Rebuilding Energia for 2013-vintage KickSat Sprites under Linux *[beta]*

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Michael Turner

Project Persephone

1-25-33 Takadanobaba

Shinjuku-ku, Tokyo 169-0075

Japan

turner@projectpersephone.org

+81 90 5203 8682

Overview

Here are some instructions for rebuilding the version of Energia used for writing and downloading code for the 2013-vintage KickSat Sprite. The OS used was Ubuntu.

Zac Manchester, team lead on the KickSat missions, has prepared an education-friendly version of the Sprite and the development kit. Until hardware is available (not at this writing), the following instructions may be the easiest way to get going with programming the Sprite.

Goals

1. Take the reader through the steps required to set up the environment under Linux
2. Rebuild Energia.

Specifications

You'll need a KickSat Sprite development kit (TI MSP430 Launchpad with 2013-vintage Sprite attached through a shield) and a computer able to run Linux, with at least one extra USB port available. You'll need an internet connection, and Linux root privileges. Make sure you have the right kind of USB cable -- look at the plug on the Launchpad board to be sure.

Caveats

KickSat 2 Sprites may or may not work with these instructions.

If you have one of the Sprites made in 2013 by Project Persephone, and you discover a need to solder the components, or to debug the connections, note that your efforts will be complicated by the lack of silk-screening on the Sprite. This was an artifact of problems with a PCB fab operation in Japan. The layout, with silk-screen, can be found in the KickSat repository on github.

Setup Steps

General preparation: the Universe

Start a terminal window. At the shell prompt, type

```
sudo add-apt-repository universe
```

(This is drawn from "[How do I enable the 'Universe' repository](#)?".)

Get your universe up to date

It's better to have fresh copies of all tools. Enter this command:

```
sudo apt-get update
```

If you get a message like "E: Could not get lock …", it's possible your Ubuntu software updater is still running. Wait until it finishes.

Get the Right Java

Energia, which is written in Java, must be rebuilt in a Java development environment. Builds have been successful with JDK 8. Results are not guaranteed for other Java versions. The Oracle version of Java 8 is hard to get now. The OpenJDK version is not.

```
sudo apt install openjdk-8-jre-headless
```

Get the Right MSP430 C Compiler Tools

Texas Instruments, which sells the MSP430 Launchpad, offers a tools package download. Because this tools package involves some legal boilerplate (possibly related to export restrictions on the MSP430), attempts to download from outside the U.S. have been unsuccessful. There are, however, Gnu Project tools that work. Get them:

```
sudo apt-get install gcc-msp430
```

Get the open source debugger for MSP430 development

The debugger seems to be separately bundled:

```
sudo apt-get install mspdebug
```

Get the "Ant" build tool

All of the commands for building and running this version of Energia are issued as arguments to "ant".

```
sudo apt-get install ant
```

Get "git" for fetching the code

The needed code for KickSat 1 Energia lives on github.com. You'll need git to get it.

```
sudo apt-get install git
```

Get the code for Energia

The code for the KickSat 1 version of Energia is archived on one branch. The TI CC430 is a low-power, small-memory variant of the MSP430 with radio frequency support.

```
git clone -b Branch_CC430_RF_support https://github.com/zacmanchester/Energia.git
```

This step will create a directory, "Energia." It can take a while.

Go to the "build" directory

The build directory is where you'll be executing all your ant commands, including building and (if the build is successful) starting KickSat 1 Sprite Energia.

```
cd Energia/build
```

Do a directory listing, "ls" just to see what's there.

Start the build

Enter the command

```
ant build
```

or

```
sudo ant build
```

if "ant build fails.

The problem you may run across here: "Unable to find a javac compiler." Try

```
set JAVA_HOME /usr/bin/
```

Try running Energia

Enter the command

```
 sudo ant run
```

You may see error messages instead of the Energia starting screen. One of these could be a problem with Gnome "assistive technology". The fix may be to comment out one line in a configuration file:

```
 sudo vi /etc/java-8-openjdk/accessibility.properties
```

Depending on your user status and your configuration, there may be a problem with access to the USB ports. If so--

Get the access rules

If it seems you need access to the USB ports, enter the command

wget http://energia.nu/files/71-ti-permissions.rules [Broken?]

wget   https://s3.amazonaws.com/energiaUS/files/71-ti-permissions.rules [?]

See   https://energia.nu/guide/install/linux/ - [test TBD]

Fix the access rules

Again, only if you needed the access rules. Look at the file /etc/udev/rules.d.

You might want to make a backup of it.

Enter the command

```
sudo mv /71-ti-permissions.rules /etc/udev/rules.d/
```

This should reconfigure access to the USB ports.

Restart the relevant service

Again, only if you needed to change the access rules. Enter this command.

```
sudo service udev restart
```

This should fix any problems with access to the USB ports. Note that a reboot should have the same effect.

Try running Energia

Enter this command. *[TBD - sudo unnecessary with access rules gotten?]*

```
sudo ant run
```

You should see something like this: [screencapture TBD]

You'll need to make sure of serial port settings and the like, but for that, see the instructions under the subheading "Your First Sprite Program" at the KickSat Sprite "Getting Started" page.