v.2 (2020-Aug-24)

How to install Cadnano on Windows

Getting started

This chapter describes how to set up and configure your local **Windows** desktop or laptop so you can begin designing DNA origami nanostructures with **Cadnano**. If you have an Apple computer, please see the **macOS** version of this document. This tutorial matches how we set up our own machines in the Douglas Lab as of September 2018.

When we refer to **Cadnano1**, we mean two separate "legacy" versions of Cadnano. The first is **cadnano v0.2.3** which supports honeycomb-lattice designs, and the second is **cadnanoSQ v0.2.4**, which supports square-lattice designs). **Cadnano1** was written in the ActionScript language (similar to JavaScript) for the **Adobe AIR** platform. **Cadnano2** is the Python port of Cadnano1. It uses **PyQt5**, a library that provides Python bindings for **Qt** (pronounced "cute"), a cross-platform GUI framework, which replace the function of Adobe AIR.

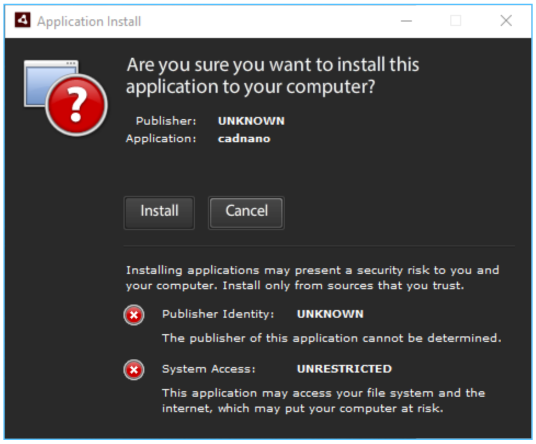
We find that it is useful to have a more than one copy of **Cadnano** available on your system. For example, you might want to open two versions of a design and edit them side-by-side. Also, while an OS update may often cause one version to stop working, it is rare that both will break simultaneously.

~ Notation styles for this document ~

URLs = blue clickable links	http://bionano.ucsf.edu/
Programs and packages = bold	**cadnano2**
Terminal commands = gray monospace font	`python main.py`
Button or tab = bold with brackets	**[Clone a repository]**
Important notes = bold red	**Don't forget this**

Step 1. Install both honeycomb and square-lattice versions of Cadnano1

1. Install **Adobe AIR** from: https://get.adobe.com/air/
2. Download **cadnano** and **cadnanoSQ** from http://cadnano.org/legacy
3. Double-click each installers and follow the instructions. You should see an Application Install dialog window. Don't worry about the warning, it just means that we didn't pay a tax to become a known publisher. When you proceed, you can choose to add a desktop shortcut, or install in a different location.



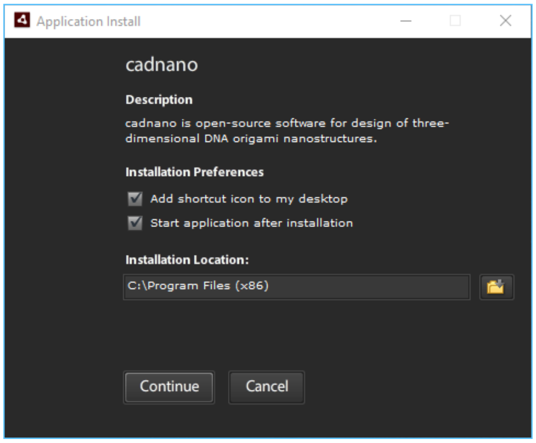
Are you sure you want to install this application to your computer?

Publisher: UNKNOWN
Application: cadnano

Installing applications may present a security risk to you and your computer. Install only from sources that you trust.

Publisher Identity: UNKNOWN
The publisher of this application cannot be determined.

System Access: UNRESTRICTED
This application may access your file system and the internet, which may put your computer at risk.



