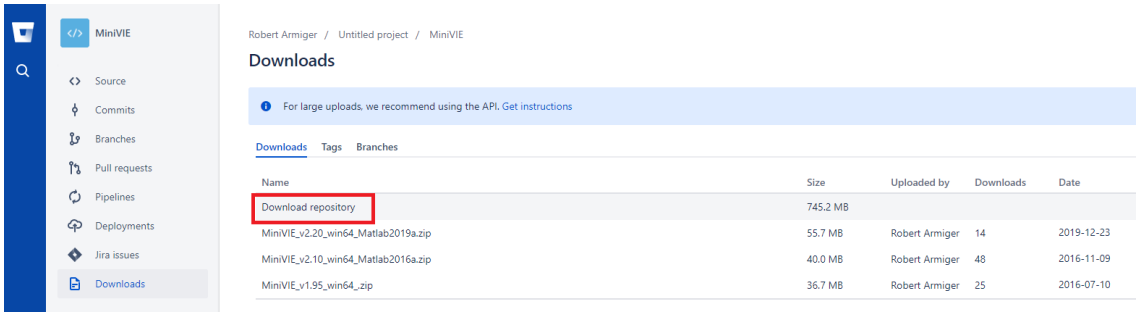
MiniVIE Download

Navigate to the MiniVIE git repository: https://bitbucket.org/rarmiger/minivie

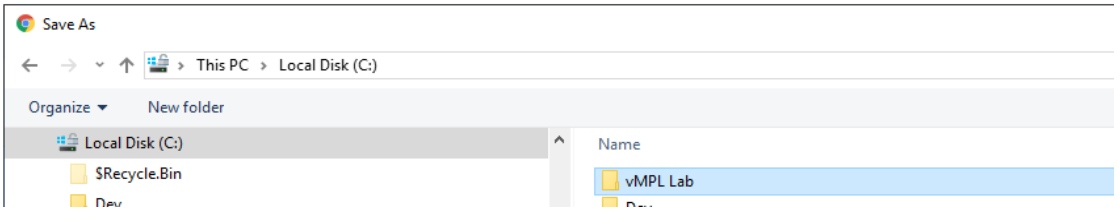
Go to "Downloads" at the bottom of the left menu:



Click on "Download Repository":



Save the zip file to a location of your choice on our file system where you will be working for the laboratory (example below).

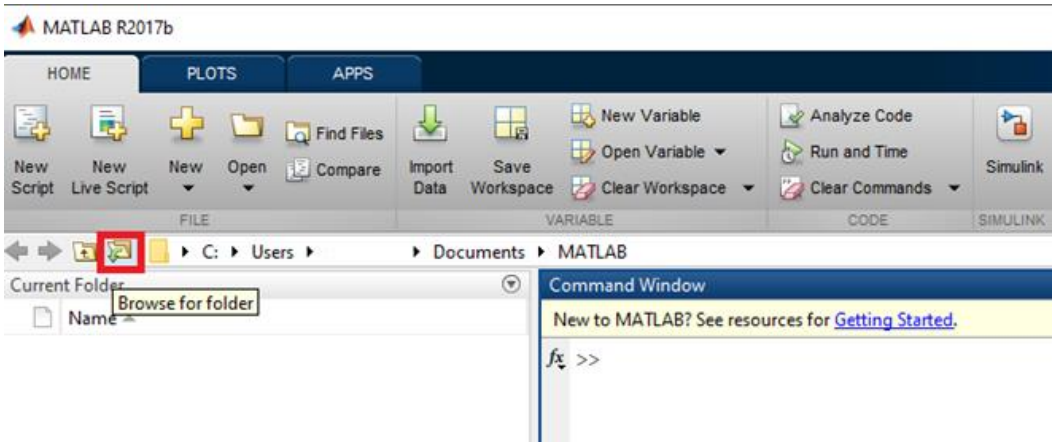


Unpack the Zip file – we recommend changing the git-version-generated folder name (e.g. "rarmiger-minivie-e2b0230ee6cf") to "MiniVIE" for simplicity – this folder will need to be accessible by MATLAB.

MiniVIE Setup within MATLAB

Once you have downloaded the MiniVIE Zip file and saved it to a location on your hard disk where you are keeping files for this course, and then unzipped the Zip file into a new folder, you can access the MiniVIE scripts and libraries inside that folder within the MATLAB environment. We can also setup some **shortcuts** into your MATLAB environment that will allow you to quickly utilize some of the MiniVIE functions. This process is the same for Windows and for Mac computers.

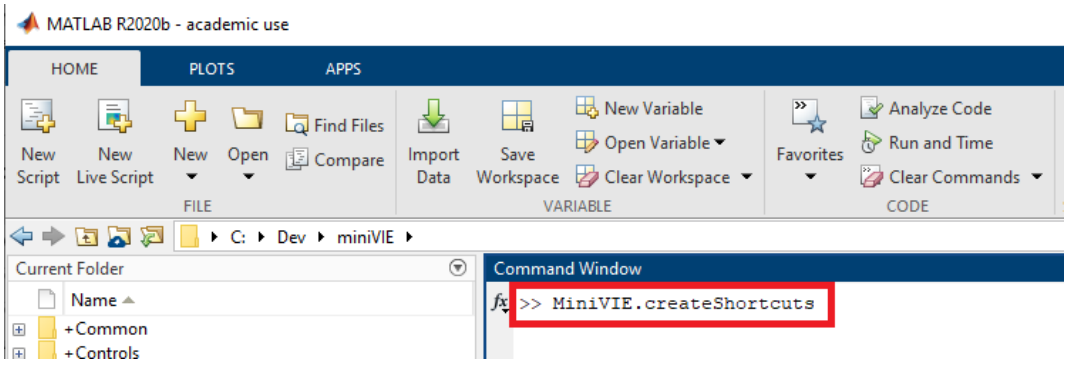
Once MATLAB is open, use the navigation bar (or the "Browse for Folder" button) to navigate to the folder where you saved the MiniVIE folder:



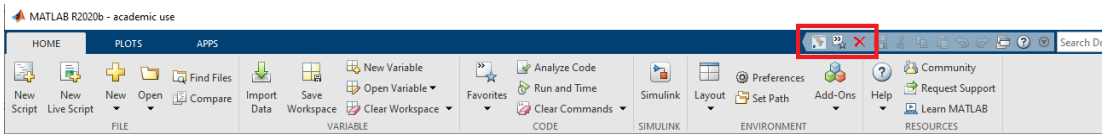
Select the "MiniVIE" folder location where you unpacked the files before – **this will be the folder that you will use for each part of the lab.** This will update where MATLAB is currently accessing files.

To setup MiniVIE Shortcuts, which will provide convenient ways to open up and run functions in the MiniVIE, type the following command in the Command Window, and press enter to execute the command – **Remember that MATLAB is CaSe sEnSiTiVe (the "M", "VIE", and "S" in the command below are all uppercase)**:

```
>>MiniVIE.createShortcuts
```



You should see new shortcut icons for MiniVIE functions appear in the upper right:



MiniVIE MATLAB Shortcuts:

MiniVIE:

This will open up the MiniVIE Command Trainer application. When run, this will prompt you to specify a configuration file (use the default “user_config.xml” file that is in the root MiniVIE folder) – open by clicking “Open”.

goto MiniVIE:

This will automatically set the MATLAB navigation to the MiniVIE folder location. This is helpful for navigating to the MiniVIE folder when you first start MATLAB (if it starts in another location).

Cleanup:

This will gracefully close out any open communication ports, which is helpful if there are any communication issues when reading muscle activity signals from the Myoband, or sending commands to the vMPL.