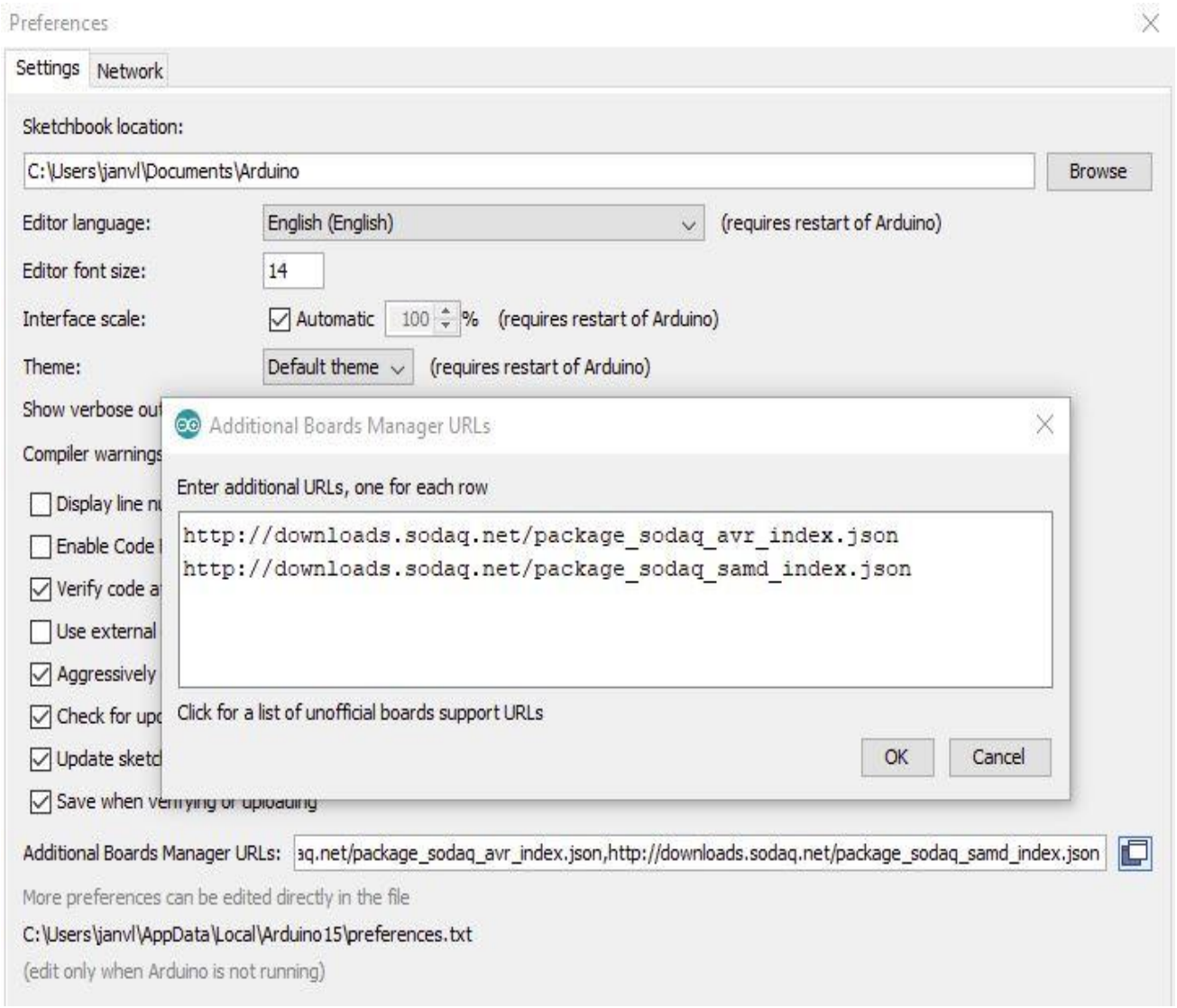
Procedure and code to connect the SARA-n211 module to the network

