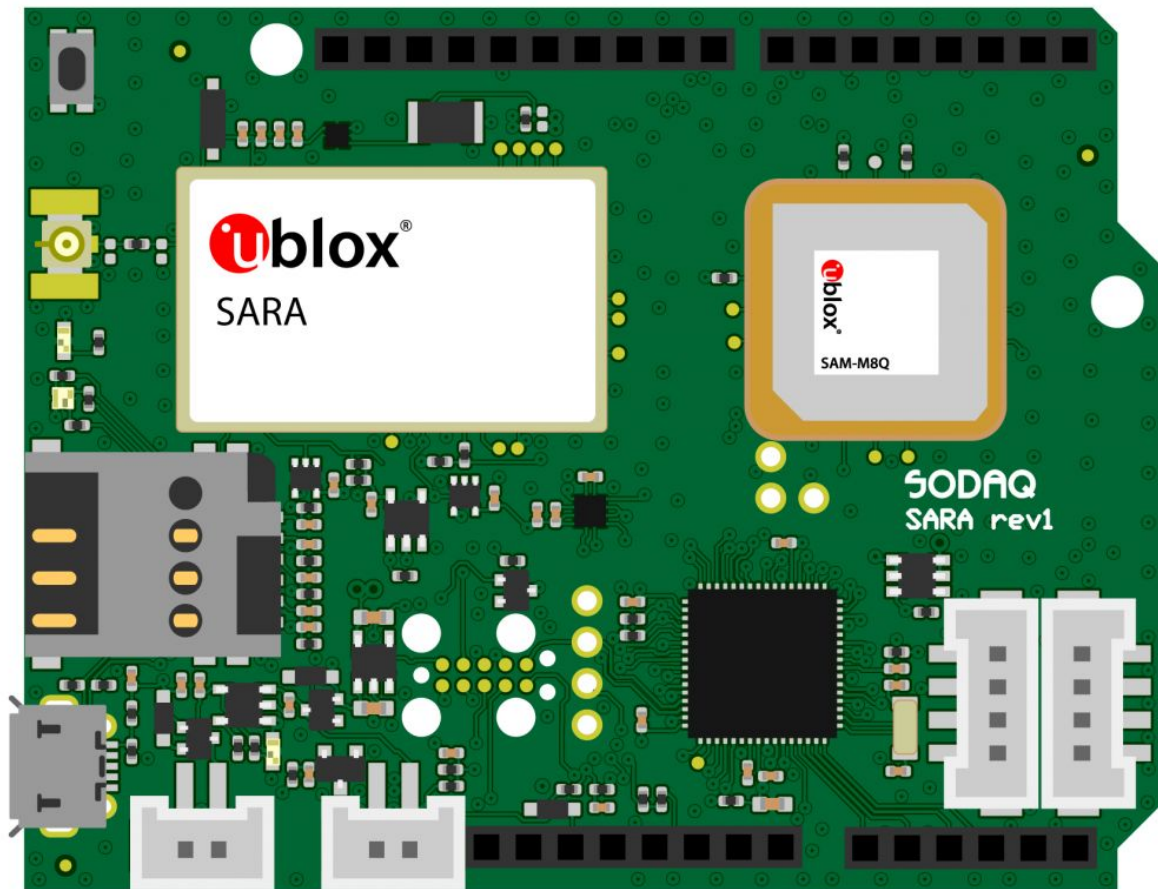


Hands-on

Workshop May 16th 2019

SODAQ

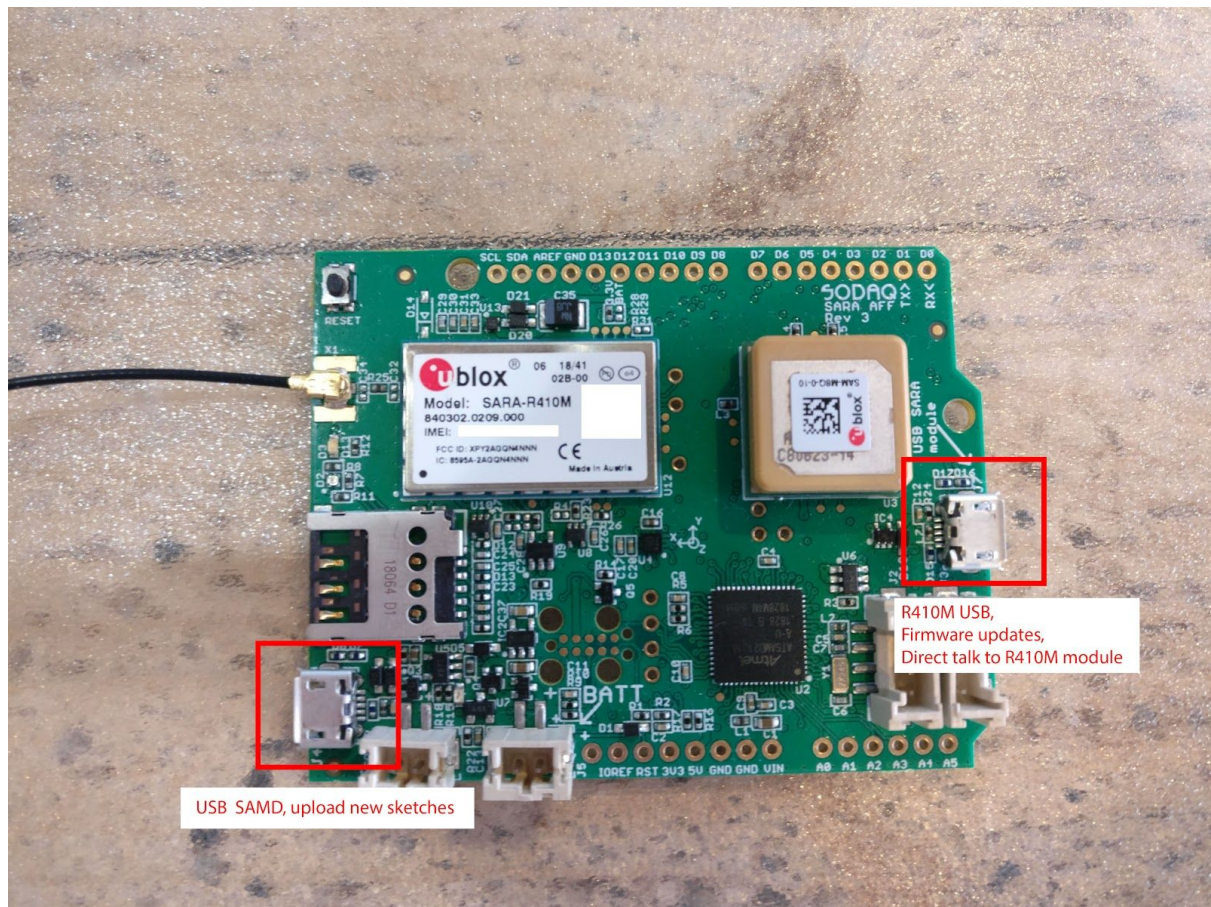


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Unboxing

- SODAQ SARA AFF R410M
- Vodafone NB-IoT SIM
- Vodafone LTE-M SIM
- Micro USB cable
- Battery



Preparations

Before we can start with the fun stuff we need to install boardfiles with the required drivers.

Arduino IDE

Make sure you have the latest [Arduino IDE](https://www.arduino.cc/en/Main/Software).
<https://www.arduino.cc/en/Main/Software>

For Windows we recommend the installer.

When your Arduino IDE is installed, it might be necessary to restart your computer. In some cases, if you don't restart your computer, the IDE will not launch.