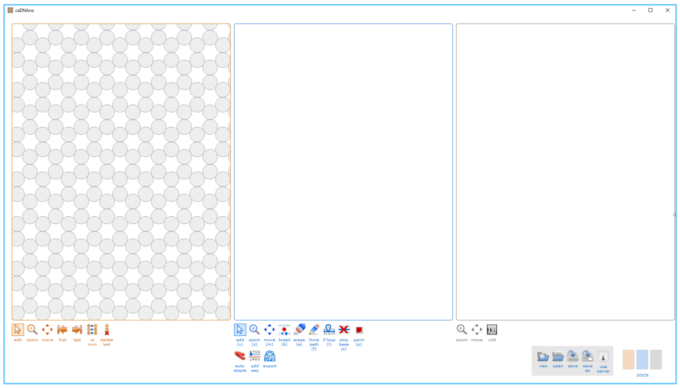
cadnano

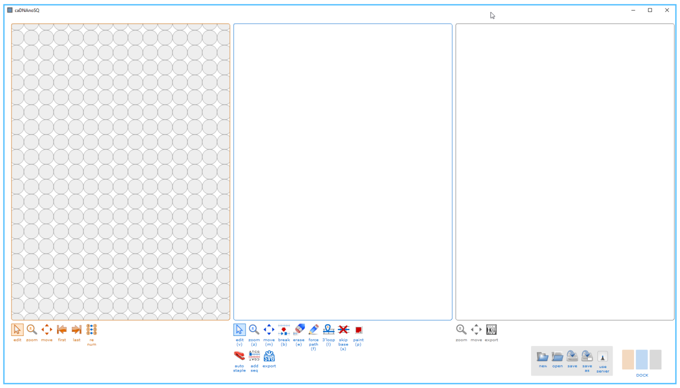
Description
cadnano is open-source software for design of three-dimensional DNA origami nanostructures.

Installation Preferences
☑ Add shortcut icon to my desktop
☑ Start application after installation

Installation Location:
C:\Program Files (x86)

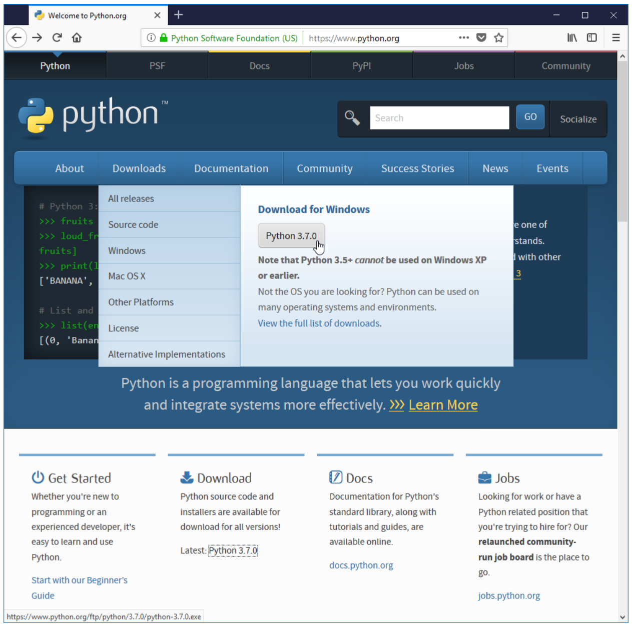
4. You should see these windows when you successfully install and launch **cadnano** and **cadnanoSQ**, respectively.





Step 2. Install Python3

1. Visit https://www.python.org/ and mouse over the **[Downloads]** tab, and download and run the installer.



Download for Windows

Note that Python 3.5+ *cannot* be used on Windows XP or earlier.

Not the OS you are looking for? Python can be used on many operating systems and environments.

View the full list of downloads.

Python is a programming language that lets you work quickly and integrate systems more effectively. >>> Learn More

Get Started

Whether you're new to programming or an experienced developer, it's easy to learn and use Python.

Start with our Beginner's Guide

Download

Python source code and installers are available for download for all versions!

Latest: Python 3.7.0

Docs

Documentation for Python's standard library, along with tutorials and guides, are available online.

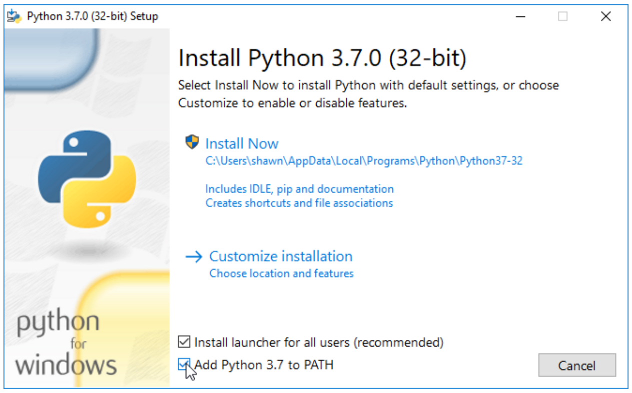
docs.python.org

Jobs

Looking for work or have a Python related position that you're trying to hire for? Our **relaunched community-run job board** is the place to go.

jobs.python.org

https://www.python.org/ftp/python/3.7.0/python-3.7.0.exe



Install Python 3.7.0 (32-bit)

Select Install Now to install Python with default settings, or choose Customize to enable or disable features.

