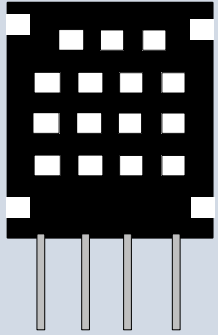


<https://www.halvorsen.blog>



Arduino and AM2320

AM2320 Temperature and Humidity Sensor

Hans-Petter Halvorsen

Contents

- Introduction
- Introduction to Arduino
- Overview of the AM2320
Temperature and Humidity Sensor
- Arduino Examples
 - Read Temperature and Humidity Data
from AM2320 Sensor



Introduction

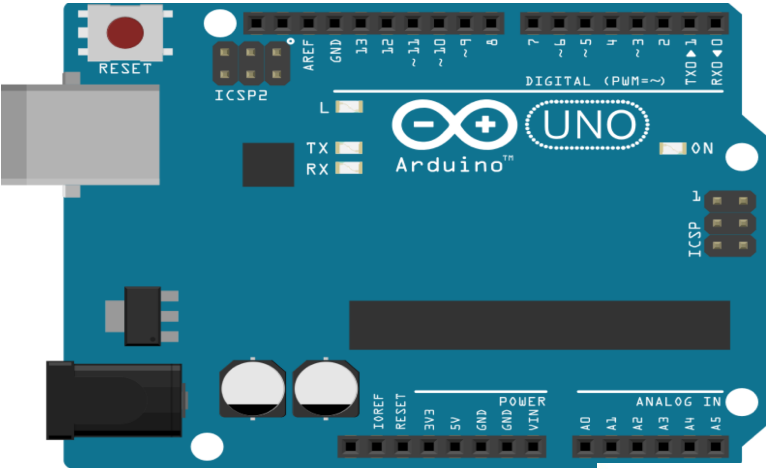
Hans-Petter Halvorsen

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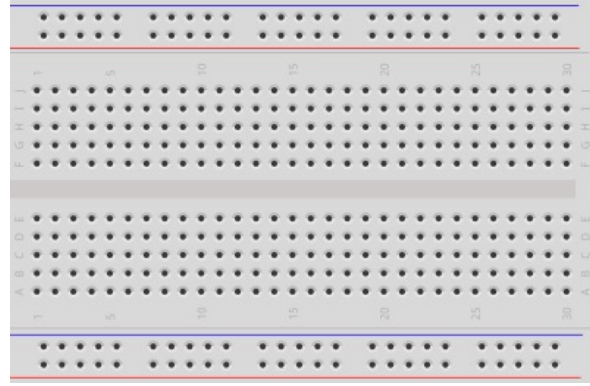
Introduction

- We will use an **AM2320** Temperature and Humidity Sensor
- The Sensor has so-called **I2C** Interface
- We will use **Arduino UNO** Hardware and the Arduino IDE Software
- We will create different Arduino Examples where we read Temperature Values and Humidity Values from the Sensor

