

A Hacker's Introduction **to the Nokia N900**

Introduction

Welcome to the Hacker's Introduction to the Nokia N900. This guide is intended to help you begin connecting the N900's built-in capabilities to information and actions in the physical world. The following pages contain a step-by-step tutorial for connecting an Arduino to a BlueSMiRF Bluetooth Modem, and for configuring the modem to communicate with your computer and with the Nokia N900.

With this connection established, you can receive and send serial data over Bluetooth. You can then use languages such as Python or Flash on the phone to respond to or affect physical devices connected to your Arduino.

This guide is primarily intended for people with some experience with Arduino and/or with programming in Linux environments.



Introduction to the Phone

The Nokia N900 is the newest generation of Nokia's Internet Tablets. The N900 is running on the new Maemo 5.0 software, and it includes cellular telephony in addition to the many features included in previous generations of tablets. Sensors and input devices include a tactile QWERTY keyboard, resistive touch screen, 5-megapixel camera, GPS, microphone, accelerometer, light sensor, proximity sensor, and IR port. Displays and output devices include a 3.5-inch 800X480 screen, speakers, vibrating motor, TV out, and FM transmitter. The N900 supports connectivity over cell phone, wireless network, Bluetooth, and USB.

Because the Maemo operating system is based on Linux, you can use standard communication protocols such as Bluetooth and standard languages such as Python or Flash to develop your interfaces and applications. Maemo 5.0 includes a number of libraries and services, such as GStreamer for managing media playback and D-Bus for sending messages between applications, and you can import third party applications and libraries to create exactly the results you want.

For more information on the N900 visit <http://maemo.nokia.com/n900/>

For more information on developing in the Maemo environment visit <http://www.maemo.org>