Install Now
C:\Users\shawn\AppData\Local\Programs\Python\Python37-32

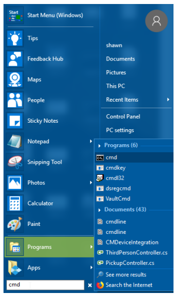
Includes IDLE, pip and documentation
Creates shortcuts and file associations

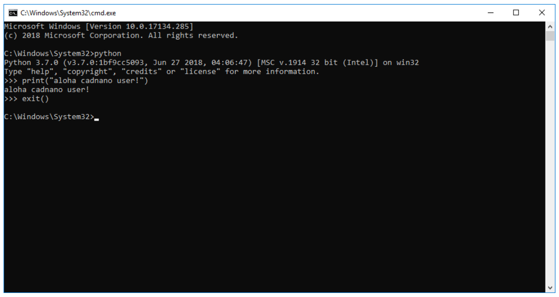
→ Customize installation
Choose location and features

☑ Install launcher for all users (recommended)

☑ Add Python 3.7 to PATH

2. Make sure you check the option **Add Python 3.7 to PATH** before continuing the installation. If you forget to do this, you can rerun the installer with the correct setting. Then click the **[Install Now]** button.
3. Confirm that Python3 is successfully installed by running it from a Command terminal. You can launch the terminal by opening the Start menu and searching for **cmd.exe**:



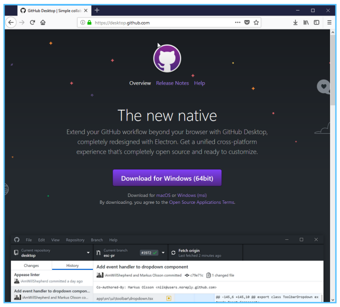


```
Microsoft Windows [Version 10.0.17134.285]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\System32>python
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:47) [MSC v.1914 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print("aloha cadnano user!")
aloha cadnano user!
>>> exit()

C:\Windows\System32>_
```

4. From the terminal, type `python` and hit enter. You should see the Python version and a >>> prompt. Quit python with the command `exit()`.

Step 3. Install GitHub Desktop

1. Visit https://desktop.github.com/ and download the **Windows** installer. Install with the default settings.
2. If you do not yet have a GitHub.com account, now is a good time to create one. Otherwise, enter your existing credentials. (This account will be necessary if you wish to report any issues or bugs with **Cadnano2** at https://github.com/douglaslab/cadnano2/issues)



https://desktop.github.com

The new native

Extend your GitHub workflow beyond your browser with GitHub Desktop, completely redesigned with Electron. Get a unified cross-platform experience that's completely open source and ready to customize.

Download for macOS or Windows (msi)
By downloading, you agree to the Open Source Applications Terms.

Current repository: desktop
Current branch: esc-pr
Fetch origin — Last fetched 2 minutes ago

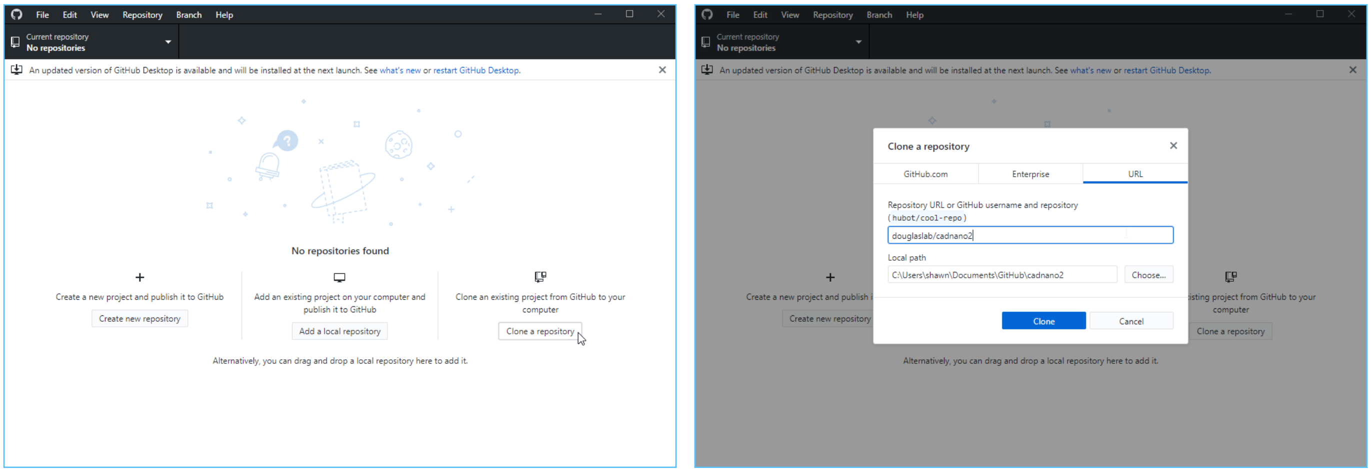
Appease linter — iAmWillShepherd committed a day ago
Add event handler to dropdown compon... — iAmWillShepherd and Markus Olsson co...