1. Arduino IDE – Setup your NB-IoT Module

- Need Latest Arduino IDE
- Add the following URLbefore installing the required libraries: 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_avr_index.json
  http://downloads.sodaq.net/package_sodaq_samd_index.json



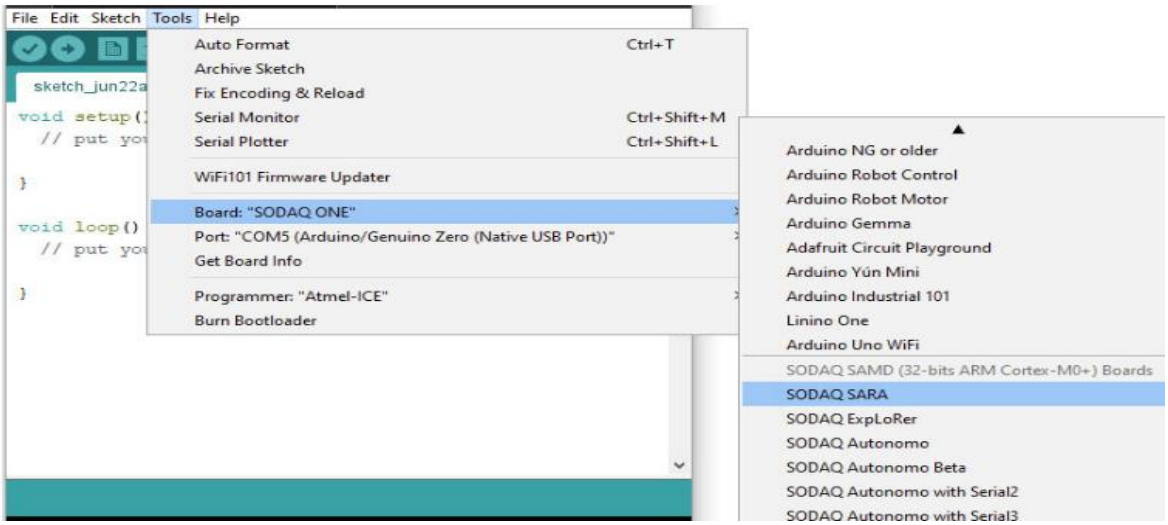
2. Installation

- **Board**

Click on Tools > Board:⋯ > Boards Manager⋯

Search for SODAQ.

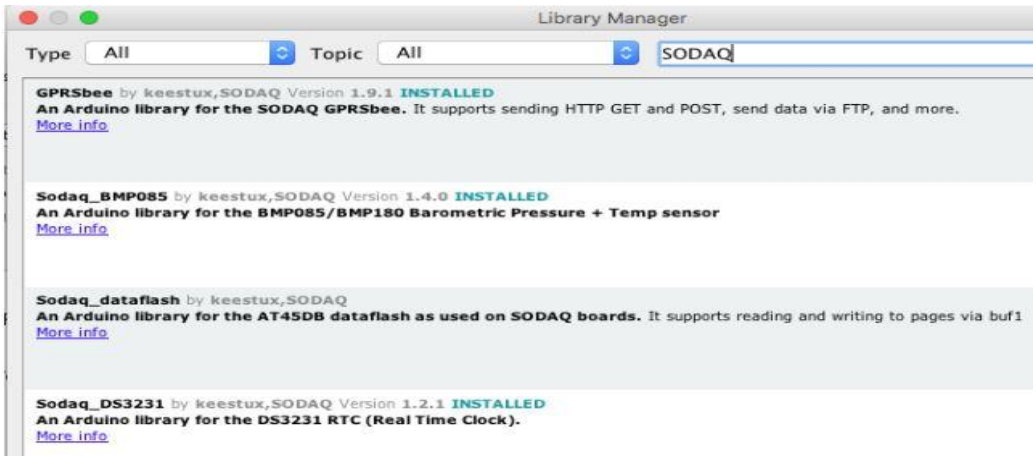
(Click on a board collection, an install button will appear. Install the latest version of your selected board collection.)