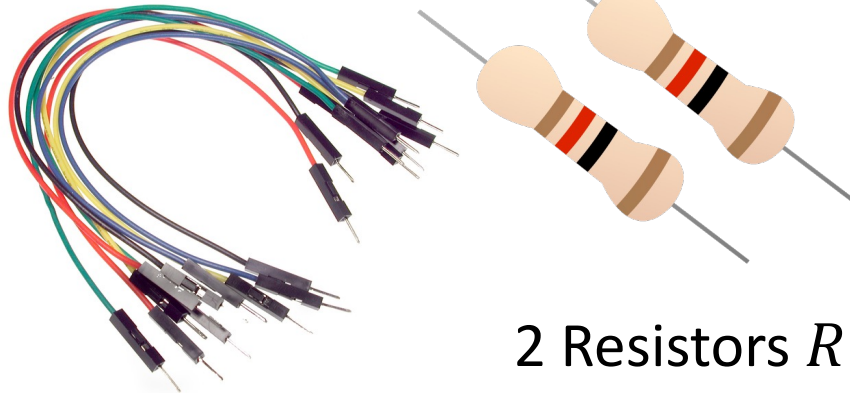
Hardware



Arduino UNO

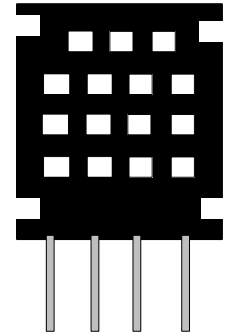


Breadboard



Wires

2 Resistors $R = 10\text{k}\Omega$



AM2320

AM2320 Temperature and Humidity Sensor



<https://www.adafruit.com/product/3721>

Software



Arduino IDE: <https://www.arduino.cc/>



Arduino

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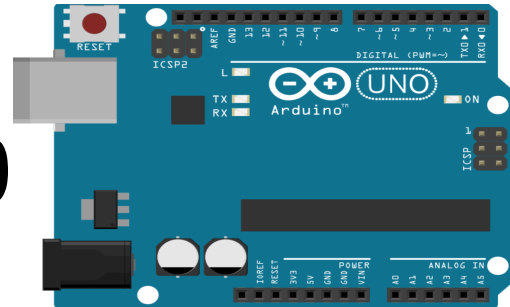
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Arduino

- Arduino is an open-source electronics platform based on easy-to-use hardware and software.
- It's intended for anyone making interactive projects, from kids to grown-ups.
- You can connect different Sensors, like Temperature, etc.
- It is used a lots in Internet of Things (IoT) projects
- Homepage:
<https://www.arduino.cc>

Arduino

- Arduino is a Microcontroller
- Arduino is an open-source platform with Input/Output Pins (Digital In/Out, Analog In and PWM)
- Price about \$20
- Arduino Starter Kit ~\$40-80
with Cables, Wires, Resistors, Sensors, etc.



Arduino UNO

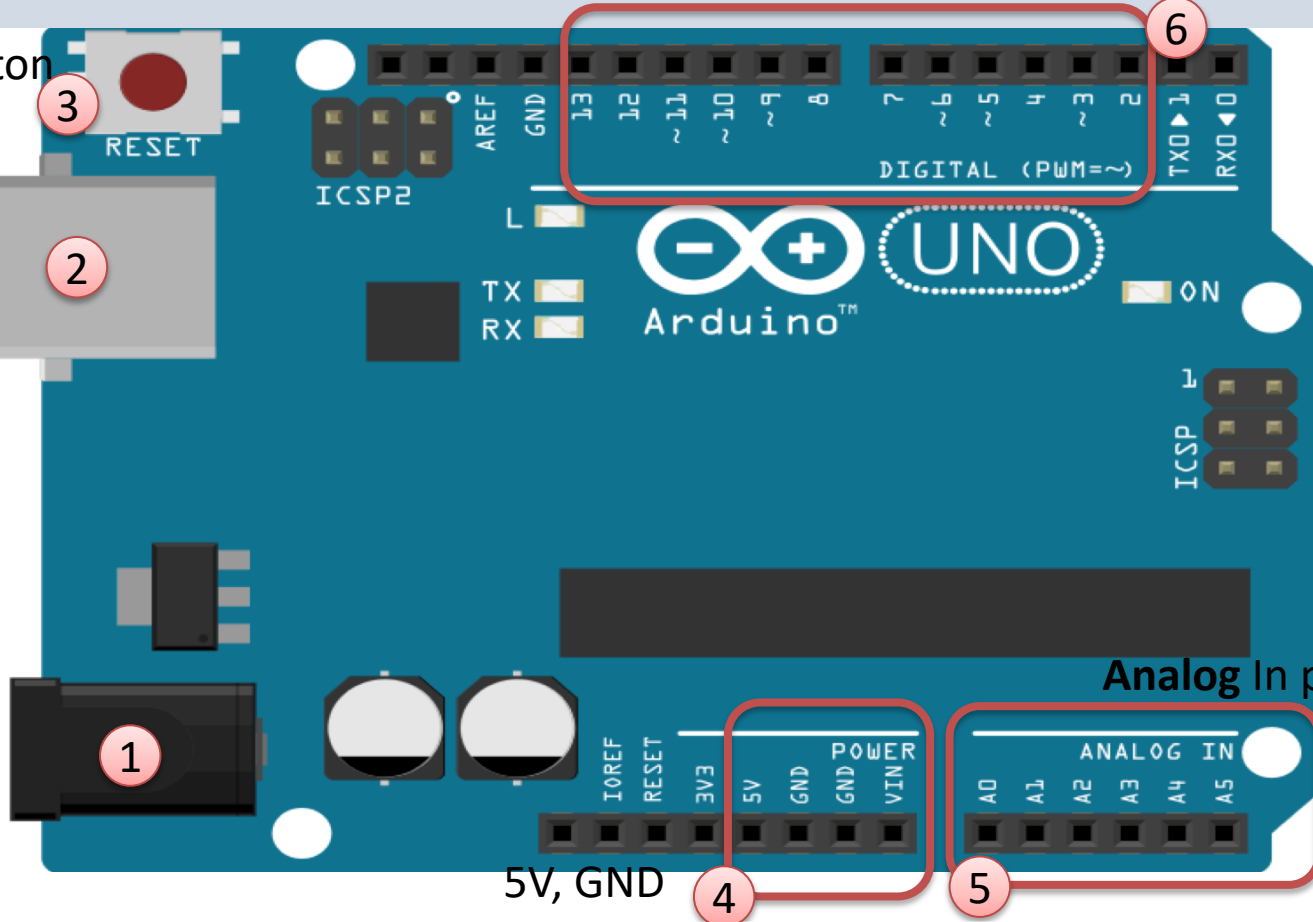
Digital ports (2-13)

