

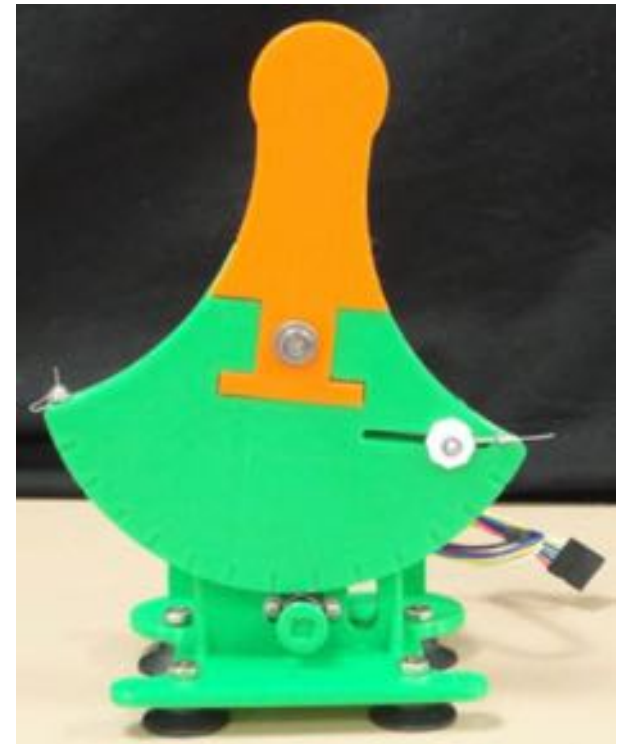
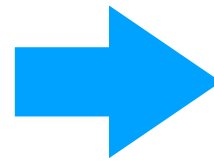
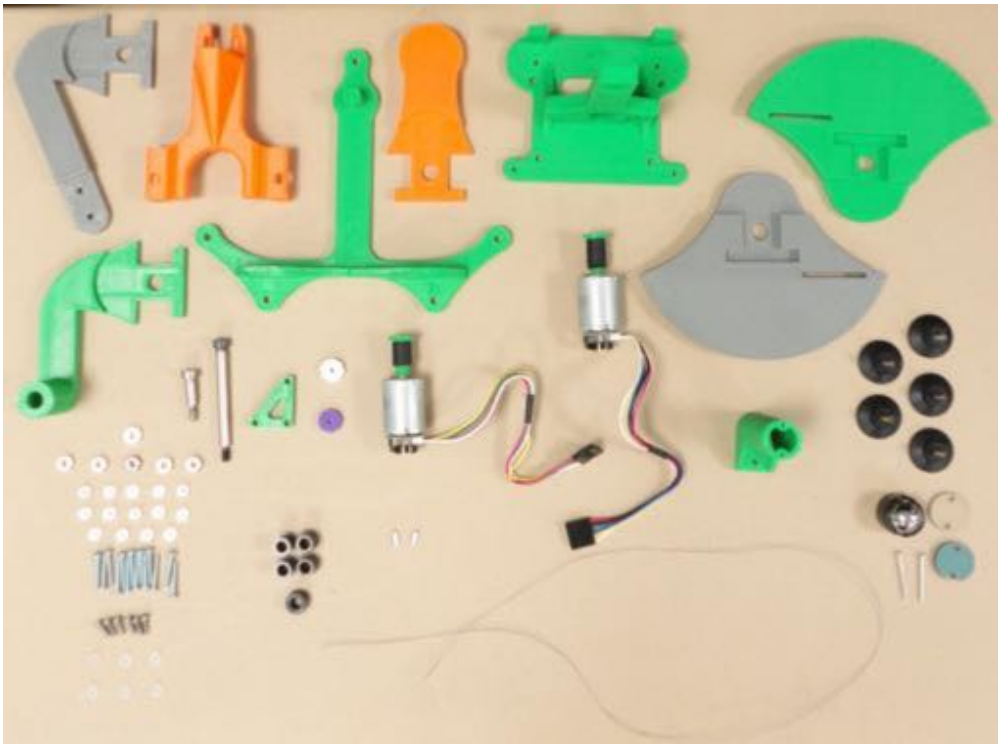