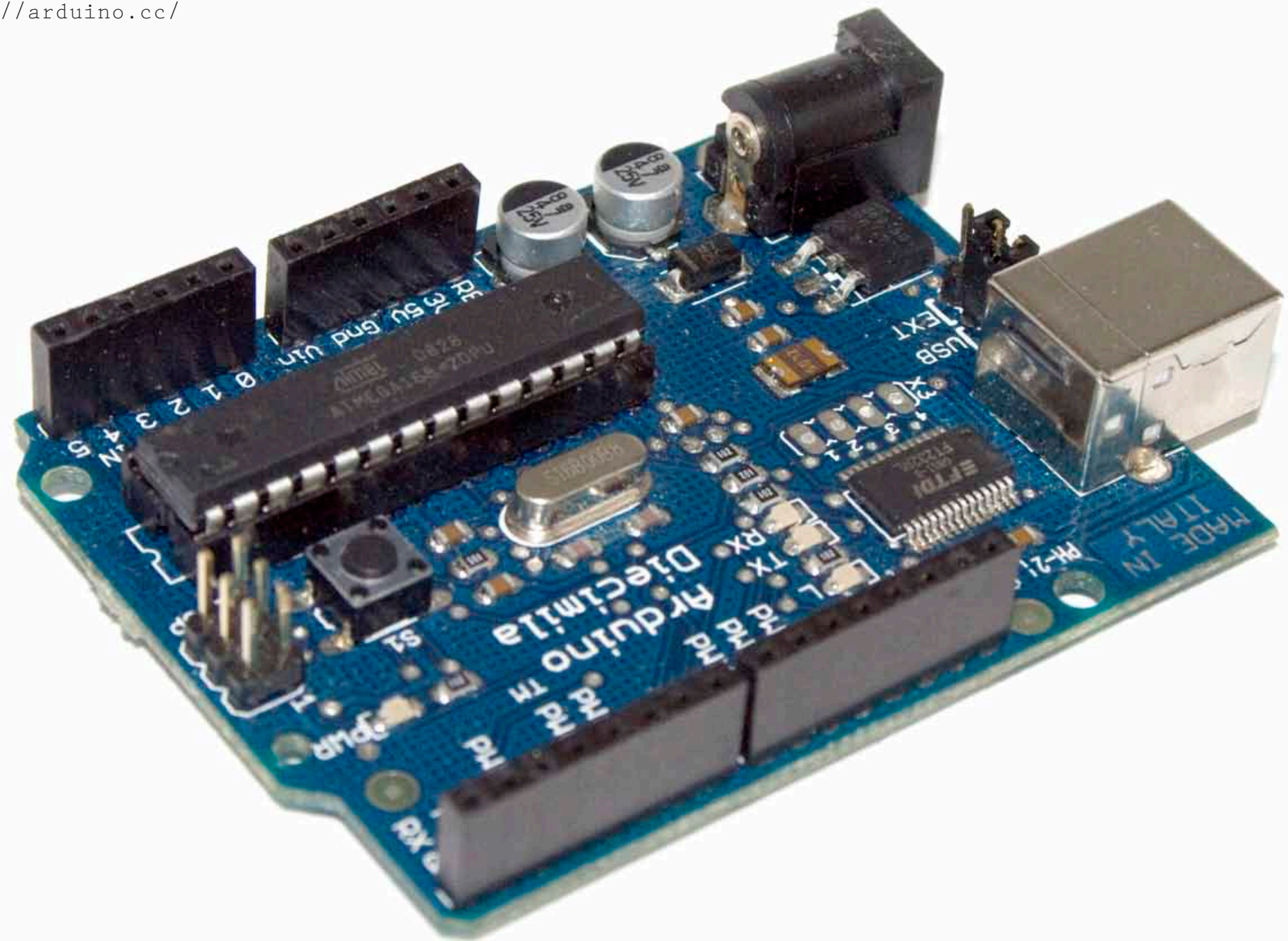


Introduction to Arduino

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software running on a computer, such as Flash, Processing, or MaxMSP, to name but a few.