Add event handler to dropdown component
iAmWillShepherd and Markus Olsson committed c79e71c 1 changed file
Co-Authored-By: Markus Olsson <niik@users.noreply.github.com>
app\src\ui\toolbar\dropdown.tsx
@@ -145,6 +145,10 @@ export class ToolbarDropdown ex

Step 4. Install Cadnano2 by cloning the source git repository

We will use **GitHub Desktop** to install **Cadnano2**. If you have not previously used the application, when you first open it you will not have any custom repositories. Some versions of Desktop have a tutorial repository. You can view the tutorial if you wish, and then delete it.

1. Click on the **[Clone a repository]** button on the bottom right, or navigate to the same command via the **File** menu. You will see the "Clone a repository" dialog shown in the right panel below:



Current repository: No repositories

An updated version of GitHub Desktop is available and will be installed at the next launch. See what's new or restart GitHub Desktop.

No repositories found

Create a new project and publish it to GitHub

Add an existing project on your computer and publish it to GitHub

Clone an existing project from GitHub to your computer

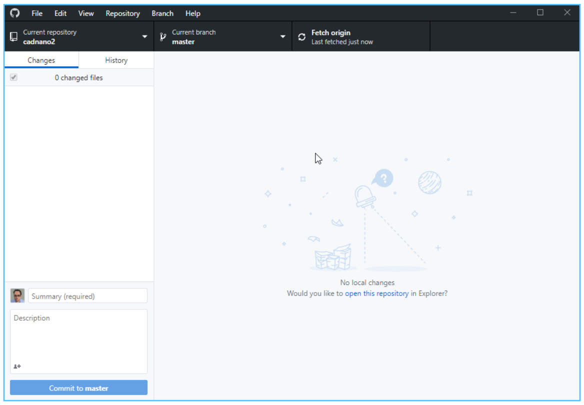
Alternatively, you can drag and drop a local repository here to add it.

Clone a repository

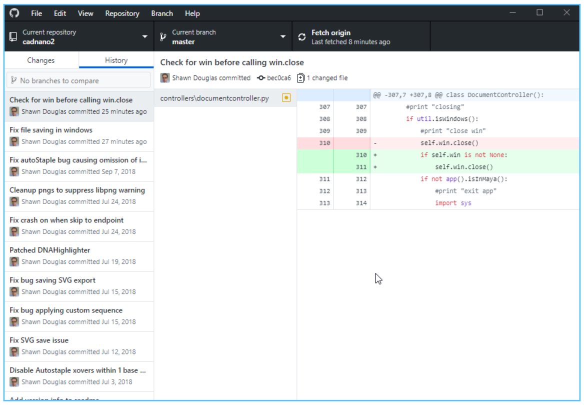
Repository URL or GitHub username and repository
(hubot/cool-repo)
douglaslab/cadnano2

Local path
C:\Users\shawn\Documents\GitHub\cadnano2

2. Choose the **[URL]** tab and enter `douglaslab/cadnano2` then click the **[Clone]** button. It should download.
3. Confirm that you successfully downloaded **cadnano2**. It should be selected under the "Current repository" button at the top, and the "Changes" window layout will appear. We have not made any source changes, so it should be empty. Select the **History** tab to see some recent commits.



No local changes
Would you like to open this repository in Explorer?