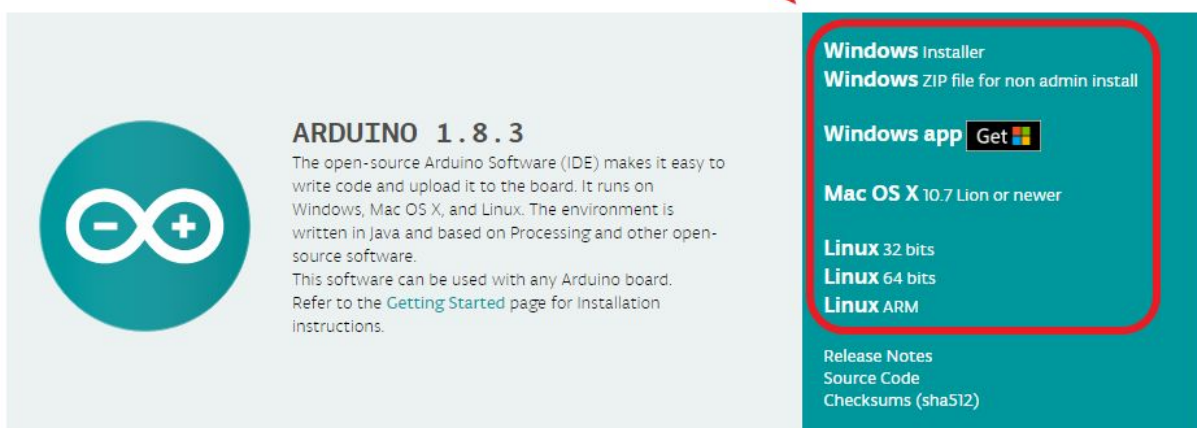
Access the Online IDE



The screenshot shows the Arduino Web Editor interface. On the left is the Arduino logo (an infinity symbol with a minus and plus sign). To its right, the text reads: **ARDUINO WEB EDITOR**, followed by a paragraph: "Start coding online with the [Arduino Web Editor](#), save your sketches in the cloud, and always have the most up-to-date version of the IDE, including all the contributed libraries and support for new Arduino boards. The Arduino Web Editor is one of the [Arduino Create platform's](#) tools." Below this is a link: "Try It Now Getting Started". To the right of the text is a small window showing a code editor with the following code:

```
void setup () {  
  }  
  
void loop () {  
  }
```