- **Library**

Click on Sketch > Include Libraries > Manage Libraries⋯

Search for SODAQ and nb_IoT



Code to connect NB-IoT SARA n211 (Give manually AT commands)
(For Demo)

```
#include <Arduino.h>

#if defined(ARDUINO_SODAQ_SARA)
/* SODAQ SARA */
#define DEBUG_STREAM SerialUSB
#define MODEM_STREAM Serial1
#define powerPin SARA_ENABLE
#define enablePin SARA_TX_ENABLE

#else
#error "Please select the SODAQ SARA as your board"
#endif

unsigned long baud = 9600;

void setup()
{
#ifdef powerPin
  // Turn the nb-iot module on
  pinMode(powerPin, OUTPUT);
  digitalWrite(powerPin, HIGH);
#endif

#ifdef enablePin
  // Set state to active
  pinMode(enablePin, OUTPUT);
  digitalWrite(enablePin, HIGH);
#endif // enablePin

  // Start communication
  DEBUG_STREAM.begin(baud);
  MODEM_STREAM.begin(baud);
}

// Forward every message to the other serial
void loop()
{
  while (DEBUG_STREAM.available())
  {
    MODEM_STREAM.write(DEBUG_STREAM.read());
  }

  while (MODEM_STREAM.available())
  {
    DEBUG_STREAM.write(MODEM_STREAM.read());
  }
}}
```