For more information visit <http://arduino.cc/>



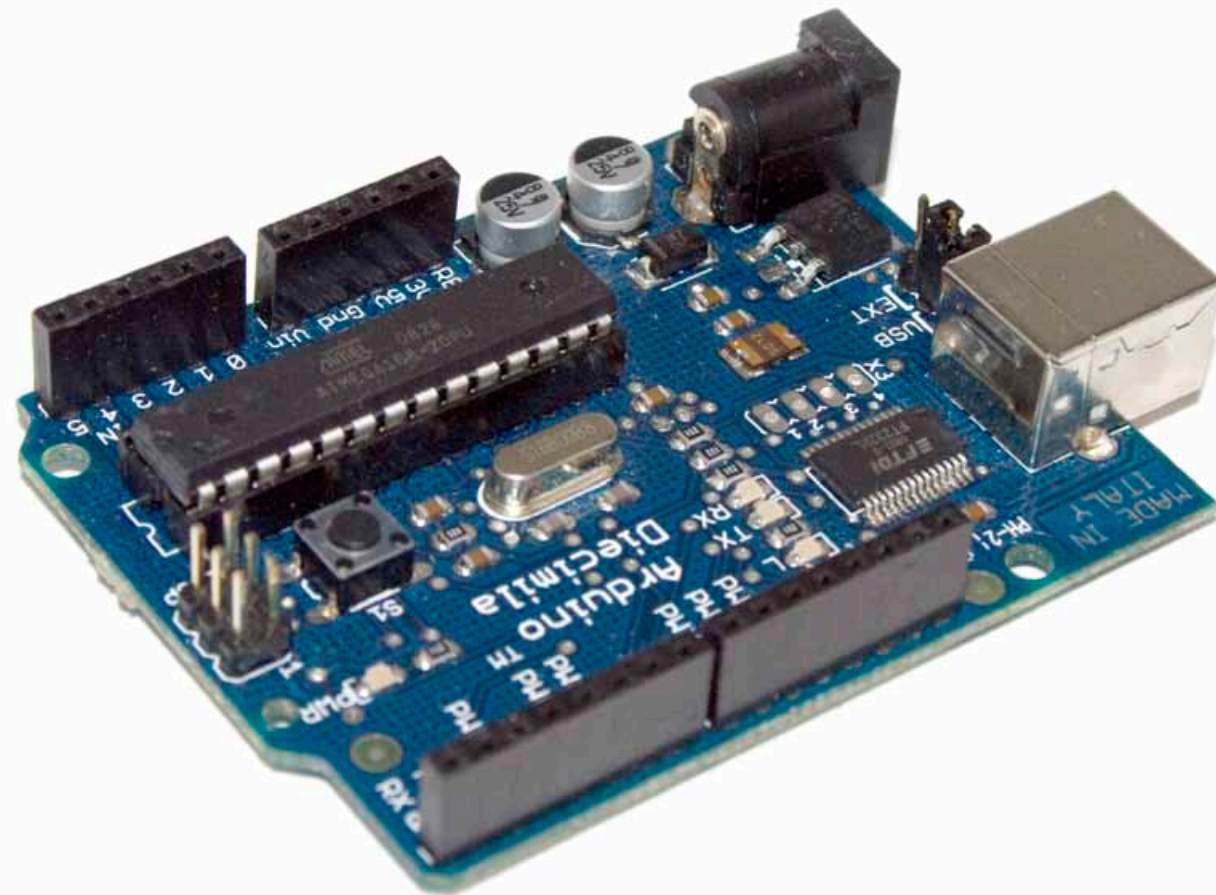
Getting started with Arduino

Installing Arduino

This tutorial is aimed at people with a basic knowledge of Arduino. If you are new to it, examples and documentation can be found in the Learning section of the Arduino site, here <http://arduino.cc/en/Tutorial/HomePage>.

