App Inventor + IoT: Setting Up Your Arduino

In order to make the Arduino 101 to work with App Inventor + IoT we need to do a bit of setup. Most of this you will only need to do once.

- If you haven't already, install the Arduino Integrated Development Environment (IDE) (Link)
- Now open up the IDE and open the **AIM-for-Things-Arduino101.ino** file (the Arduino file for App Inventor), which you can download <u>here</u>.
 - Note: If another file is open (often named "sketch_today's date" you can close it once you open the AIM-for-Things-Arduino101 file.)
 - You should see a screen that looks very similar to the picture below:

• • •	AIM-for-Things	s-Arduino101	Arduino 1.8.1			
9 🖸 🗈 🖻						Q
AIM-for-Things-Arduino101 §	Accelerometer.hh	Button.hh	Camera.hh	Console.hh	Fingerprint.hh	👻 yrd
1 #define NAME	"App Inventor"	// no more	than 11 chara	icters		
2 #define DEBUGGING	ENABLED					
3 4 #define ACCELEROMETER	DISABLED					
5 #define BUTTON	DISABLED					
6 #define CAMERA	DISABLED					
7 #define CONSOLE	DISABLED					
8 #define FINGERPRINT	DISABLED					
9 #define GYROSCOPE	DISABLED					
10 #define LED	ENABLED					
11 #define LIGHT_SENSOR	DISABLED					
12 #define MOISTURE_SENSOR 13 #define PINS	DISABLED DISABLED					
14 #define PROXIMITY	DISABLED					
15 #define PWM	DISABLED					
16 #define RGBLCD	DISABLED					
17 #define SERVO	DISABLED					
18 #define SOUND_RECORDER	DISABLED					
19 #define TEMPERATURE	DISABLED					
20 21 // frequency to read sen	con values in us					
22 const unsigned long SENS		000.				
23 const unsigned long IMU_		,000				
24 const double IMU_FILTER_		a for accele	erometer low p	ass filter		
25	· · · · · · · · ·		· · · ·			
26 unsigned long nextSensor						
27 unsigned long nextIMURea	d;					
28 double dt;						
29 30 const uint8_t BITS[8] =	5 QxQ1 QxQ2 QxQ1	0~08 0~10	0x20 0x10	0280 2.		
31 const uint8_t MASK[8] =						
32	(),),),),),),),),),),),),),	o, o,	ond:, ond:,			
33 #include "common.h"						
		•				
					and address of the second	
			Ar	duino/Genuino 101	on /dev/cu.usbmode	m1441

30 min Now we're going to install some libraries that are necessary to run Arduino with App Inventor.

- Note: While you might not need these libraries for every project they are a good baseline and are required for the <u>Healthy Plant App</u>
- Click on the **Sketch** dropdown menu, hover over **Include Library**, and then select **Manage Libraries**

É Arduino File Edit	Sketch Tools Help	
	Upload 業U Upload Using Programmer 企業U	101 Arduino 1.8.1
AIM-for-Things-Arduino101 1 #include <curieble.h></curieble.h>	Export compiled Binary て発S Show Sketch Folder 業K	
<pre>2 #include <curieimu.h> 3 #include <rgb_lcd.h></rgb_lcd.h></curieimu.h></pre>	Include Library	Manage Libraries
4 #include <dht.h> 5</dht.h>	Add File	Add .ZIP Library
6 #define NAME 7 #define DEBUGGING	"Mike's AI" // no more than 11 (ENABLED	Arduino libraries

• In *Filter your search...* type "DHT-sensor-library" and click Install.

0 😑		Library Manager		
ype All	Topic All	¢ DHT-sense	or-library	
DHT sensor library Arduino library for l More info		y Sensors Arduino library for DHT	11, DHT22, etc Temp & Humidity Sens	ors
			Version 1.3.0 ‡	nstall
				Close
				Clo

• Now, let's do the same for "Adafruit Unified Sensor" (you might need to scroll down to find the right one)

0		Library Manager
Type All	Topic All	adafruit unified sensor
More info		
Adafruit LSM303DL		Accelerometer + Magnetometer) Unified sensor driver for Adafruit's LSM303
Breakout (Accelerom	ieter + Magnetometer)	Accelerometer + magnetometer) Unified sensor driver for Adalruit's LSM505
<u>More info</u>		
27. State 5 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2		Unified sensor driver for Adafruit's TSL2561 breakouts
More info		
Adafruit Unified Se Required for all Ad		. A unified sensor abstraction layer used by many Adafruit sensor libraries
More info		
		Version 1.0.2
		Close
		close