Check for win before calling win.close
Shawn Douglas committed 25 minutes ago
Fix file saving in windows
Shawn Douglas committed 27 minutes ago
Fix autoStaple bug causing omission of i...
Shawn Douglas committed Sep 7, 2018
Cleanup pngs to suppress libpng warning
Shawn Douglas committed Jul 24, 2018
Fix crash on when skip to endpoint
Shawn Douglas committed Jul 24, 2018
Patched DNAHighlighter
Shawn Douglas committed Jul 19, 2018
Fix bug saving SVG export
Shawn Douglas committed Jul 15, 2018
Fix bug applying custom sequence
Shawn Douglas committed Jul 15, 2018
Fix SVG save issue
Shawn Douglas committed Jul 12, 2018
Disable Autostaple xovers within 1 base ...
Shawn Douglas committed Jul 3, 2018

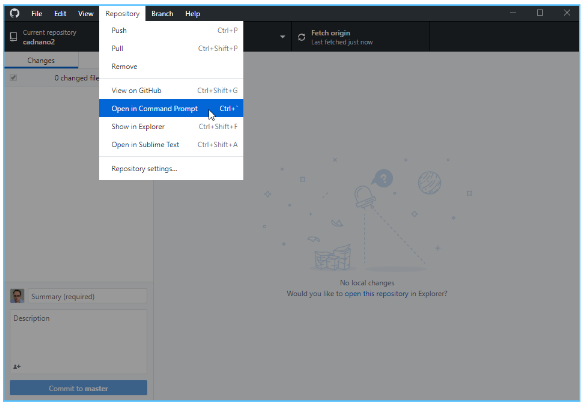
Check for win before calling win.close
Shawn Douglas committed bec0ca6 1 changed file

controllers\documentcontroller.py

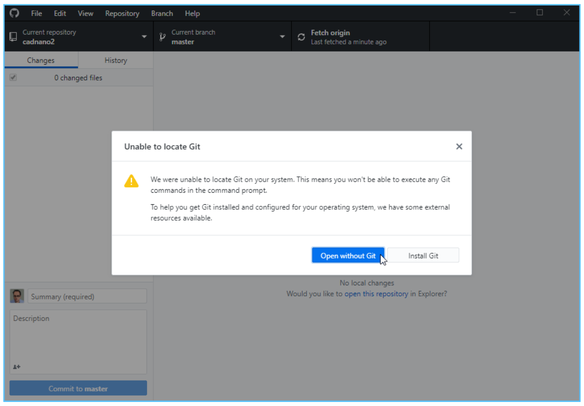
```
            @@ -307,7 +307,8 @@ class DocumentController():
307  307            #print "closing"
308  308            if util.isWindows():
309  309                #print "close win"
310       -             self.win.close()
     310  +             if self.win is not None:
     311  +                 self.win.close()
311  312            if not app().isInMaya():
312  313                #print "exit app"
313  314                import sys
```

We are almost ready to run Cadnano2, but first we need to install a two more dependencies. We will do so from the terminal window. Conveniently, GitHub Desktop provides a command that opens a terminal in the directory of the current repository, which will be useful in a moment.

4. Use the mouse to navigate in the menu bar to Repository → Open in Command Prompt.



No local changes
Would you like to open this repository in Explorer?



Unable to locate Git

We were unable to locate Git on your system. This means you won't be able to execute any Git commands in the command prompt.

To help you get Git installed and configured for your operating system, we have some external resources available.

No local changes
Would you like to open this repository in Explorer?

We won’t be using git commands at the moment, so you can just click **[Open without Git]** to proceed. You should now have a command terminal open, similar to launching **cmd.exe** from the Start menu, but the prompt and current working directory should match the **cadnano2** git repository path. If you wish to suppress the “Unable to locate Git” warning in the future, you can go ahead and click the **[Install Git]** button and follow the instructions.

Step 5. Install Cadnano2 dependencies: PyQt5 and networkx

PyQt5 is required to run **Cadnano2**, similar to Adobe AIR for **Cadnano1**. The **networkx** package is used to handle some of the graph algorithms for the original version of the Autobreak plugin. We won’t be using that feature, but it’s easier to just install the dependency for now. We will be using **pip**, a command-line python package installer.

1. Install **PyQt5** using the following command:

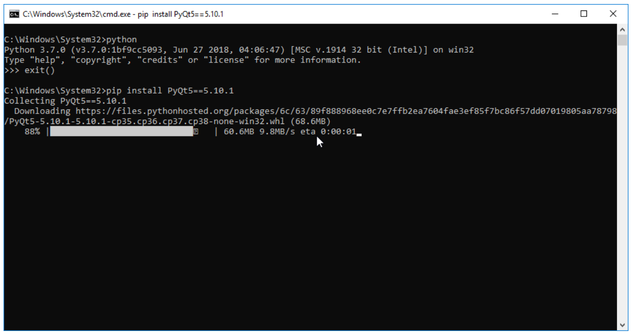
```
pip install PyQt5
```

The “==5.10.1” part forces the installation of a specific version of PyQt5. We have found that the latest version of PyQt5 (version 5.11.2, as of September 2018) causes some runtime errors, but this one should work fine.