Download the Arduino IDE

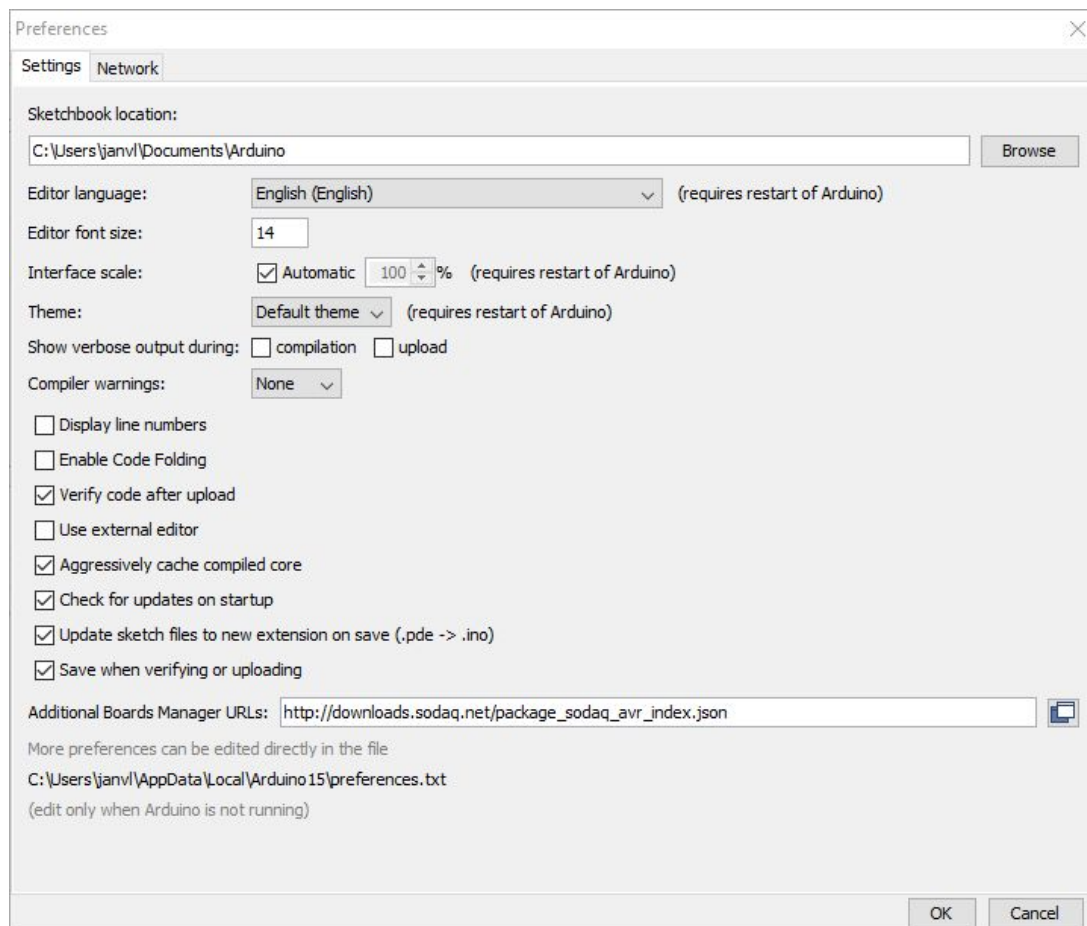


The screenshot shows the Arduino 1.8.3 download page. On the left is the Arduino logo. To its right, the text reads: **ARDUINO 1.8.3**, followed by a paragraph: "The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. Refer to the [Getting Started](#) page for installation instructions." To the right of the text is a list of download options: **Windows** Installer, **Windows** ZIP file for non admin install, **Windows app** (with a "Get" button), **Mac OS X** 10.7 Lion or newer, **Linux** 32 bits, **Linux** 64 bits, and **Linux** ARM. Below these options are links for "Release Notes", "Source Code", and "Checksums (sha512)". A red arrow points from the "Try It Now Getting Started" link in the previous screenshot to the "Windows Installer" option in this screenshot.

Board files

When your IDE is all started, we should add the URL before we can install the libraries. Click on File > Preferences and at the bottom you should see 'Additional Boards Manager URLs'. This is where you need to paste the following URL:

http://downloads.sodaq.net/package_sodaq_samd_index.json



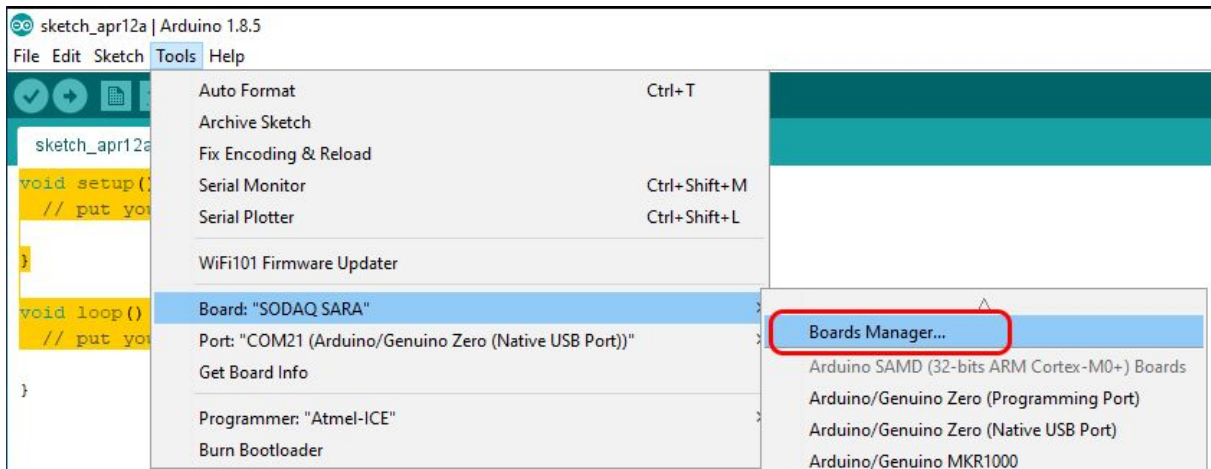
Installation

Click on Tools > Board:... > Boards Manager...

Search for SODAQ.

Click on a board collection, an install button will appear.

Install the latest version of your selected board collection.



Select Board and Port

Everytime you want to upload a sketch to the board, check if the board and port are correct.

Select your board from the menu:

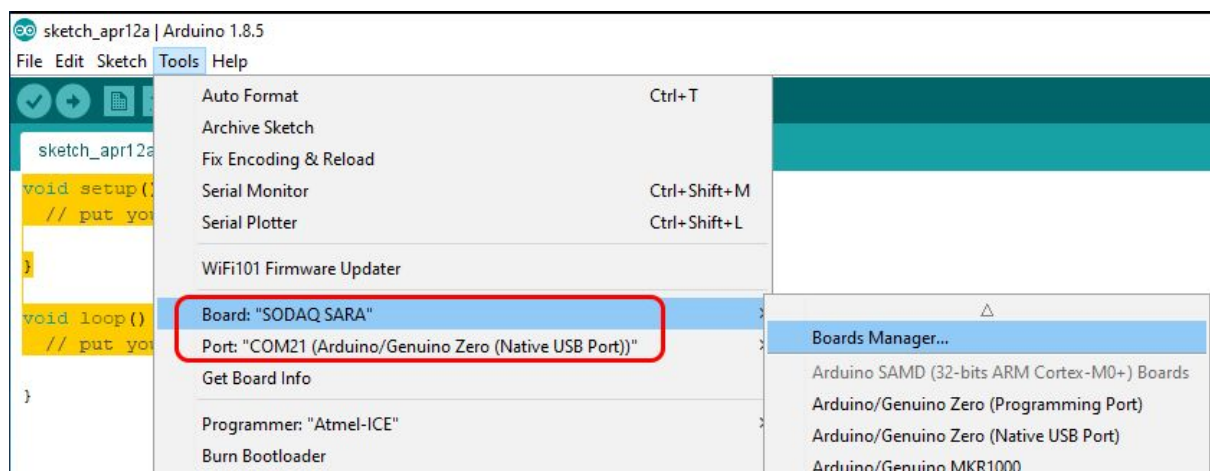
Click on Tools > Board:... > your board

Connect your board to your computer.

Select the com port of your device.

Select the "SODAQ SARA" as your board.

For the port: select the "SODAQ SARA", it can be that the name behind the COM number is incorrect, the Arduino IDE shows the first board name with the SAMD21 in the list. When you also have the Arduino Zero board installed the name most likely is "Arduino Zero".



AT Commands

Your device is preloaded with the **Maker Software**.

One of the features is that it has a build-in command mode. In the command mode you can send all AT commands supported by the module.

If you in a later stage erase this sketch, you can download and reinstall from

<http://handouts.sodaq.com/>

We made a list with the basic AT commands:

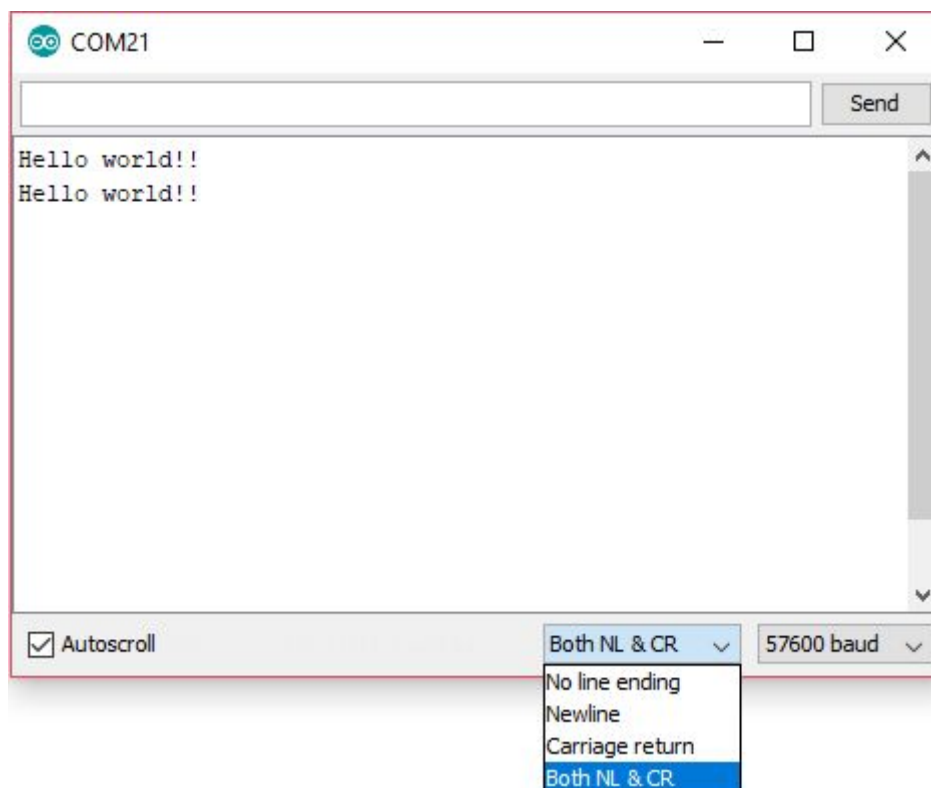
http://learn.sodaq.com/Boards/Sara_AFF/Examples/passthrough/#vodafone-nl-nb-iot

You can find all AT commands here:

https://www.u-blox.com/sites/default/files/SARA-R4-SARA-N4_ATCommands_%28UBX-17003787%29.pdf

For most applications we need to enable “Both NL & CR”.

Or send the commands new line and carriage return manually.



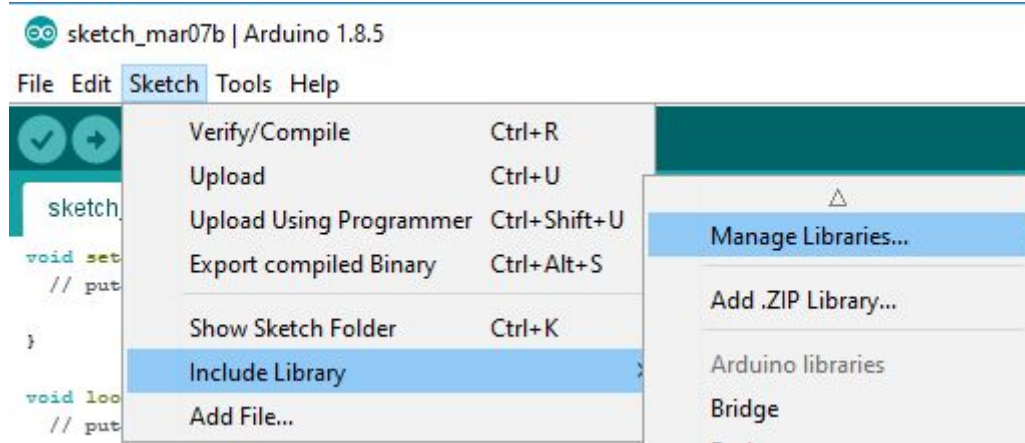
Libraries

Libraries make our life easier.