ME 20N: Haptics: Engineering Touch
Autumn 2017

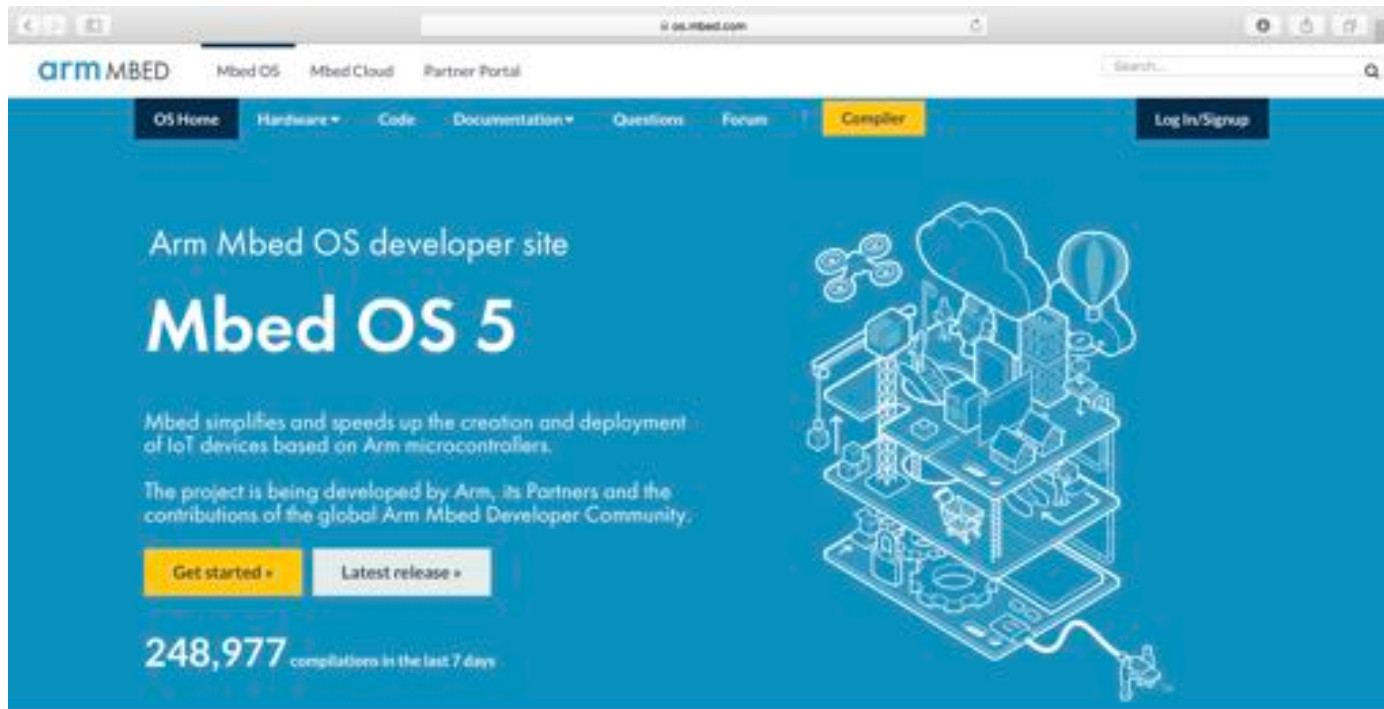
Week 3: Hapkit Assembly and Software

Allison M. Okamura
Stanford University

Hapkit Assembly



Hapkit Software



The screenshot shows the Arm Mbed OS developer site homepage. The browser address bar displays "mbed.com". The navigation bar includes "arm MBED", "Mbed OS", "Mbed Cloud", and "Partner Portal". A search bar is located on the right. The main navigation menu contains "OS Home", "Hardware", "Code", "Documentation", "Questions", "Forum", "Compiler", and "Log In/Signup". The main content area features the text "Arm Mbed OS developer site" and "Mbed OS 5". Below this, it states "Mbed simplifies and speeds up the creation and deployment of IoT devices based on Arm microcontrollers." and "The project is being developed by Arm, its Partners and the contributions of the global Arm Mbed Developer Community." There are two buttons: "Get started" and "Latest release". A statistic shows "248,977 compilations in the last 7 days". On the right, there is a white line-art illustration of a multi-layered IoT system with various components like a drone, a cloud, a hot air balloon, a laptop, and a smartphone.

Blog

 mbed OS 5.6.2 released
Anna Briden - about 5 hours ago

Questions

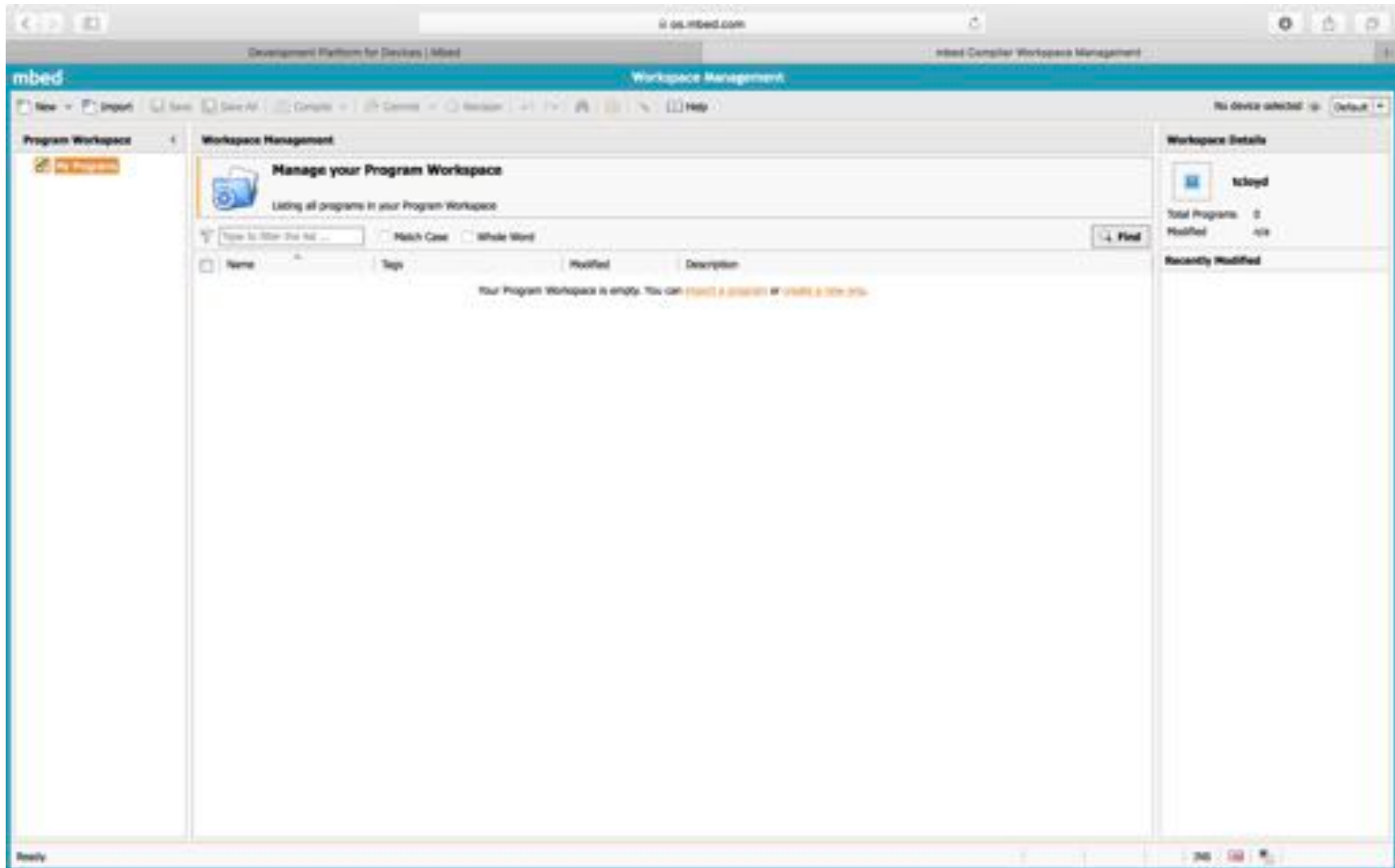
 answer
Cannot export to IDE from mbed-cl