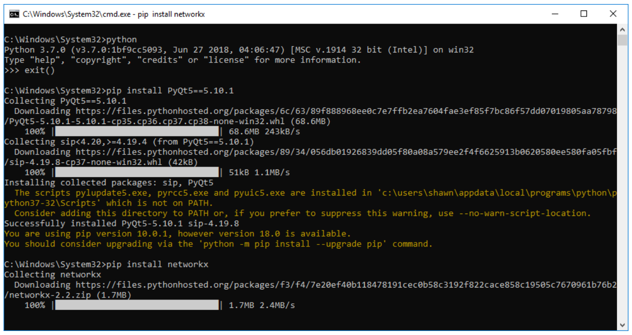
2. Install **networkx** using the following command:

```
pip install networkx
```

The above commands should output messages about downloading and installing the corresponding packages. If you see warnings about upgrading **pip** to the newest version, you can ignore them. Or, follow the instructions if you wish.



```
C:\Windows\System32>python
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:47) [MSC v.1914 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> exit()

C:\Windows\System32>pip install PyQt5==5.10.1
Collecting PyQt5==5.10.1
  Downloading https://files.pythonhosted.org/packages/6c/63/89f888968ee0c7e7ffb2ea7604fae3ef85f7bc86f57dd07019805aa78798
/PyQt5-5.10.1-5.10.1-cp35.cp36.cp37.cp38-none-win32.whl (68.6MB)
    88% |████████████████████████████▌   | 60.6MB 9.8MB/s eta 0:00:01
```



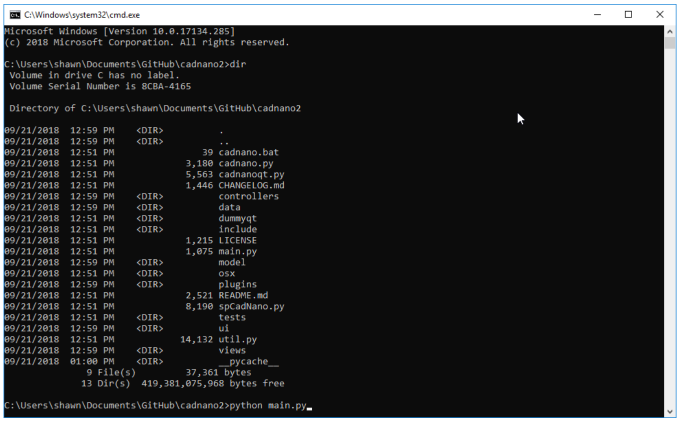
```
C:\Windows\System32>python
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:47) [MSC v.1914 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> exit()

C:\Windows\System32>pip install PyQt5==5.10.1
Collecting PyQt5==5.10.1
  Downloading https://files.pythonhosted.org/packages/6c/63/89f888968ee0c7e7ffb2ea7604fae3ef85f7bc86f57dd07019805aa78798
/PyQt5-5.10.1-5.10.1-cp35.cp36.cp37.cp38-none-win32.whl (68.6MB)
    100% |████████████████████████████████| 68.6MB 243kB/s
Collecting sip<4.20,>=4.19.4 (from PyQt5==5.10.1)
  Downloading https://files.pythonhosted.org/packages/89/34/056db01926839dd05f80a08a579ee2f4f6625913b0620580ee580fa05fbf
/sip-4.19.8-cp37-none-win32.whl (42kB)
    100% |████████████████████████████████| 51kB 1.1MB/s
Installing collected packages: sip, PyQt5
  The scripts pylupdate5.exe, pyrcc5.exe and pyuic5.exe are installed in 'c:\users\shawn\appdata\local\programs\python\p
ython37-32\Scripts' which is not on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed PyQt5-5.10.1 sip-4.19.8
You are using pip version 10.0.1, however version 18.0 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.

C:\Windows\System32>pip install networkx
Collecting networkx
  Downloading https://files.pythonhosted.org/packages/f3/f4/7e20ef40b118478191cec0b58c3192f822cace858c19505c7670961b76b2
/networkx-2.2.zip (1.7MB)
    100% |████████████████████████████████| 1.7MB 2.4MB/s
```