Reset button

USB for PC
connection



External Power
Supply



5V, GND

Analog In ports (0-5)



AM2320

Temperature and Humidity Sensor

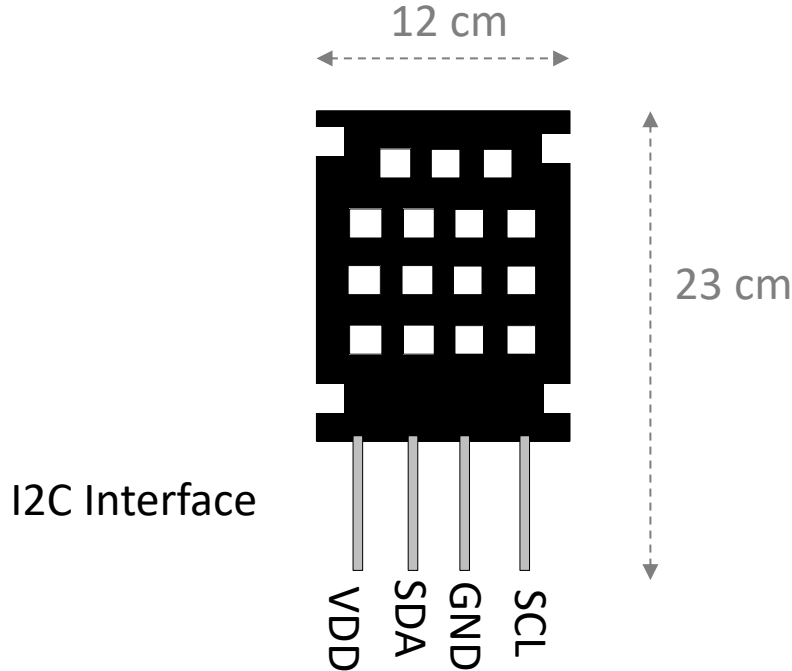
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AM2320

- Temperature and Humidity Sensor
- I2C Interface
- Accuracy: Humidity $\pm 3\%RH$ and Temperature $\pm 0.5^{\circ}C$ according to the Datasheet
- I2C address: 0x5C
- Price: about \$4
- <https://learn.adafruit.com/adafruit-am2320-temperature-humidity-i2c-sensor>
- https://www.elfadistelec.no/Web/Downloads/t/ds/Adafruit%203721_eng_tds.pdf