Activity

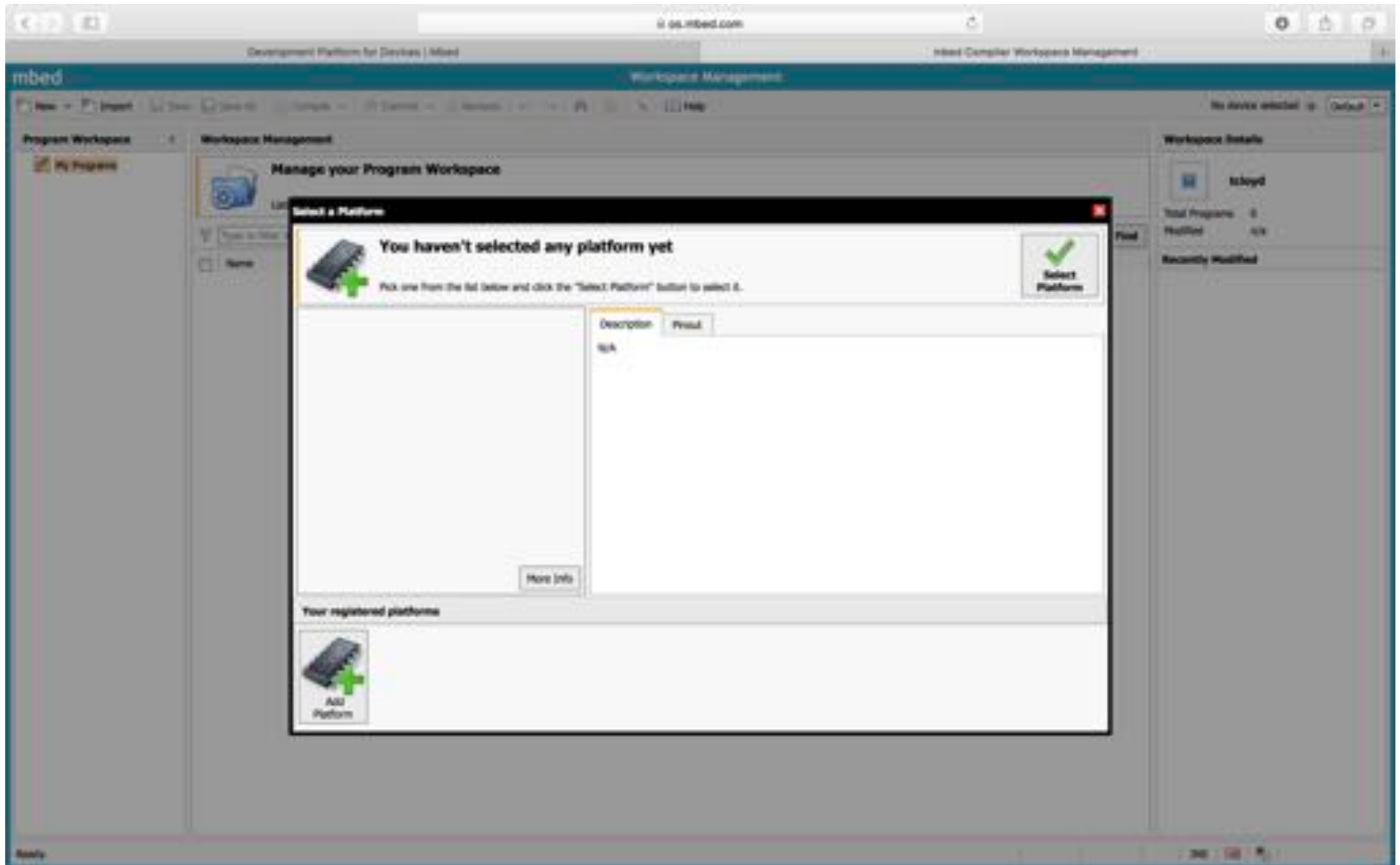
+ Your dashboard

 Program updated:
ME21001 Lab04 Exercise 01 - exercise 1.1

Hapkit Software



Hapkit Software



Hapkit Software

The screenshot shows the ARM Mbed website interface. At the top, there's a navigation bar with 'arm MBED' logo and links for 'Mbed OS', 'Mbed Cloud', and 'Partner Portal'. Below that is a secondary navigation bar with 'OS Home', 'Hardware', 'Code', 'Documentation', 'Questions', 'Forum', and 'Compiler'. A search bar on the right contains 'Nucleo-F446ZE'. The main content area is titled 'Boards' and features a filter sidebar on the left. The filter sidebar includes sections for 'Mbed Enabled', 'Mbed OS support', 'Target vendor', and 'Platforms vendor'. The main board grid displays six boards with their respective images and specifications:

- mbed LPC1768**: Cortex-M3, 96MHz, 512KB Flash, 32KB RAM
- mbed LPC1114**: Cortex-M0, 48MHz, 32KB Flash, 8KB RAM
- FRDM-KL25Z**: Cortex-M0+, 120MHz, 128KB Flash, 56KB RAM, USB-OTG
- NUCLEO-F446ZE**: Cortex-M4 + FPU, 180MHz, 512KB Flash, 128KB SRAM, USB 2.0 full speed
- NXP LPC800-MAX**: Cortex-M0+, 56KB Flash, 4KB RAM
- EA LPC4088 QuickStart Board**: Cortex-M4, 120MHz, 512KB Flash, 96KB SRAM
- Sereduino-Arch**: Cortex-M0, 48MHz, 32KB Flash, 8KB RAM



Hapkit Software

The screenshot shows the ARM Mbed website interface. At the top, there's a navigation bar with 'arm MBED' logo and links for 'Mbed OS', 'Mbed Cloud', and 'Partner Portal'. Below this is a secondary navigation bar with 'OS Home', 'Hardware', 'Code', 'Documentation', 'Questions', 'Forum', and 'Compiler' (highlighted in yellow). The main content area is titled 'Boards > NUCLEO-F446ZE' and features a large heading 'NUCLEO-F446ZE' with a sub-heading 'STM32 Nucleo-144 development board with STM32F446ZE MCU, supports Arduino, ST Zio and morpho connectivity'. A central image shows the physical board and the Mbed logo. To the right, there's a 'Board Partner' section with the ST logo and 'life.augmented' tagline. Below the board image is an 'Overview' section with a paragraph describing the board's features. A 'Table of Contents' sidebar lists: 1. Overview, 2. Microcontroller features, 3. Nucleo features, 4. Board pinout, 5. Getting started, 6. Supported shields, 7. Technical references, 8. Known limitations. At the bottom right, there are two yellow buttons: 'Add to your Mbed Compiler' and 'Buy Now'.