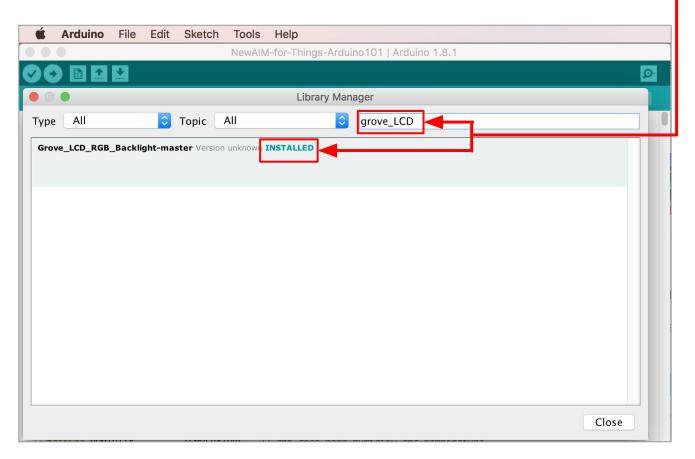
Getting the Grove LCD RGB Backlight working is a bit different.

- First you need to download the library file <u>here</u> to your computer.
- In the Arduino IDE menu, click on
 Sketch > Include Library > Add .ZIP Library ______
- Find the file on your computer and upload it

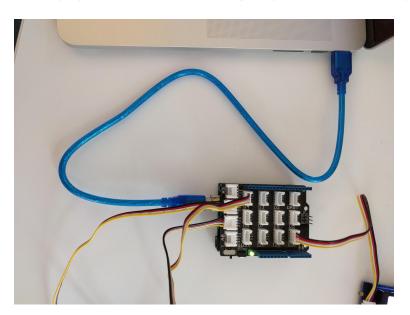
É Arduino File Edit	Sketch Tools Help	
	Verify/Compile 第R Upload 第U Upload Using Programmer 企業U	1 Arduino 1.8.1
NewAIM-for-Things-Arduino10	Export compiled Binary て#S	
1 #include <curieble.h> 2 #include <curieimu.h></curieimu.h></curieble.h>	Show Sketch Folder #K	
3 #include <rgb_lcd.h></rgb_lcd.h>	Include Library	Manage Libraries
4 #include <dht.h> 5</dht.h>	Add File	Add .ZIP Library
6 #define NAME 7 #define DEBUGGING	"Test AI" // no more than 11 ch ENABLED	Arduino libraries

To confirm the library was successfully installed click back to manage libraries:

- Sketch > Include Library > Manage Libraries
- In the search bar type in "Grove LCD"
 - You should see "Grove_LCD_RGB_Backlight-master" as Installed —



Now, if you haven't already, you should now plug in your Arduino to your computer.



Next, you need to select the correct Arduino board (Arduino/Genuino 101).

 Under the Tools menu go to the Board sub-menu. At the bottom if you see -"Arduino/Genuino 101" then select it. If not, follow the steps below.

Árduino File Edit Sketch	Tools Help		1
AIM-for-Things-Arduino101 Arduino 1	Auto Format 第 Archive Sketch Fix Encoding & Reload Serial Monitor 介第 Serial Plotter 介第 WiFi101 Firmware Updater	M	
		Boards Manager Arduino AVR Boards	
	Programmer: "ArduinoISP" Burn Bootloader	Arduino Yún Arduino/Genuino Uno Arduino Duemilanove or Diecimila Arduino Nano	
		Arduino/Genuino Mega or Mega 2560 Arduino Mega ADK Arduino Leonardo Arduino Leonardo ETH Arduino/Cenuino Micro	
		Arduino Esplora Arduino Mini Arduino Ethernet Arduino Fio Arduino BT	
		LilyPad Arduino USB LilyPad Arduino Arduino Pro or Pro Mini Arduino NG or older	
		Arduino Robot Control Arduino Robot Motor Arduino Gemma Adafruit Circuit Playground Arduino Yún Mini	
٥		Arduino Industrial 101 Linino One Arduino Uno WiFi	
		Intel Curie (32-bit) Boards Arduino/Genuino 101 	

If you don't see the Arduino/Genuino 101, select Board Manager from the same sub-menu mentioned above.

Árduino File Edit Sketch	Tools Help			
AIM-for-Things-Arduino101 Arduino 1	Auto Format Archive Sketch Fix Encoding & Reload	ЖТ		
	Serial Monitor Serial Plotter	<mark></mark>		
	WiFi101 Firmware Updater			
	Board: "Arduino/Genuino 101"	•	Boards Manager	
	Port		Arduino AVR Roards	

In the search bar, type "101" and then select the "Intel Curie Board by Intel"

- Click on the "Select version" dropdown, and select 1.0.7 Note: DO NOT use later versions of the firmware
- Click on "Install"