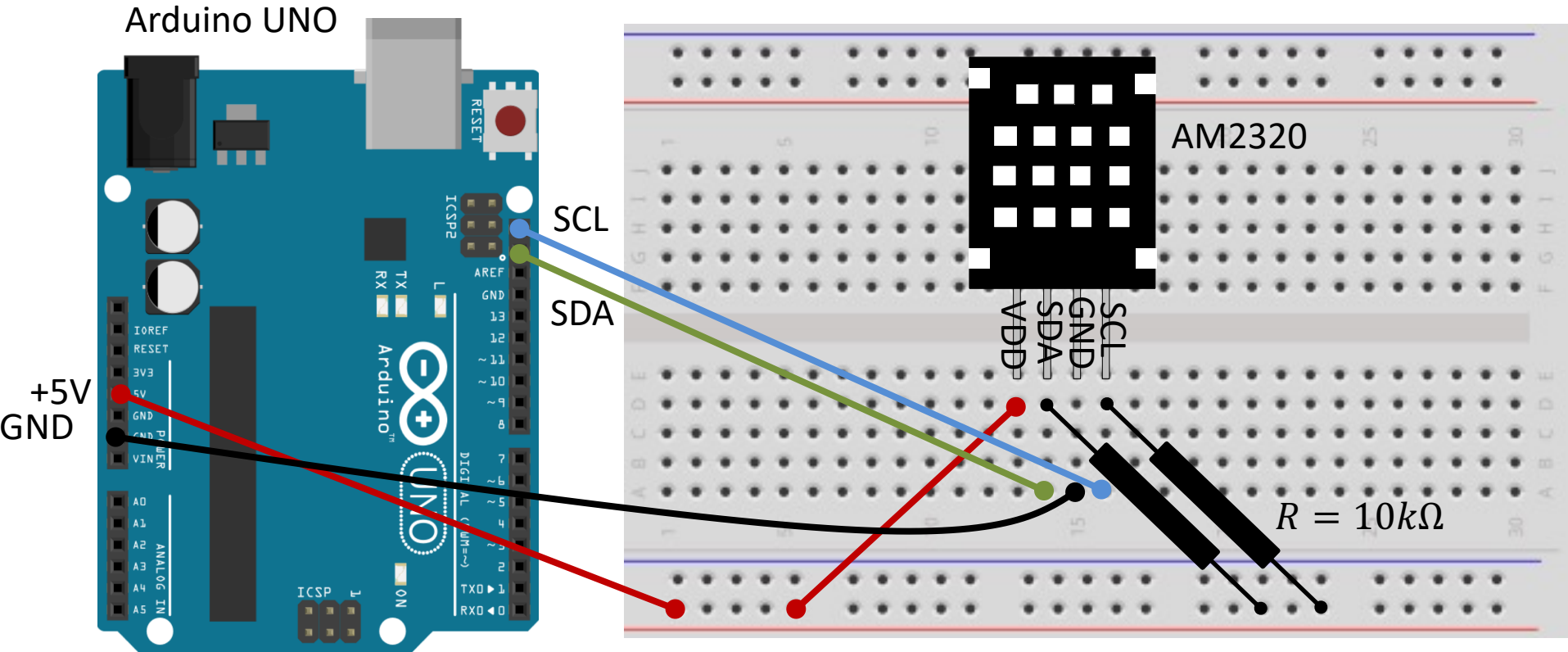
AM2320



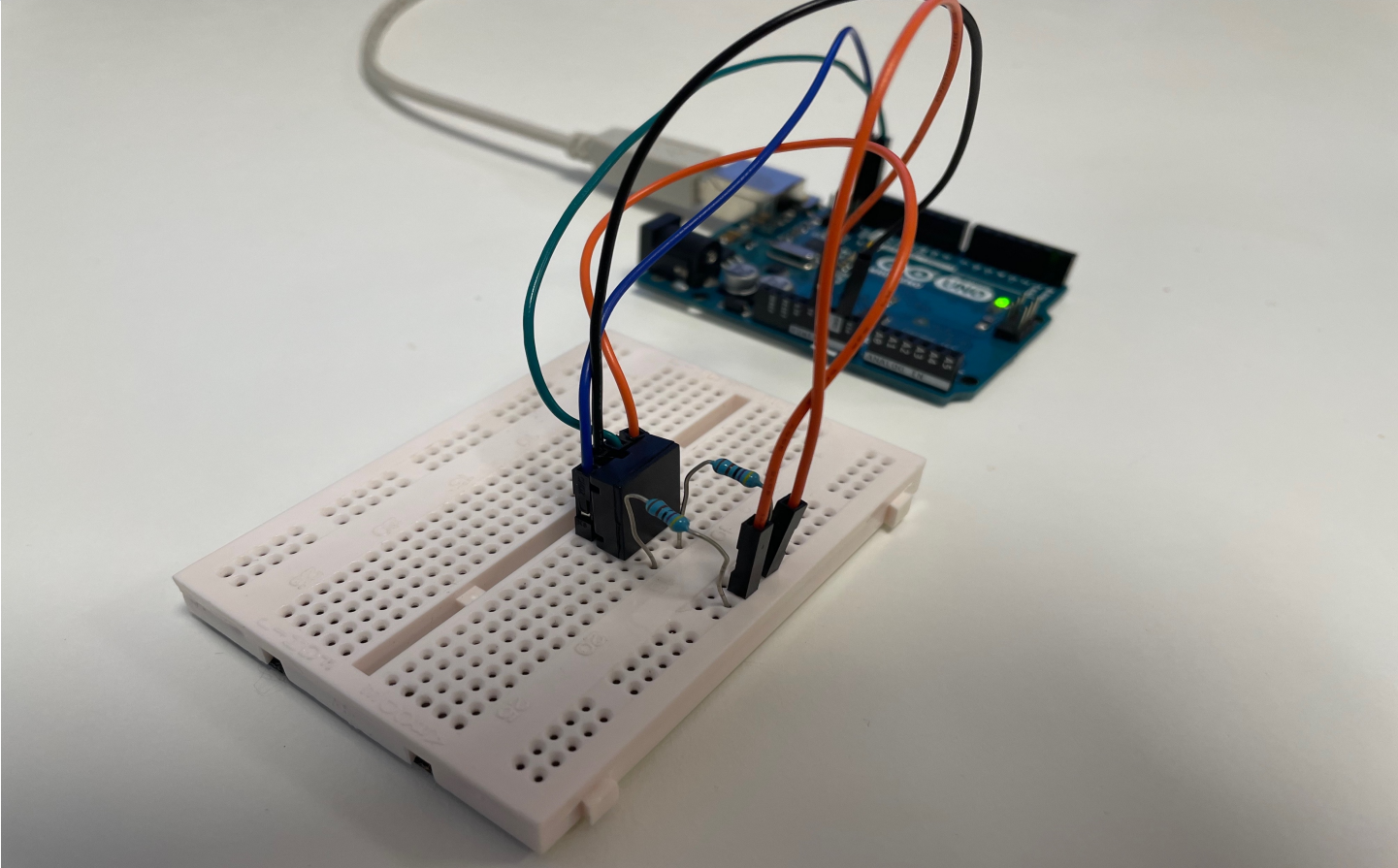
Pin Overview:

- **VDD** – Power, 3-5VDC
- **SDA** - I2C data in/out, requires a pullup resistor of 2-10K Ω to VDD
- **GND** - Ground
- **SCL** - I2C clock in, requires a pullup resistor of 2-10K Ω to VDD

AM2320 Wiring



AM2320 Physical Wiring





Arduino Examples

Hans-Petter Halvorsen

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Arduino Libraries

You may want to use the following premade Arduino Libraries:

- Adafruit Unified Sensor
- Adafruit AM2320 Sensor Library

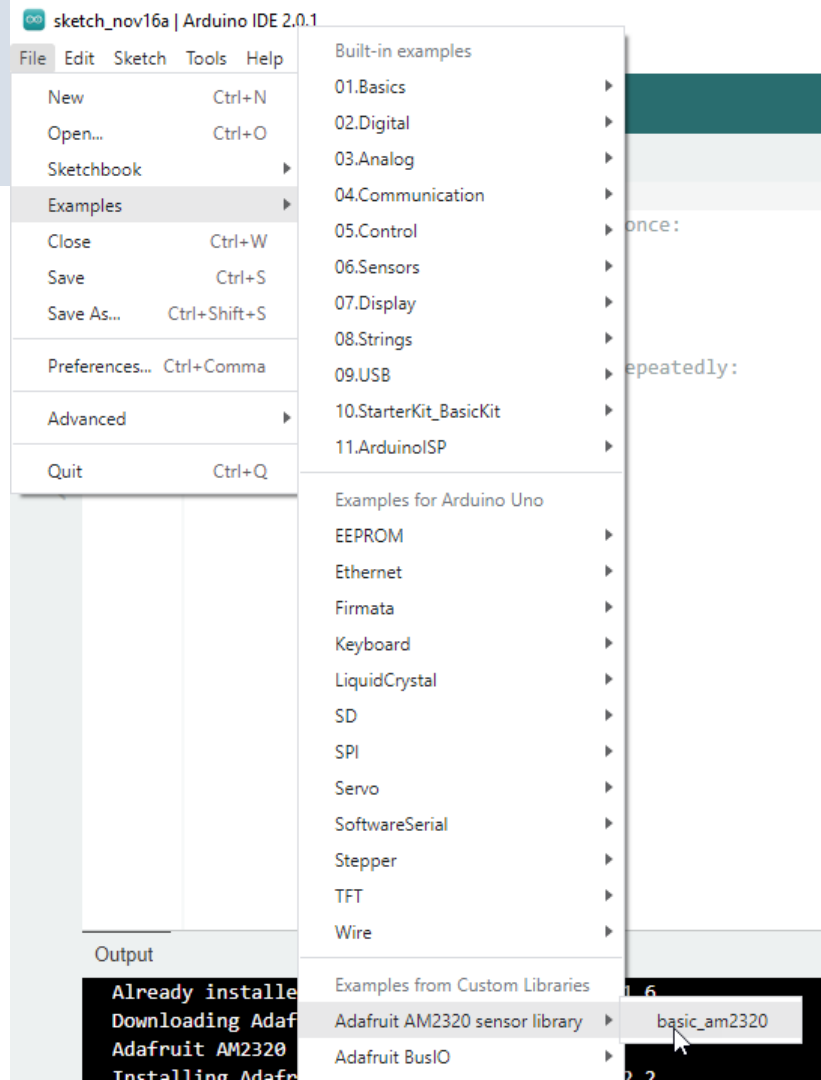
Arduino Library Manager

The screenshot displays the Arduino IDE interface. The top menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu is a toolbar with icons for checking, running, and uploading code, along with a dropdown menu currently set to 'Arduino Uno'. The main workspace is divided into three panels. The left panel, titled 'LIBRARY MANAGER', shows search results for 'AM2320'. It lists three libraries: 'Adafruit AM2320 sensor library by Adafruit' (version 1.2.2), 'AM2320_asukiaaaa by Asuki Kono' (version 1.1.4), and 'AM232X by Rob Tillaart' (version 0.4.4). Each entry includes a brief description and an 'INSTALL' button. The right panel shows a code editor for 'sketch_nov16a.ino' with the following code:

```
1 void setup() {  
2   // put your setup code here, to run once:  
3 }  
4  
5  
6 void loop() {  
7   // put your main code here, to run repeatedly:  
8 }  
9  
10
```

The bottom panel is labeled 'Output' and is currently empty. The status bar at the very bottom indicates 'Ln 1, Col 1, UTF-8' and 'Arduino Uno on COM6'.

Built-in Example





Arduino Code Examples

Read Humidity and Temperature Data

Hans-Petter Halvorsen

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Temperature

`readTemperature();`

```
#include "Adafruit_Sensor.h"
#include "Adafruit_AM2320.h"
```

```
Adafruit_AM2320 am2320 = Adafruit_AM2320();
```

```
void setup()
```

```
{
```

```
  Serial.begin(9600);
```

```
  while (!Serial)
```

```
  {
```

```
    delay(10);
```

```
  }
```

```
  Serial.println("Adafruit AM2320 Basic Test");
```

```
  am2320.begin();
```

```
}
```

```
void loop()
```