Development Platform for Devices | Mbed

Mbed OS Mbed Cloud Partner Portal

OS Home Hardware Code Documentation Questions Forum Compiler

Boards > NUCLEO-F446ZE

NUCLEO-F446ZE

STM32 Nucleo-144 development board with STM32F446ZE MCU, supports Arduino, ST Zio and morpho connectivity

Overview

The STM32 Nucleo-144 board provides an affordable and flexible way for users to try out new concepts and build prototypes with the STM32 microcontroller, choosing from the various combinations of performance, power consumption and features. The ST Zio connector, which is an extension of Arduino™ Uno, provides access to more peripherals and ST morpho headers make it easy to expand the functionality of the Nucleo open development platform with a wide choice of specialized shields. The STM32 Nucleo-144 board does not require any separate probe, as it integrates the ST-LINK/V2-1 debugger/programmer and it comes with the STM32 comprehensive software HAL library, together with various packaged software examples, as well as a direct access to the ARMmbed™ online resources.

Table of Contents

1. Overview
2. Microcontroller features
3. Nucleo features
4. Board pinout
5. Getting started
6. Supported shields
7. Technical references
8. Known limitations

To compile a program for this board using Mbed CLI, use `nucleo_f446ze` as the target name.

Board Partner

life.augmented

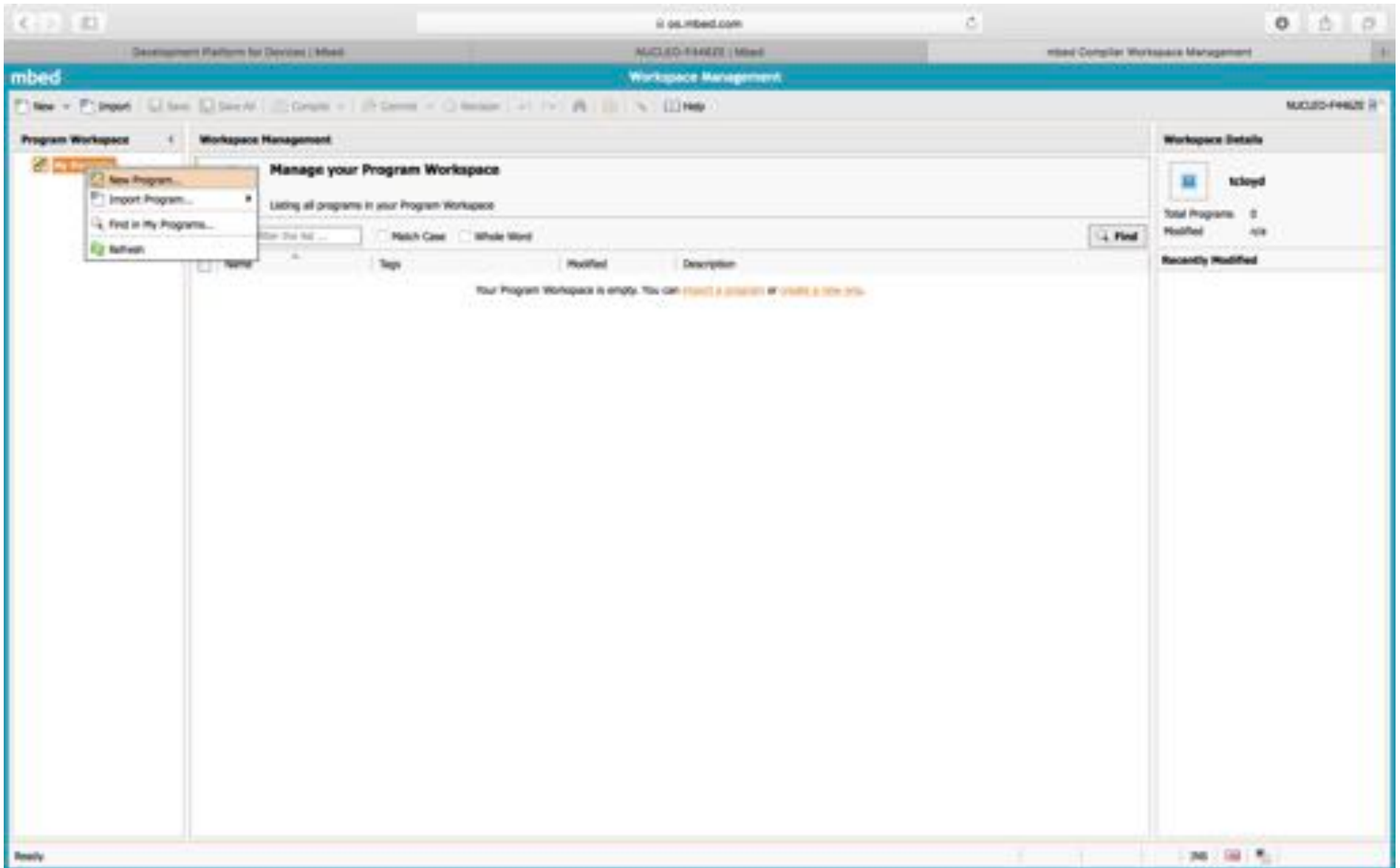
ST

A world leader in providing the semiconductor solutions that make a positive contribution to people's lives, both today and in the future.