Most libraries we make available open source, you can view the code in GitHub. The installation can be done through the Arduino IDE Library manager.

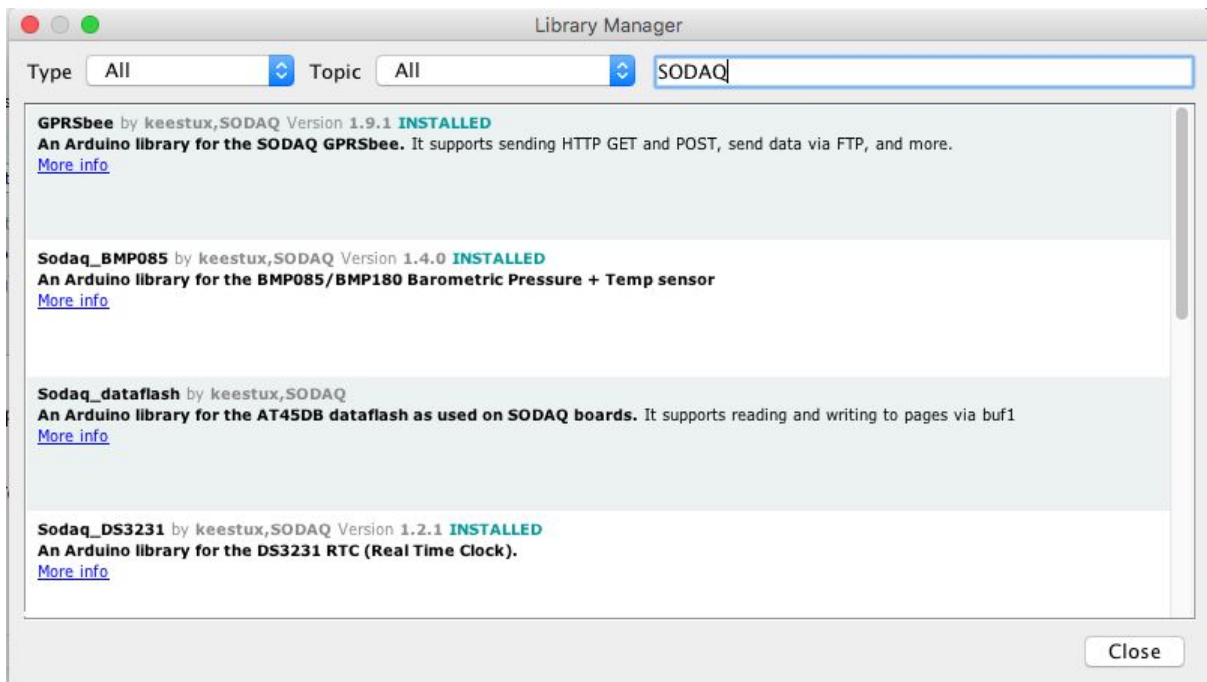
Install libraries

Go to “Sketch” → “Include Library” → “Manage Libraries...”