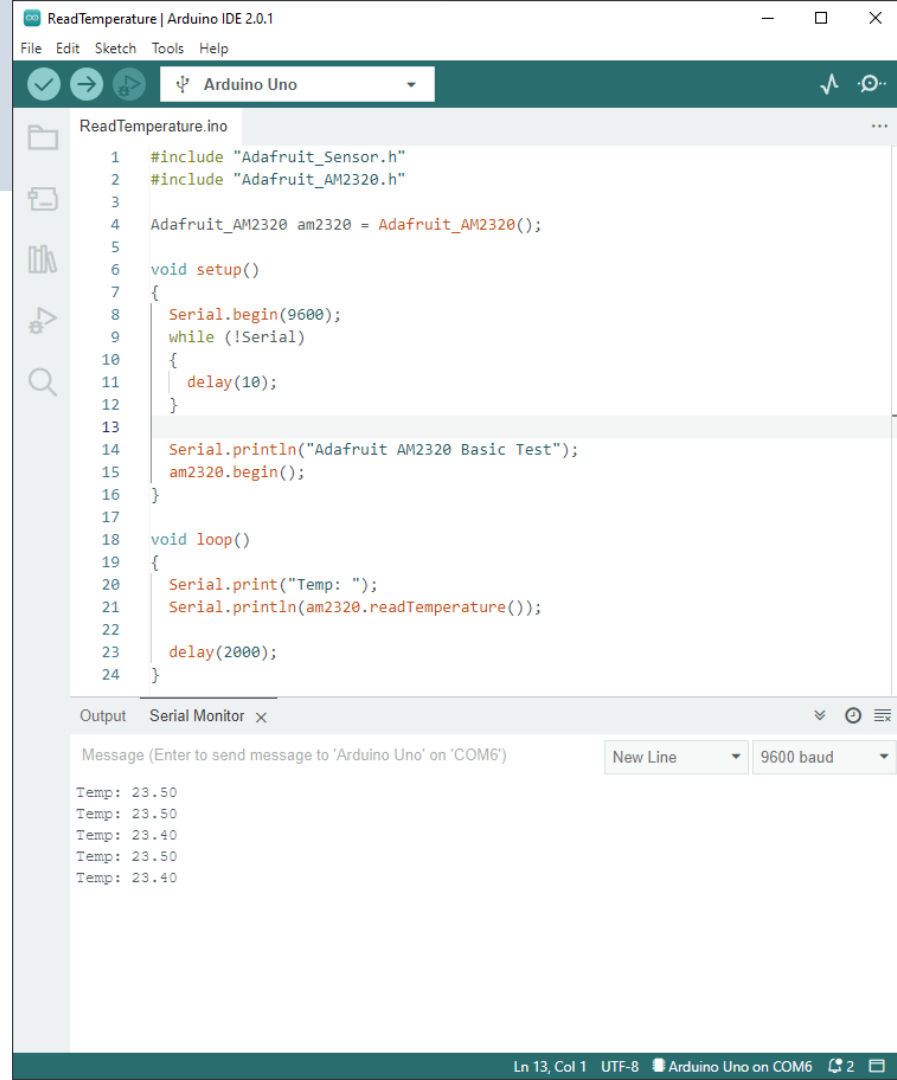
```
{
```

```
  Serial.print("Temp: ");
```

```
  Serial.println(am2320.readTemperature());
```

```
  delay(2000);
```

```
}
```



Humidity

readHumidity()

```
#include "Adafruit_Sensor.h"
#include "Adafruit_AM2320.h"
```

```
Adafruit_AM2320 am2320 = Adafruit_AM2320();
```

```
void setup()
```

```
{
```

```
  Serial.begin(9600);
```

```
  while (!Serial)
```

```
  {
```

```
    delay(10);
```

```
  }
```

```
  Serial.println("Adafruit AM2320 Basic Test");
```

```
  am2320.begin();
```

```
}
```

```
void loop()
```

```
{
```

```
  Serial.print("Hum: ");
```

```
  Serial.println(am2320.readHumidity());
```

```
  delay(2000);
```

```
}
```