Arduino Board

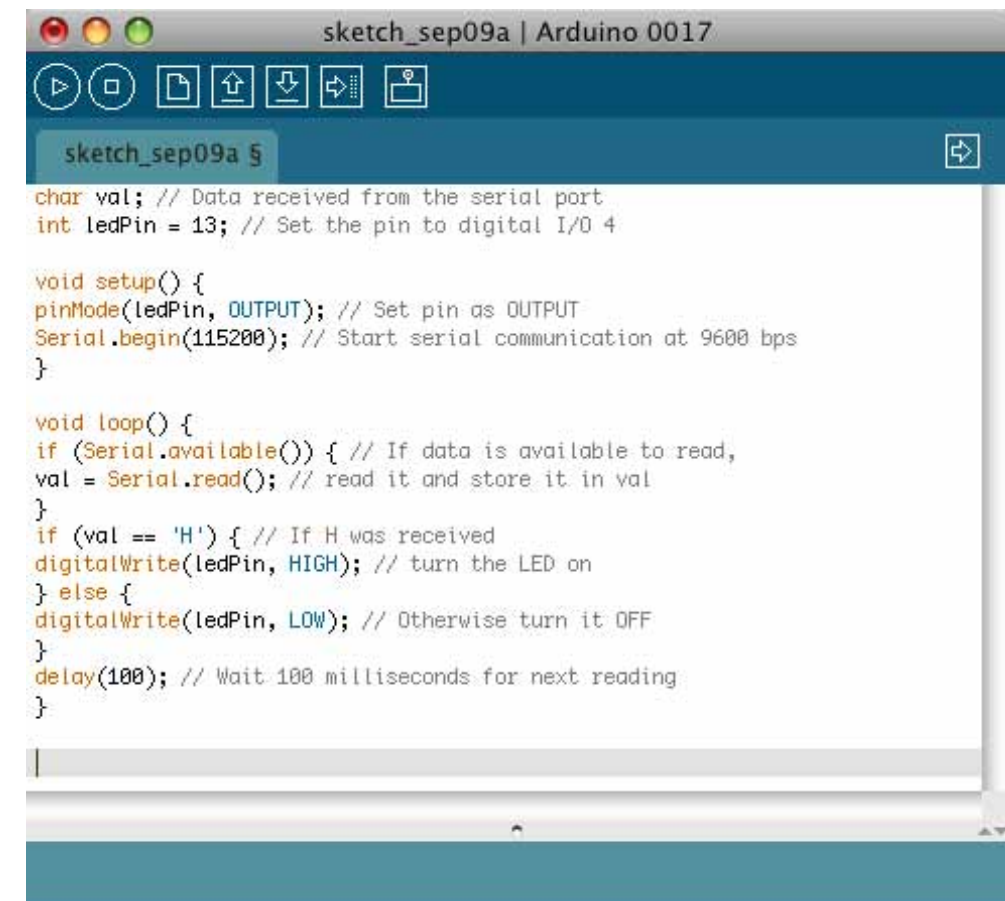
The board pictured here is an Arduino Diecimila, but there are a number of boards available. Visit www.arduino.cc for where to find them in your area, or, if you're feeling bold, design your own (all the plans are available to download online).