Step 6: Running Cadnano2

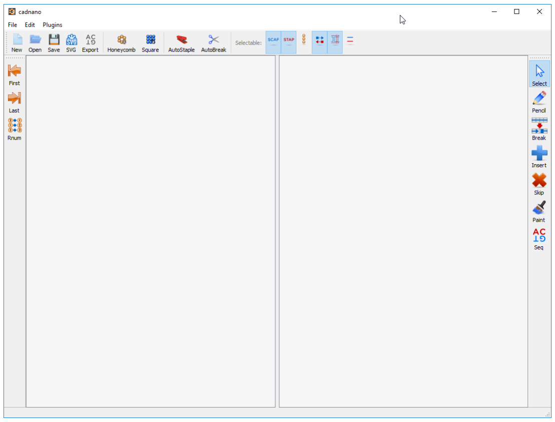
We should be ready to run **cadnano2**. If you still have your terminal window open from Step 5 with the cadnano2 repository path as your working directory, you can skip to step 2.

1. Open **GitHub Desktop.** Use the mouse to navigate in the menu bar to Repository → Open in Command Prompt and choose **[Open without Git]** if you have not installed Git.
2. Use the Terminal window to launch Cadnano2 using the following command:

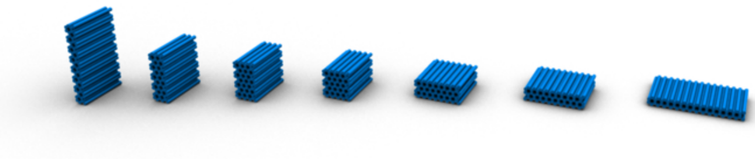
```
python main.py
```



```
Microsoft Windows [Version 10.0.17134.285]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\shawn\Documents\GitHub\cadnano2>dir
 Volume in drive C has no label.
 Volume Serial Number is 8CBA-4165

 Directory of C:\Users\shawn\Documents\GitHub\cadnano2

09/21/2018  12:59 PM    <DIR>          .
09/21/2018  12:59 PM    <DIR>          ..
09/21/2018  12:51 PM                39 cadnano.bat
09/21/2018  12:51 PM             3,180 cadnano.py
09/21/2018  12:51 PM             5,563 cadnanoqt.py
09/21/2018  12:51 PM             1,446 CHANGELOG.md
09/21/2018  12:59 PM    <DIR>          controllers
09/21/2018  12:59 PM    <DIR>          data
09/21/2018  12:51 PM    <DIR>          dummyqt
09/21/2018  12:51 PM    <DIR>          include
09/21/2018  12:51 PM             1,215 LICENSE
09/21/2018  12:51 PM             1,075 main.py
09/21/2018  12:59 PM    <DIR>          model
09/21/2018  12:51 PM    <DIR>          osx
09/21/2018  12:59 PM    <DIR>          plugins
09/21/2018  12:51 PM             2,521 README.md
09/21/2018  12:51 PM             8,190 spCadNano.py
09/21/2018  12:51 PM    <DIR>          tests
09/21/2018  12:59 PM    <DIR>          ui
09/21/2018  12:51 PM            14,132 util.py
09/21/2018  12:59 PM    <DIR>          views
09/21/2018  01:00 PM    <DIR>          __pycache__
               9 File(s)         37,361 bytes
              13 Dir(s)  419,381,075,968 bytes free

C:\Users\shawn\Documents\GitHub\cadnano2>python main.py
```