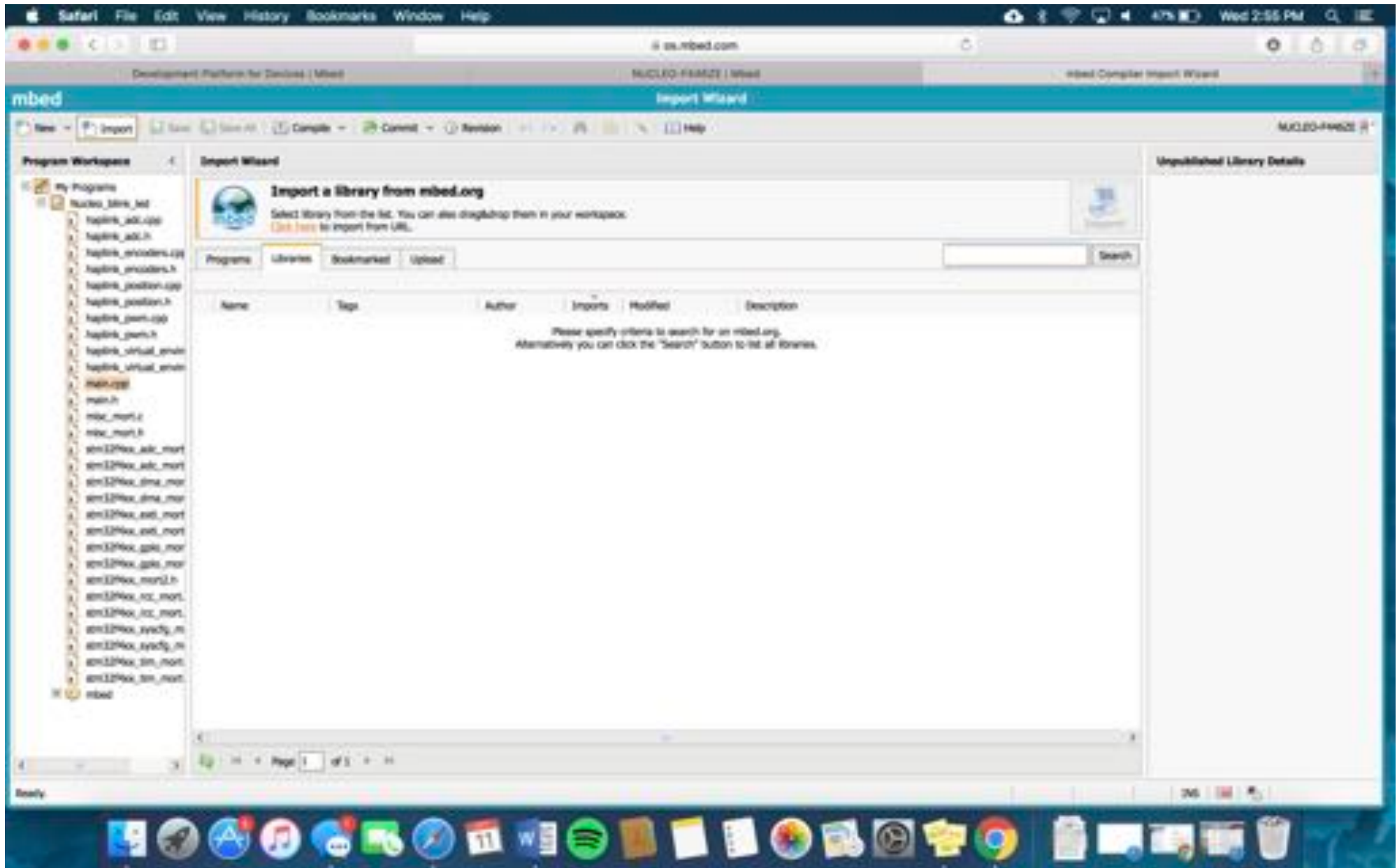
Add to your Mbed Compiler

Buy Now

Hapkit Software



Hapkit Software

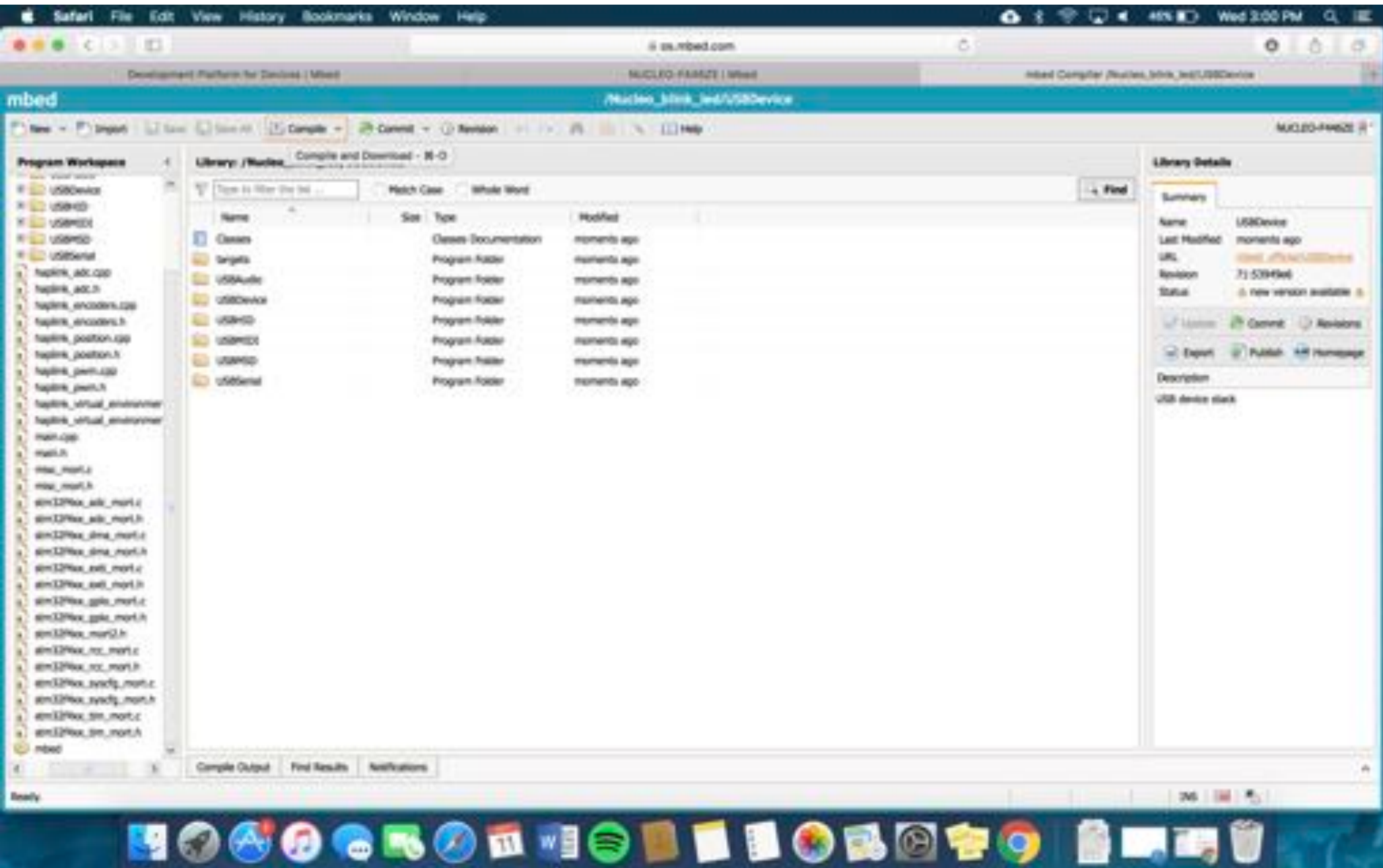


Hapkit Software

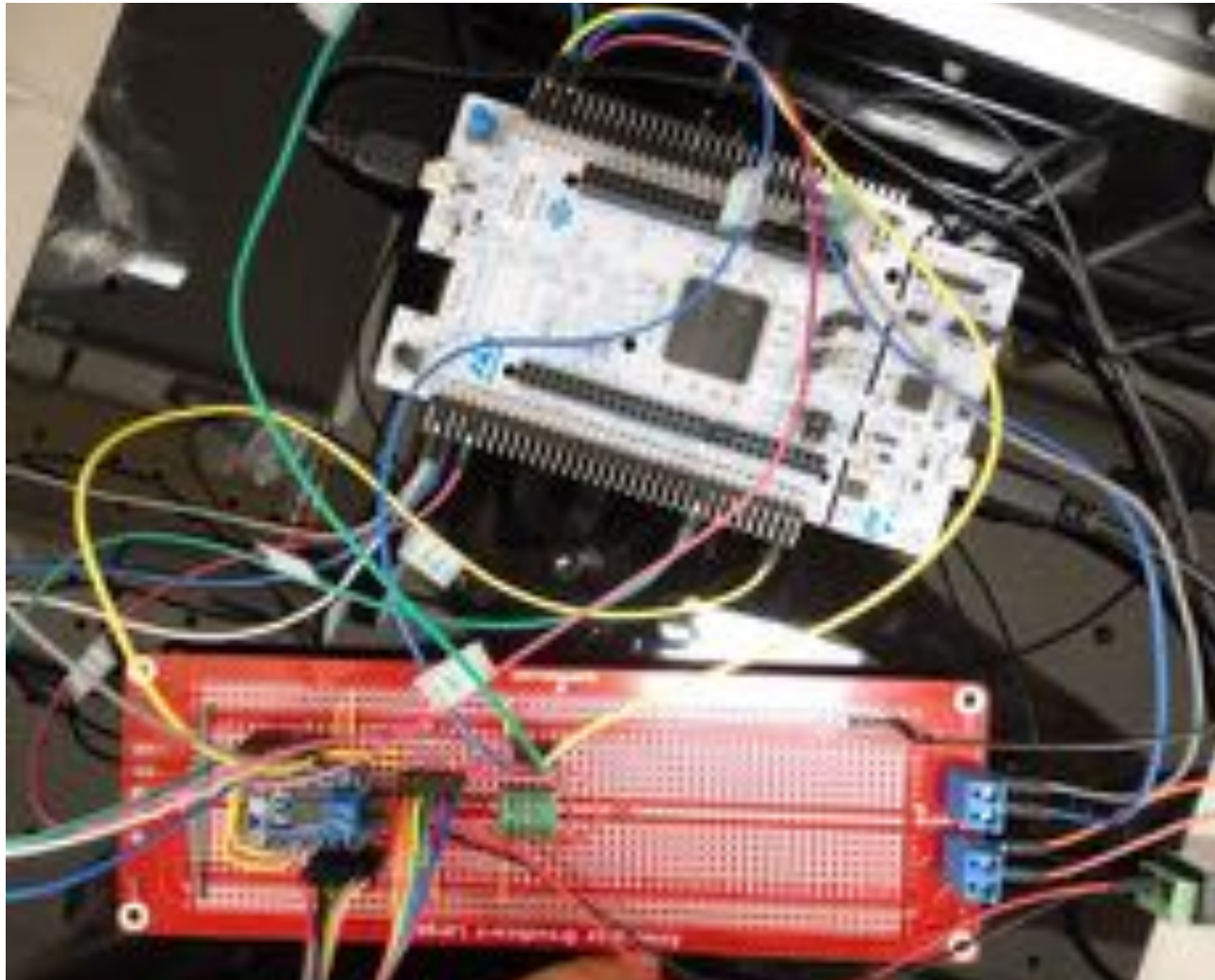
The screenshot shows the mbed.org website's 'Import Wizard' interface. The main content area is titled 'Import a library from mbed.org' and displays a list of published libraries on mbed.org matching the search term 'USBDevice'. The table below lists these libraries with their names, tags, authors, import counts, modification dates, and descriptions.