ReadTemperature | Arduino IDE 2.0.1

File Edit Sketch Tools Help

✓ → 🔍 Arduino Uno

ReadTemperature.ino

```
1 #include "Adafruit_Sensor.h"
2 #include "Adafruit_AM2320.h"
3
4 Adafruit_AM2320 am2320 = Adafruit_AM2320();
5
6 void setup()
7 {
8     Serial.begin(9600);
9     while (!Serial)
10     {
11         delay(10);
12     }
13
14     Serial.println("Adafruit AM2320 Basic Test");
15     am2320.begin();
16 }
17
18 void loop()
19 {
20     Serial.print("Hum: ");
21     Serial.println(am2320.readHumidity());
22
23     delay(2000);
24 }
```

Output Serial Monitor x

Message (Enter to send message to 'Arduino Uno' on 'COM6') New Line 9600 baud

Hum: 23.60
Hum: 23.50
Hum: 23.50
Hum: 23.50
Hum: 23.50
Hum: 53.70

Ln 10, Col 4 UTF-8 Arduino Uno on COM6 2

Updated Library

- Sometimes you may get “nan” if you try to read both Temperature and Humidity
- A solution for this issue is found here:
<https://forums.adafruit.com/viewtopic.php?t=188263>
- Download updated “Adafruit_AM2320.h” and “Adafruit_AM2320.cpp” and replace these files in the Arduino Library you already have installed on your PC
- A new function **readTemperatureAndHumidity()** has been added that reads both temperature and humidity out of the sensor in one read

Temperature & Humidity

readTemperatureAndHumidity()

```
#include "Adafruit_Sensor.h"  
#include "Adafruit_AM2320.h"
```

```
Adafruit_AM2320 am2320 = Adafruit_AM2320();
```

```
float temperature, humidity;
```

```
void setup()
```

```
{
```

```
  Serial.begin(9600);
```

```
  while (!Serial)
```

```
  {
```

```
    delay(10);
```

```
  }
```

```
  Serial.println("Adafruit AM2320 Basic Test");
```

```
  am2320.begin();
```

```
}
```

```
void loop()
```

```
{
```

```
  if (am2320.readTemperatureAndHumidity(&temperature, &humidity))
```

```
  {
```

```
    Serial.print("Temp: "); Serial.println(temperature);
```

```
    Serial.print("Hum: "); Serial.println(humidity);
```

```
  }
```

```
  else
```

```
  {
```

```
    Serial.println("*** READ ERROR ***");
```

```
  }
```

```
  delay(2000);
```

```
}
```



Arduino Uno



ReadTempandHumidity.ino

```
1  #include "Adafruit_Sensor.h"
2  #include "Adafruit_AM2320.h"
3
4  Adafruit_AM2320 am2320 = Adafruit_AM2320();
5
6  float temperature, humidity;
7
8  void setup()
9  {
10   Serial.begin(9600);
11   while (!Serial)
12   {
13     delay(10);
14   }
15
16   Serial.println("Adafruit AM2320 Basic Test");
17   am2320.begin();
18 }
19
20 void loop()
21 {
22   if (am2320.readTemperatureAndHumidity(&temperature, &humidity))
23   {
24     Serial.print("Temp: "); Serial.println(temperature);
25     Serial.print("Hum: "); Serial.println(humidity);
26   }
27   else
28   {
29     Serial.println("*** READ ERROR ***");
30   }
31   delay(2000);
32 }
```

Output Serial Monitor x



Message (Enter to send message to 'Arduino Uno' on 'COM6')

New Line

9600 baud

Temp: 23.30
Hum: 23.60
Temp: 23.30
Hum: 23.60
Temp: 23.30

References

- Arduino I2C Interface:
<https://docs.arduino.cc/learn/communication/wire>
- Adafruit AM2320 Sensor Overview:
<https://learn.adafruit.com/adafruit-am2320-temperature-humidity-i2c-sensor>
- Datasheet:
https://www.elfadistelec.no/Web/Downloads/_t/ds/Adafruit%203721_eng_tds.pdf
- Updated Library Fixing NaN Bug:
<https://forums.adafruit.com/viewtopic.php?t=188263>

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