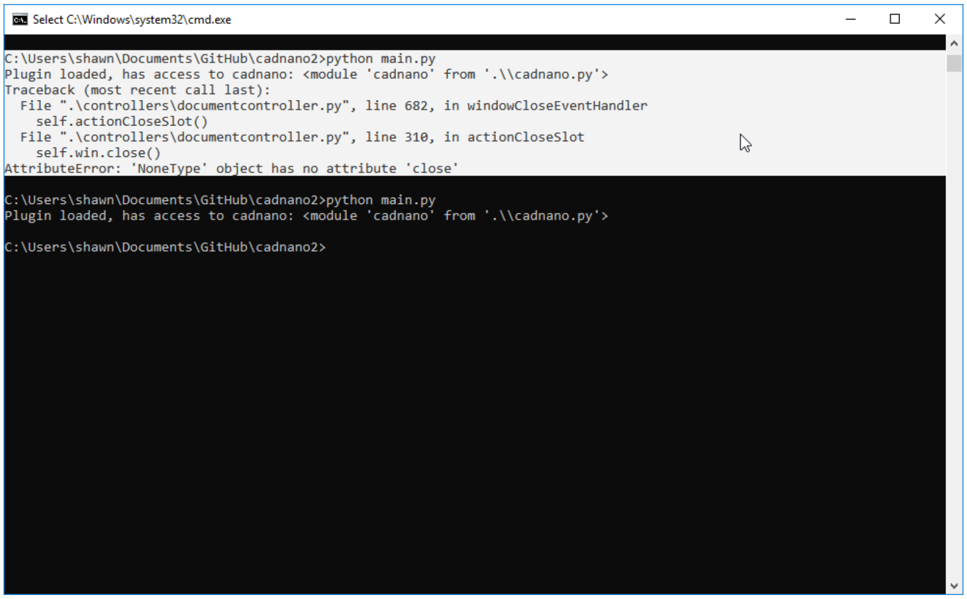


Both honeycomb and square lattice designs are handled by the same version of **cadnano2**, so we are all done! You can click on the **[Honeycomb]** or **[Square]** button in the interface to get started, or visit http://cadnano.org/gallery.html to download some published DNA origami designs to open and play with.



Step 7: Reporting Bugs

The **douglaslab/cadnano2** application is not bug free. You should get in the habit of saving your designs frequently, and reporting bugs when it crashes so we can make it more stable over time. As you may have noticed from the commit history, some bugs were even revealed in the process of building this tutorial. Typically, you will get a Traceback with some information about the code that was executing when an exception was thrown:

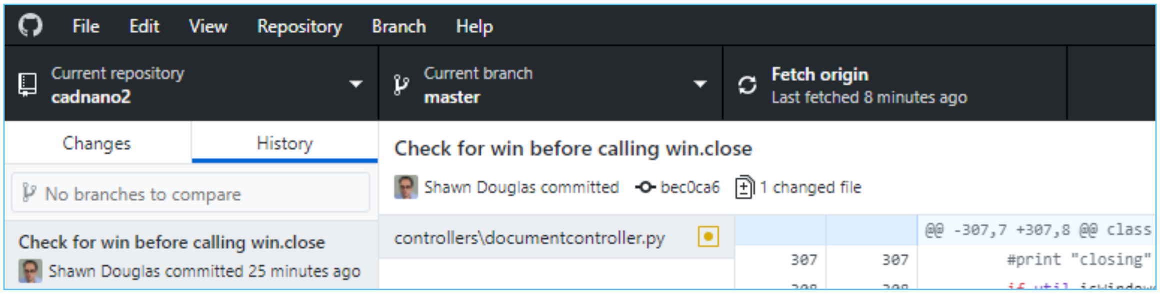


```
C:\Users\shawn\Documents\GitHub\cadnano2>python main.py
Plugin loaded, has access to cadnano: <module 'cadnano' from '.\\cadnano.py'>
Traceback (most recent call last):
  File ".\controllers\documentcontroller.py", line 682, in windowCloseEventHandler
    self.actionCloseSlot()
  File ".\controllers\documentcontroller.py", line 310, in actionCloseSlot
    self.win.close()
AttributeError: 'NoneType' object has no attribute 'close'

C:\Users\shawn\Documents\GitHub\cadnano2>python main.py
Plugin loaded, has access to cadnano: <module 'cadnano' from '.\\cadnano.py'>

C:\Users\shawn\Documents\GitHub\cadnano2>
```

If you encounter this situation, please copy the full traceback and paste it into new "Issue" along with detailed steps to reproduce at https://github.com/douglaslab/cadnano2/issues. If you have any example files that will be useful in reproducing the bug, please upload them too. If you poke around in the source code and think that you've fixed the bug, please submit a pull request along with your Issue. If we incorporate your fix, you will be added to the list of contributors.

Step 8: Updating Cadnano2 when it's been patched

If you submit any bugs, hopefully, we will be able to patch the source code quickly. Once that is done, you'll need to synchronize your local copy of cadnano2 with the latest commit. You can do so by clicking the **[Fetch origin]** button at the top right of the **Github Desktop** interface:



Check for win before calling win.close
Shawn Douglas committed 25 minutes ago

Check for win before calling win.close
Shawn Douglas committed bec0ca6 1 changed file

controllers\documentcontroller.py

```
@@ -307,7 +307,8 @@ class
307    307        #print "closing"
```

Assuming you haven't made any local changes to the source code in the master branch, it should synchronize and the **[History]** tab should reveal any new commits since the last time you fetched.