Name	Tags	Author	Imports	Modified	Description
USBDevice	device USB	mbed official	16476	27 Jul 2017	USB device stack
USBHost	Host-hub endpoint mbed Host	mbed official	4176	17 Aug 2017	USBHost library. NOTE: This library is only officially supported on the LPC1114 platform adding additional features
USBSerial		Sam Rowe	2244	26 Jun 2013	
USBPICO	Stellaris PICO USB USBPICO	Simon Frit	961	20 Feb 2011	A library to send and receive PICO messages over USB using the default USB-PICO of
USBPICO_50		Samuel Housley	738	21 Jan 2013	USBPICO example using an SD card
USBHID	joystick PlayStation	Peter Koushanov	658	11 May 2012	Joystick enabled version of USBPICO -library Has full Playstation 3 functionality include
USBDeviceLibrary		Carl - Substack	570	13 Nov 2013	USB Device Library
USBHostSystem	USBHost LocalFileSystem	GH-Thomas	318	28 Jan 2015	Class that combined LocalFileSystem with a USBPICO device, similar to LocalFileSystem
USBHostKeyboard	Composite USB USBKeyboard	Chris Powell	318	30 Mar 2013	A Composite device with USBSerial and USBKeyboard
USBHost		John van	296	18 Apr 2013	
USBHost		Sam D	218	28 Mar 2017	USBHost for STM support
L442-USBHost	FROM 4L442 FROM 4L442 USB	Yveschoua Choua	188	05 Feb 2014	Simple USBHost library for FROM 4L442(FROM 4L252). Backward compatibility of off
USBHostLib		Carlo Alberto Ni	174	22 Jul 2013	Import Library
USBHostSystem	USBHost USB Lib	Sam D	159	27 Aug 2013	Using the USBHostSystem class to provide SD-card with USBPICO and LocalFileSystem a
USBHostPico	usb host endpoint USB Host	Sam Rowe	144	01 Feb 2014	Xbox 360 Wireless Controller for Windows library. sample: http://mbed.org/users/skr
CPU_Usage	CPU-CPU usage performance	Jan Martin	122	08 Jan 2016	CPU_Usage is a very lightweight library that can be easily incorporated into your app
DISCO_F1498G	DISCO_F1498G STM32F149	Clara Grant	97	11 Jul 2016	partly working USB Device lib for STM32F149G Discovery both interface are working
LPC4088-USBHost	LPC4088 USB	Nanvase Choua	83	23 Apr 2014	Simple USBHost library for LPC4088. Backward compatibility of official-usbhost.
USBLocalFileSystem		Nanvase Choua	77	21 Jun 2014	Emulation of LocalFileSystem with virtual CDROM
USBULK	Bulk Transport USB	Shuichi Yamaguchi	70	28 Apr 2014	USB Bulk Transport driver Made by Shuichi Yamaguchi. UsedLibry USBULK more
USB joystick	joystick USB	Wim Mulders	68	05 Jan 2017	USB joystick updated for 30 buttons and added wait for connect.