Type All Initial Arduino AVR Boards by Arduino version 1.6.18 INSTALLED Boards included in this package: Arduino Yún, Arduino/Genuino Uno, Arduino Uno WiFi, Arduino Diecimila, Arduino Nano, Arduino/Genuino Mega, Arduino Eto, Arduino Etonardo, Arduino Etonardo, Arduino Etonemet, Arduino, Cennuino Mini, Arduino Etonemet, Arduino, Cennuino Nano, Arduino Robot Motor, Arduino Etonema, Adafruit Circuit Playground, Arduino Vún Mini, Arduino Industrial 101, Linino One. Online help More Info Select version Install Remove 1.0.7 1.0.6 1.0.4				Boards Manager		
Boards included in this package: Arduino Yún, Arduino/Genuino Uno, Arduino Uno WiFi, Arduino Diecimila, Arduino Nano, Arduino/Genuino Mega, Arduino MegaADK, Arduino Leonardo, Arduino Leonardo Ethernet, Arduino Industrial 101, Linino One. Arduino Yún Mini, Arduino Industrial 101, Linino One. Infel Curie Boards by Intel version 2.0.2 NSTALLED boards included in this package: raduino Industrial 101. More info Select version Install Install Remove 1.0.7 1.0.6 1.0.5 1.0.4	ype All		101			
Variable included in this package. variation of the information of th	Boards included in this Arduino Yún, Arduino/(eonardo, Arduino Leo ilyPadUSB, Arduino L Playground, Arduino Yu Dnline help	package: Genuino Uno, Ard nardo Ethernet, A ilypad, Arduino P	uino Uno WiFi, Arc Arduino/Genuino M ro, Arduino ATMeg	ino Diecimila, Arduino Nano, Ardui rro, Arduino Esplora, Arduino Mini, / NG, Arduino Robot Control, Arduino	Arduino Ethernet, Arduino Fio, Ard	uino BT, Arduino
tore info	oards included in this		.0.2 INSTALLED			
1.0.7 1.0.6 1.0.5 1.0.4						
1.0.6 1.0.5 1.0.4		Insta	.11			Remove
1.0.4						
	1.0.4					
						Close

Next we need to select the port that the Arduino IDE (programming environment) will use to talk to the Arduino.

- First, make sure the Arduino is plugged into your computer.
- Under the Tools menu, select the "Port" sub-menu
- For Macs, under the "Port" sub-menu, you should see an option that starts with:
 - /dev/cu.usbmodem...-
- For PC computers, you should see an option that starts with:
 - **COMX (Arduino/Genuino 101)** with X being some number from 1-8
- Select this option
 - Note: It sometimes takes a minute after you plug in your Arduino for the Port to show up under the submenu

Ś	Arduino	File	Edit	Sketch	Tools	Help		
	AI	M-for-	Things-	Arduino10	Auto	Format	ЖТ	
					Fix E Seria	ive Sketch ncoding & Reload Il Monitor Il Plotter	<mark> </mark>	
					WiFi	101 Firmware Updater		
					Boar	d: "Arduino/Genuino 101"	•	
					Port			Serial ports
					Get E	Board Info		/dev/cu.lpss-serial1
						rammer: "ArduinoISP" Bootloader	•	/dev/cu.lpss-serial2 /dev/cu.Bluetooth-Incoming-Port /dev/cu.usbmodem1461 (Arduino/Genuino 101)

To run the Arduino program we need to send it to the board. To do this, click on the arrow button in the top left corner of the program window.

		AIM-for-Things-Arduino101 Arduino 1.8.1	
			ø
AIM-for-Things-Arduino101			
<pre>1 #include <curieble.h> 2 #include <curieimu.h> 3 #include <rgb_lcd.h> 4 #include <dht.h> 5</dht.h></rgb_lcd.h></curieimu.h></curieble.h></pre>			
6 #define NAME 7 #define DEBUGGING 8	"Mike's AI" ENABLED	// no more than 11 characters	
9 #define ACCELEROMETER 0 #define BUTTON 1 #define CAMERA 2 #define CONSOLE 3 #define FINGERPRINT 4 #define GYROSCOPE 5 #define LED 6 #define LIGHT_SENSOR 7 #define MOISTURE_SENSOR 8 #define PINS 9 #define PROXIMITY 10 #define RGBLCD 1 #define SERVO 22 #define SOUND_RECORDER 3 #define TEMPERATURE 4 4 4 4 4 5 #define ENABLED 1 16 #define HUMIDITY 17 #define HUMIDITY	DISABLED DISABLED ENABLED DISABLED DISABLED ENABLED	// dht does both humidity and temperature	
<pre>% % % % % % % % % % % % % % % % % % %</pre>	2		
ne uploading.		0	
		storage space. Maximum is 155648 bytes. econds.	

Once you have sent the code to the Arduino board, your App Inventor app can interact with the Arduino. Follow any of the How To's to make an app to control sensors on your board.