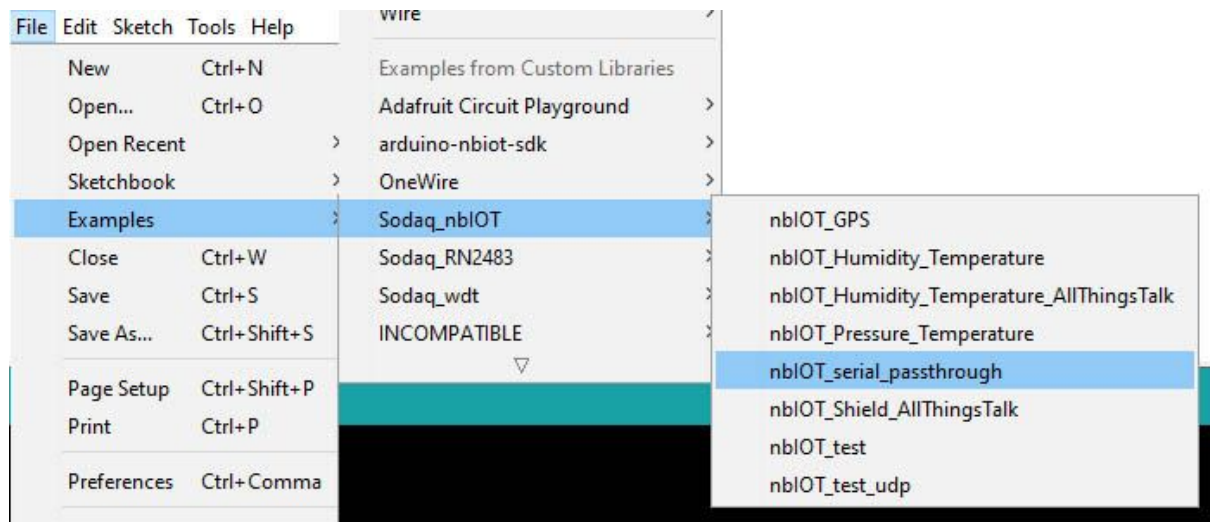
Install the following libraries:

- Sodaq_wdt
- Sodaq_R4X
- Sodaq_Ublox_GPS
- Sodaq_LSM303AGR



In most libraries you can find some examples.

In the Arduino IDE go to File > Examples > Sodaq_xxxx > example



All Things Talk

Create an account on <https://maker.allthingstalk.com/>

The device comes pre-loaded with the AllThingsTalk maker software.

This software will upload the temperature and gps, when enabled, to AllThingsTalk.

With the code on the sticker you can claim your device on AllThingsTalk.

Click on the button “New Device”

Type in your activation code, press the find button and confirm to claim your device.

Your devices already had the unique ATT Token inside, on the sticker it's called deviceId.

You only need this when in a later stage you override this software and want to again use it.

When your device is turned on, you should see data in your account.

Simple examples

We start with some simple example to show you where to find

LED

The SODAQ SARA AFF has two leds.

One Blue LED connected to pin 13 and a RGB LED with 3 control pins.

The following sketch will make the switch on and off the LEDs

```
#include "Arduino.h"
```

```
void setup() {  
  pinMode(LED_BUILTIN, OUTPUT);  
  pinMode(LED_BLUE, OUTPUT);  
}
```

```
void loop() {  
  digitalWrite(LED_BUILTIN, HIGH); // ON  
  digitalWrite(LED_BLUE, HIGH); // OFF  
  delay(500);  
  digitalWrite(LED_BUILTIN, LOW); // OFF  
  digitalWrite(LED_BLUE, LOW); // ON  
  delay(500);  
}
```

More LED examples sketches can be found here:

http://learn.sodaq.com/Boards/Sara_AFF/Examples/rgb_led/

GPS

Maybe skip this part since we are in the basement.

In the basement we will not get a GPS Fix. Later we will use a full tracker sketch.

In the library there is an example sketch which tries to get a GPS fix and have various delays.

File → Examples → Sodalq_Ublox_GPS → test_ublox_gps

Magnetometer

Inside the Sodalq_LSM303AGR library there is an example to read out the magnetometer.

File → Examples → Sodalq_LSM303AGR → mag_int

Upload the sketch and play with the board to see when the interrupt triggers.

Temperature

The SODAQ SARA AFF has an temperature sensor inside the Accelerometer.
On the following page we provide a tutorial about how to send the Temperature value to AllThingsTalk.

http://learn.sodaq.com/Boards/Sara_AFF/Examples/udp_att_temperature/

Tracker

Like the Maker software, the tracker code has AllThingsTalk prefix already built in. On this page you can find how to connect it to ATT or an other dashboard. Connect it to the dashboard you like.

http://learn.sodaq.com/Boards/Sara_AFF/Examples/universal_tracker/