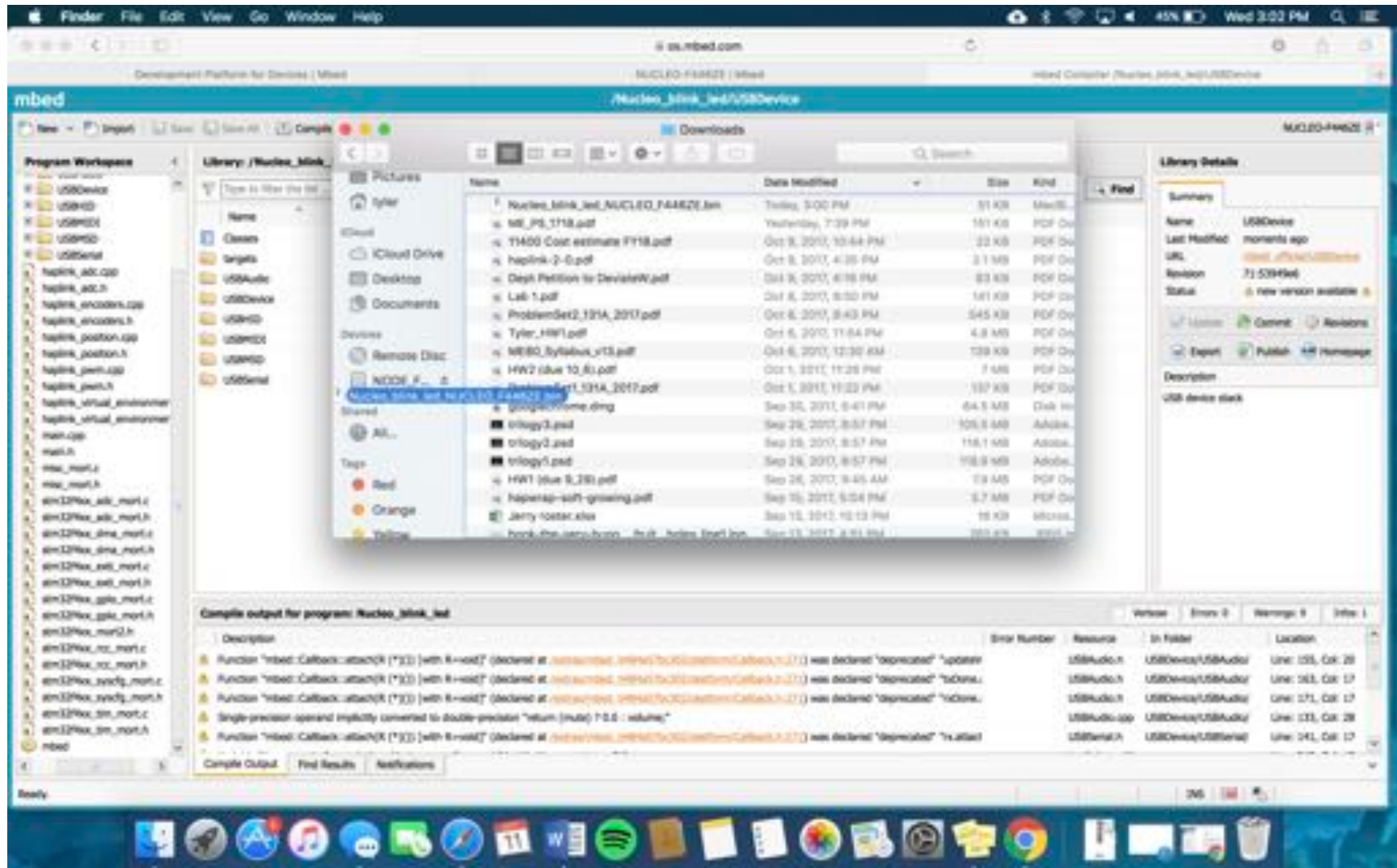
Hapkit Software

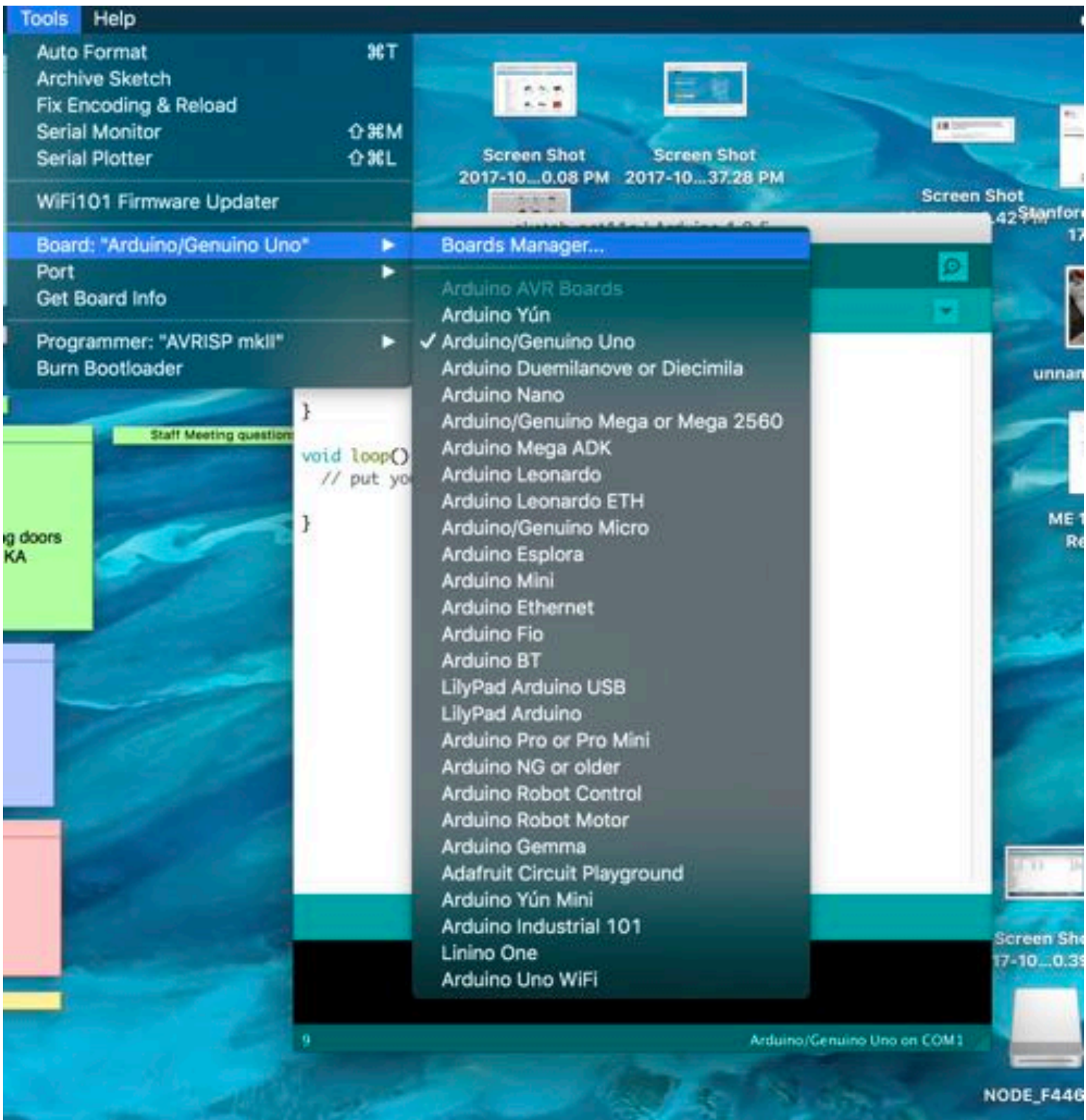


Hapkit Electronics



Hapkit Software





Tools Help

- Auto Format 36T
- Archive Sketch
- Fix Encoding & Reload
- Serial Monitor ↕ 36M
- Serial Plotter ↕ 36L

WiFi101 Firmware Updater

Board: "Arduino/Genuino Uno" ▶

Port ▶

Get Board Info

Programmer: "AVRISP mkII" ▶

Burn Bootloader

Boards Manager...

- Arduino AVR Boards
- Arduino Yún
- ✓ Arduino/Genuino Uno
- Arduino Duemilanove or Diecimila
- Arduino Nano
- Arduino/Genuino Mega or Mega 2560
- Arduino Mega ADK
- Arduino Leonardo
- Arduino Leonardo ETH
- Arduino/Genuino Micro
- Arduino Esplora
- Arduino Mini
- Arduino Ethernet
- Arduino Fio
- Arduino BT
- LilyPad Arduino USB
- LilyPad Arduino
- Arduino Pro or Pro Mini
- Arduino NG or older
- Arduino Robot Control
- Arduino Robot Motor
- Arduino Gemma
- Adafruit Circuit Playground
- Arduino Yún Mini
- Arduino Industrial 101
- Linino One
- Arduino Uno WiFi

```
}  
void loop()  
  // put yo  
}
```

sketch_oct11a | Arduino 1.8.5

sketch_oct11a

Boards Manager

Type: All

Arduino STM32F4 Boards by Arduino
Boards included in this package:
Arduino Star OTTO.
[Online help](#)
[More info](#)

1.0.1

Arduino/Genuino Uno on COM1

NODE_F446ZE

Your TO DO list

- Get your assembled Hapkit *and* blinking light checked off by end of class time today — if you run into technical problems, finish before beginning of class next Tuesday
- Continue bringing your laptop and power cord to class every day