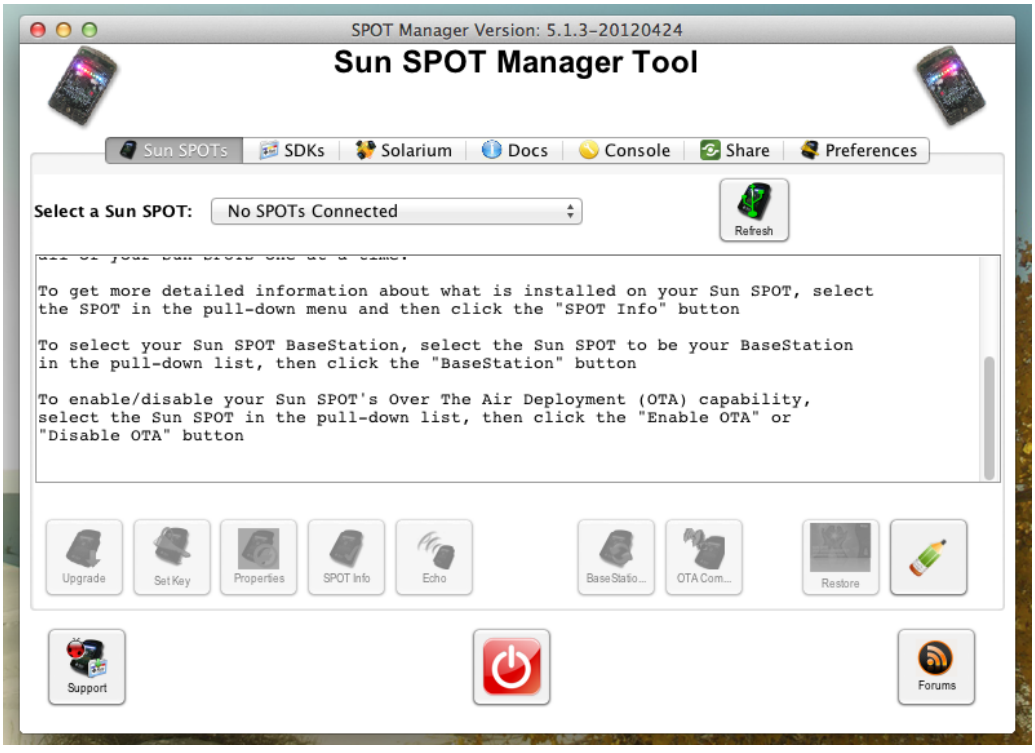
COMP90017 Sensor Networks and Applications
SunSPOT Tutorial 1 - The Bouncing Ball Demo

1 Install & configure software environment

This lab will familiarize you with the process of building a project and deploying it to the SunSPOT. It will also show you how the accelerometer and LEDs work.

Let's install the software environment first:

1. Install JRE 7 and choose a proper package for your operating system, `http://www.oracle.com/technetwork/java/javase/downloads/jre7-downloads-1880261.html`
2. Install the Sun SPOTManager from `http://www.sunspotworld.com/SPOTManager/`. Click on "Install Now" from the website and follow the prompts to install the SPOTManager. Remember that you should install everything it asks you to (ant, Netbeans, SunSPOT modules for NetBeans). After installing it, you will see the following GUI:



3. If you cannot install NetBeans from the Sun SPOTManager, you can download and install it from `https://netbeans.org/downloads/`.

4. Open the Sun SPOTManager on your desktop. Plug in the SunSPOT via USB cable and click the "Refresh" button to see the device. Then, click the "Upgrade" button to update the software on SunSPOT. If you cannot upgrade it, notify a tutor.

Notice: If you are a Mac user, you need to use "Java Web Start" to execute a .jnlp file. It can be located on "/System/Library/CoreServices". In addition, you need to create a directory in "/var/lock" and grant a 777 permission to it. Otherwise, it will always prompt "The port is in use" and your program will not be deployed successfully.

2 Build & deploy application

After you have installed the SunSPOTManager, open up NetBeans and follow the following instructions.

1. Click on open project and locate the BounceDemo-OnSPOT project file. Open it.
2. Right-click on BounceDemo-OnSPOT and select "Clean and Build Project".
3. At the bottom of the screen you will see a bunch of text. It should end with "Build Successful (total time: 11 second)". If you do not see "Build Successful" notify a tutor.
4. Make sure your SPOT is connected to the USB cable.
5. Right-click on BounceDemo-OnSPOT and select "Deploy to Sun SPOT".
6. At the bottom of the screen, you will see a bunch of text. It may say "(please reset SPOT on port COM6)". This means that the program wants you to reset your SPOT. To reset, press the small button on the bottom of the SPOT. If you have done this correctly, you will see more text at the bottom of the screen that will end with the following:

```
Sun SPOT bootloader (red-100104)
SPOT serial number = 0014.4F01.0000.6D61
Using target file name: spotsuite://Sun_Microsystems_Inc/HTTPDemo/1.0.0
Relocating application suite to 0x10900000
About to flash from /Users/hengfengli/Desktop/Demos/TwitterDemo/suite/image
Writing imageapp5348794755745255139.bintemp (3329 bytes) to local SPOT on port /dev/cu.usbmodemfa131
|=========                                                  | 15%
|==================                                         | 30%
|===========================                                | 45%
|====================================                       | 60%
|============================================               | 75%
|=====================================================      | 90%
|============================================================| 100%


Exiting
Experimental:  JNI_OnLoad called.
flashapp:
deploy:
BUILD SUCCESSFUL (total time: 11 seconds)
```

7. Unplug your SPOT from the cable.
8. Reset your SPOT again.
9. The LEDs at the top of your SPOT should light up. At each end you will see red LEDs and there will be a 'moving' LED in the middle.
10. Move your spot from left to right and watch the ball bounce.