Code II

(For field test- Don’t have to give AT command manually)

```
#include <Arduino.h>

#if defined(ARDUINO_SODAQ_SARA)

/* SODAQ SARA */

#define DEBUG_STREAM SerialUSB

#define MODEM_STREAM Serial1

#define powerPin SARA_ENABLE

#define enablePin SARA_TX_ENABLE

#else

#error "Please select the SODAQ SARA as your board"

#endif

String csq_response = "";

String csq_data = "";

unsigned long baud = 9600;

void setup()

{

#ifdef powerPin

 // Turn the nb-iot module on

 pinMode(powerPin, OUTPUT);

 digitalWrite(powerPin, HIGH);

#endif


#ifdef enablePin

 // Set state to active

 pinMode(enablePin, OUTPUT);

 digitalWrite(enablePin, HIGH);

#endif // enablePin


 // Start communication

 DEBUG_STREAM.begin(baud);

 MODEM_STREAM.begin(baud);

}
```

```
int incomingByte = 0;

// Forward every message to the other serial

void loop()

{

   DEBUG_STREAM.write("writing AT command...");

   DEBUG_STREAM.write("\n");

   MODEM_STREAM.write("AT+NRB\r");

   delay(7000);

   while(MODEM_STREAM.available())

   {

     DEBUG_STREAM.write(MODEM_STREAM.read());

   }

   MODEM_STREAM.write("AT+NCONFIG=\"CR_0354_0338_SCRAMBLING\",\"TRUE\"\r");

   delay(7000);

   while(MODEM_STREAM.available())

   {

     DEBUG_STREAM.write(MODEM_STREAM.read());

   }

   MODEM_STREAM.write("AT+NCONFIG=\"CR_0859_SI_AVOID\",\"FALSE\"\r");

   delay(7000);

   while(MODEM_STREAM.available())

   {

     DEBUG_STREAM.write(MODEM_STREAM.read());

   }


   MODEM_STREAM.write("AT+CFUN=1\r");

   delay(7000);

   while(MODEM_STREAM.available())

   {

     DEBUG_STREAM.write(MODEM_STREAM.read());

   }

  MODEM_STREAM.write("AT+CGDCONT=1,\"IP\",\"company.iot.dk1.tdc\"\r");

   delay(8000);
```

```
 while(MODEM_STREAM.available())
 {
  DEBUG_STREAM.write(MODEM_STREAM.read());
 }
MODEM_STREAM.write("AT+NBAND=20\r");
 delay(5000);
 while(MODEM_STREAM.available())
 {
  DEBUG_STREAM.write(MODEM_STREAM.read());
 }
MODEM_STREAM.write("AT+COPS=1,2,\"23801\"\r");
 delay(7000);
 while(MODEM_STREAM.available())
 {
  DEBUG_STREAM.write(MODEM_STREAM.read());
 }
MODEM_STREAM.write("AT+NUESTATS\r");
 delay(8000);
 while(MODEM_STREAM.available())
{
  DEBUG_STREAM.write(MODEM_STREAM.read());
 }
MODEM_STREAM.write("AT+CPSMS=1\r");
 delay(7000);
 while(MODEM_STREAM.available())
 {
  DEBUG_STREAM.write(MODEM_STREAM.read());
 }
 MODEM_STREAM.write("AT+CEREG?\r");
 delay(8000);
 while(MODEM_STREAM.available())
 {
  DEBUG_STREAM.write(MODEM_STREAM.read());
```

```
  }
  MODEM_STREAM.write("AT+NPING=\"8.8.8.8\"\r");
  delay(8000);
  while(MODEM_STREAM.available())
  {
   DEBUG_STREAM.write(MODEM_STREAM.read());
  }
  MODEM_STREAM.write("AT+CSQ\r");
  delay(10000);
  DEBUG_STREAM.flush();
  delay(5000);
while(MODEM_STREAM.available())
  {
   csq_response = MODEM_STREAM.readString();
DEBUG_STREAM.println(csq_response);
  }
  DEBUG_STREAM.flush();
 ////////////////////// CSQ extract string ///////////////////////
  uint8_t index = 0;
   while(index<csq_response.length())
  {
 while(csq_response.charAt(index)!='C') {
     index++;
   }
   csq_data = csq_response.substring(index+5, index+10); // Extract the CSQ number from response
   break;
  }
  //DEBUG_STREAM.print("sub-string CSQ:");
  //DEBUG_STREAM.println(csq_data);
  delay(1000);
  String at_nsot_append = "{\"accessToken\":\"d_sk_9IuyXyIlsN8ZZi1bdnYqRkfe\",\"name\":\"CSQ-03\",\"data\":\"" + csq_data + "\"}";
  DEBUG_STREAM.println(at_nsot_append);
   index=0;
```

```
  String at_nsot_append_hex = "";

  while(index < at_nsot_append.length())

  {

    at_nsot_append_hex += String(int(at_nsot_append.charAt(index)), HEX);

    index++;

  }



  String at_nsot_cmd_len = String(int((at_nsot_append_hex.length() + 24)/2.0));

  String at_nsot_cmd = "AT+NSOST=0,\"52.17.209.228\",5683," + at_nsot_cmd_len +",\"40020000b66576656e7473ff" + at_nsot_append_hex
+ "\"\r";

  DEBUG_STREAM.println(at_nsot_cmd);

   ////////////////////// End of CSQ string extract ////////////////////

  delay(5000);

  MODEM_STREAM.write("AT+CGATT?\r");

  delay(5000);

  while(MODEM_STREAM.available())

  {

    DEBUG_STREAM.write(MODEM_STREAM.read());

  }

   MODEM_STREAM.write("AT+NSOCR=\"DGRAM\",17,42000,1\r");

  delay(10000);

  while(MODEM_STREAM.available())

  {

    DEBUG_STREAM.write(MODEM_STREAM.read());

  }

 MODEM_STREAM.print(at_nsot_cmd);

  delay(7000);

  while(MODEM_STREAM.available())

  {

    DEBUG_STREAM.write(MODEM_STREAM.read());

  }

 delay(300000);

}
```

Student 1

Device secret Key: **d_sk_17AIg4blFi1Hi17HzU9BqQfP**

Student 2

Device secret Key: **d_sk_NmfLjw5AwG8bgdIuGPMN2zD7**

Student 3

Device secret Key: **d_sk_aTHupvunYVJg1NBbj5WC0j5A**

***Note: Replace device secret key in the code with your device key.