# Lab Assignment 3:
Hapkit Assembly

In this week's lab assignment, you will finish assembly of your Hapkit – your personal, one-degree-of-freedom kinesthetic haptic interface. Later you will expand it to be a two-degree-of-freedom Haplink. You can keep the Haplink after the course, although you may wind up modifying or deconstructing it to use the parts in your course project.

By now, you have received your Hapkit components and you have already printed your customized Hapkit handle. Assemble your Hapkit according to the instructions provided. Note that additional details and parts list can be found here: http://hapkit.stanford.edu/twoDOF.html

You must show your assembled Hapkit to Allison for check-off by the end of class on Thursday 10/12.

PART 1: HARDWARE
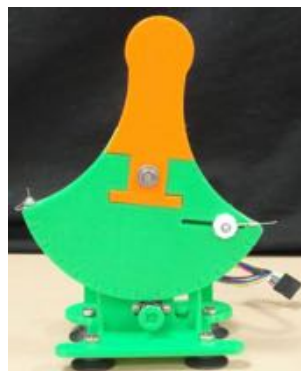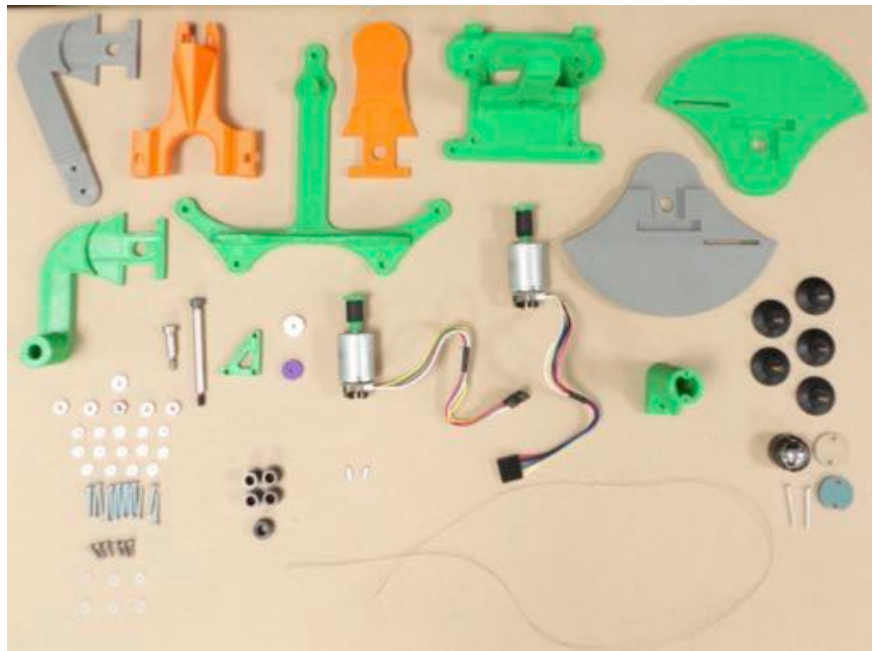
PART 2: SOFTWARE INSTALLATION AND ELECTRONICS

1. Create an account on mbed -> Go to www.mbed.com-> Click on Mbed Os developer site-> on the right upper corner click on Log In/Sign up and create an account.

2. Go to the online compiler -> Once you have an account, your user name will appear on the right-hand corner instead of the Log In/Sign up button. Click on the yellow "Compiler" button to go to the online compiler.

3. On the right-hand corner there is a message that says "no device selected", click on it. A dialog box will appear so that you can add your device. The device we are using is the Nucleo-F446ZE. Click on the Add Platform Button. This will bring you to a website.

   Search for Nucleo-F446ZE using the search of your browser NOT the search of the website. Click on the nucleo-f446Ze link.

   This will bring you to the Nucleo-F446ZE website, on the right-hand side there is a button that says "Add to your mbed compiler". Click on the button. A message will appear saying that the F446ZE platform has been added to your account.

4. Make your first program: Go back to the Online compiler, now on the right-hand side the Nucleo-F446ZE should be selected. On the left hand corner there is a "My Programs" Folder. Right click on the folder and choose New Program, Choose the Blinky LED test program and click OK.

5. On your program there is a main.cpp already. Right click on it and delete it.

6. Drag and drop from your computer the Base Haplink files (all of them at the same time) into your new program. (Download these files from http://me20n.stanford.edu)

7. Import USBDevice library: Select your program by clicking on it. Once it is selected click on the Import Button on the left-hand side. In the libraries Tab, search for USBDevice. Select USBDevice from the author "mbed official". It should be the first link. Double click on it. It will install on your program.

8. You are ready to compile! Click the compile Button.

 NOW CONNECT THE ELECTRONICS AS DESCRIBED IN THE ELECTRONICS DOCUMENT

9. Download code into your device: After you have successfully compiled, the code will be downloaded as a zip folder in your downloads folder. Drag and drop it into your device. This will make LD4 in your device blink red/green several times. When it is done blinking you are ready to use it!

10. Install the latest version of Arduino on your computer: In order to talk to the device through the USB port, you should install the latest version of Arduino. Go to arduino.cc and download the latest version of the Arduino IDE.

11. Install the OTTO board: Go to Tools-> Boards-> Boards Manager. In the boards manager search for Otto. And install the Arduino Stm32F4 boards by arduino library.

12. Once it is installed, select the OTTO board from the boards manager under tools and select one of the two serial devices under port. One is your programming port, and the other is your USB port. It will be different for each computer, but it doesn't matter if you select the wrong one. If you don't receive any messages, just select the other.

13. Open the serial Monitor and you should see messages coming from your device.