11. Remove the 'SunRoof' by pushing gently on the bump at the top of the SunRoof with the tip of your fingernail.
12. Find a partner and explore what happens when you click the switches labeled SW1 and SW2 just under the LEDs.
13. Find another group and see how many SunSPOTs you can pass the bouncing ball between.

Notice: If you meet some issue with ports or you want to use a specific port, please read and modify the "build.properties" file under that project directory.

3 Exercise: write a simple version of bouncing ball

Let's try to write a simple version of bouncing ball:

1. Click on open project in NetBeans and locate the SimpleBounce project file. Open it.
2. Open the source file SimpleBounce.java.
3. Locate to the comment "Exercise: write your logic code here."
4. Then, you can start to write your logic code.

If you complete this exercise quickly, could you think a bit how to improve it? For example, how to make it move smoothly? You can implement your cool idea on SunSPOTs.

4 Eclipse or Ant (Optional)

Some people may prefer to use Eclipse or command lines instead of NetBeans.

4.1 Eclipse

If you choose to use Eclipse to compile and deploy SunSPOT programs, you need to import a project as following steps:

1. Open "File" menu in Eclipse. Click "New">"Java Project".
2. Unclick "use default location" option and choose the project's directory. Then, click "Finish" to import the project directory.
3. Right-click the project "BounceDemo-OnSPOT" in "Package Explorer" and click the "Properties" option.
4. Click "Java Build Path" and after switching to "Libraries" tab, click "Add External JARs..." button, see Figure 1.
5. Add six jar files from the SDK directory "SunSPOT>sdk>lib", including transducer_device.jar, multihop_common.jar, spotlib_device.jar, spotlib_common.jar, ipv6lib_common.jar, squawk_device.jar.
6. Right-click "build.xml" file under the project's directory. Then, click "Run As>Ant Build...".
7. Only click "deploy" option in Targets tab, then run it. (Later, you may need to use other options, like "run" or "host-run".)

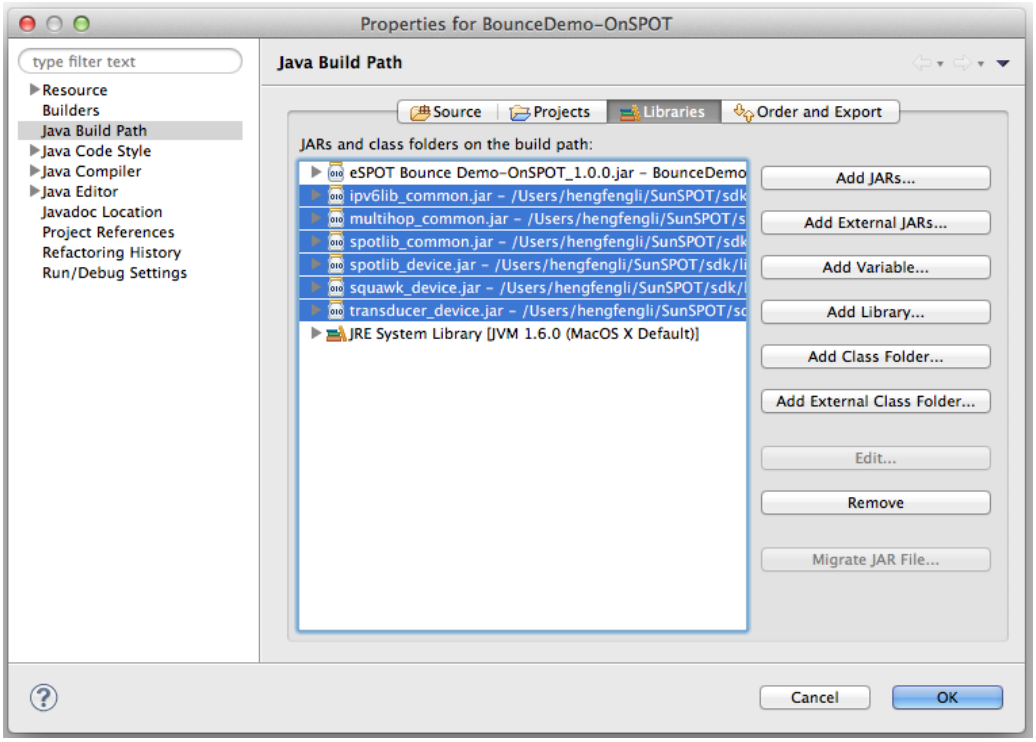


Figure 1: Add external jar files

4.2 Ant

If you choose to use command lines to compile and deploy SunSPOT programs, you need to remember the following commands:

```
# Go to project's directory
cd BounceDemo-OnSPOT/

# Deploy application using ant
ant deploy

# Deploy application using ant with a specific port
ant deploy -Dport=/dev/ttyACM0

# Run the application
ant run

# Run the application with a specific port
ant run -Dport=/dev/ttyACM0
```

If you want to know more commands about how to use Ant to build a SunSPOT program, you can read the "build.xml" file under the project's directory.