Programming Environment

The current version of the Arduino software is 0017. You can download it for free from the Arduino website.

Installing the Arduino software is quite straightforward, but the method will differ depending on your operating system. Go to <http://arduino.cc/en/Guide/HomePage> for up to date installation instructions.



Connecting BlueSMiRF to Arduino

What you will need.

i. Components

Arduino Duemilanove
USB cable
BlueSMiRF Bluetooth Modem
(available in the US from
www.sparkfun.com
and in the UK from www.
coolcomponents.co.uk)

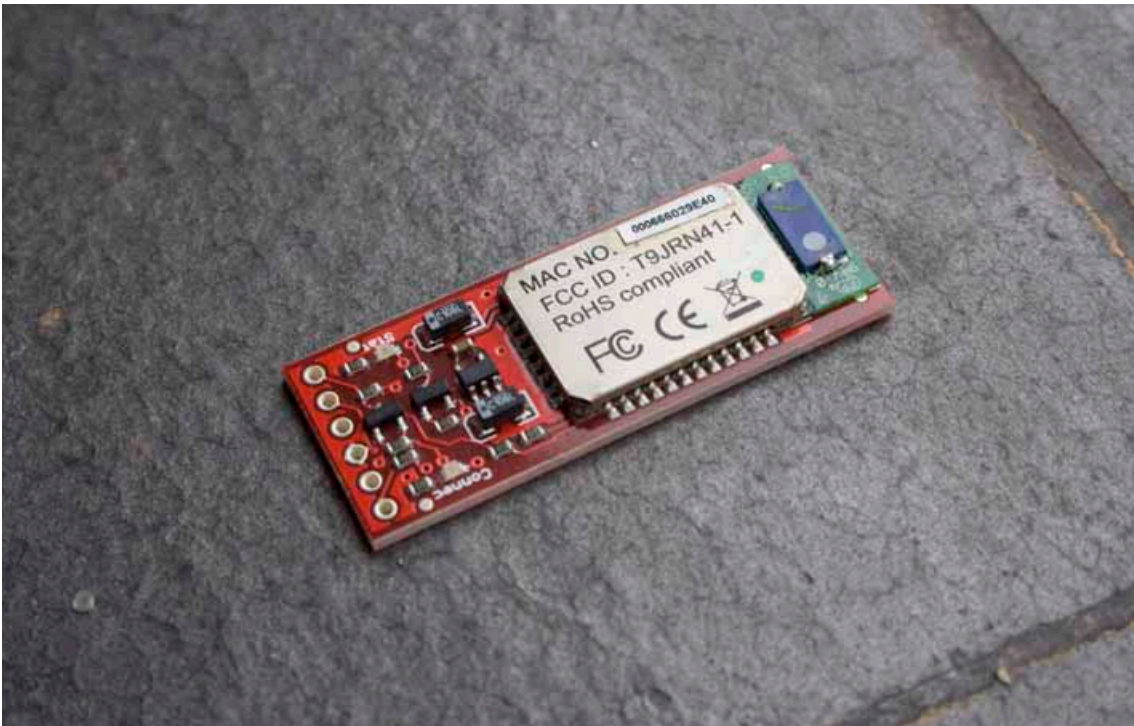
ii. Tools

Soldering iron

iii. Equipment

Breadboard
Jump wires
Header pins
Solder

Bluetooth Module



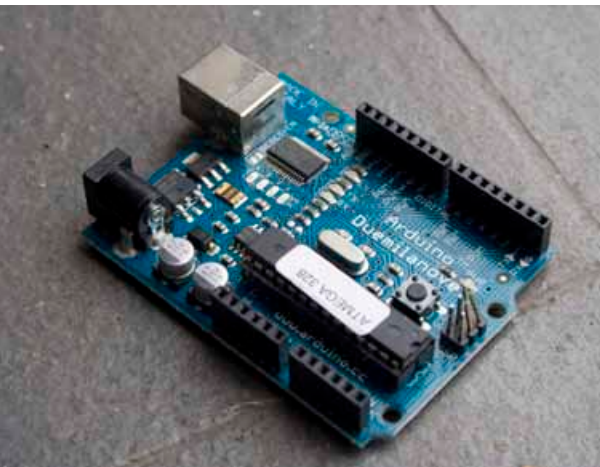
Solder Wire



USB Cable



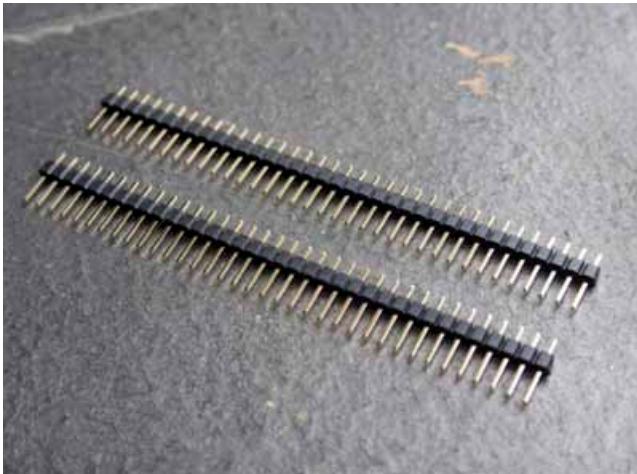
Arduino



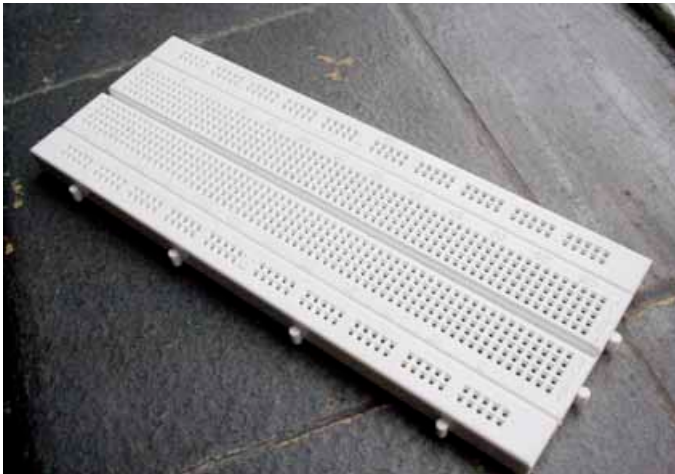
Jumper Cables



Pin Extenders



Breadboard



Soldering Iron



Connecting BlueSMiRF to Arduino

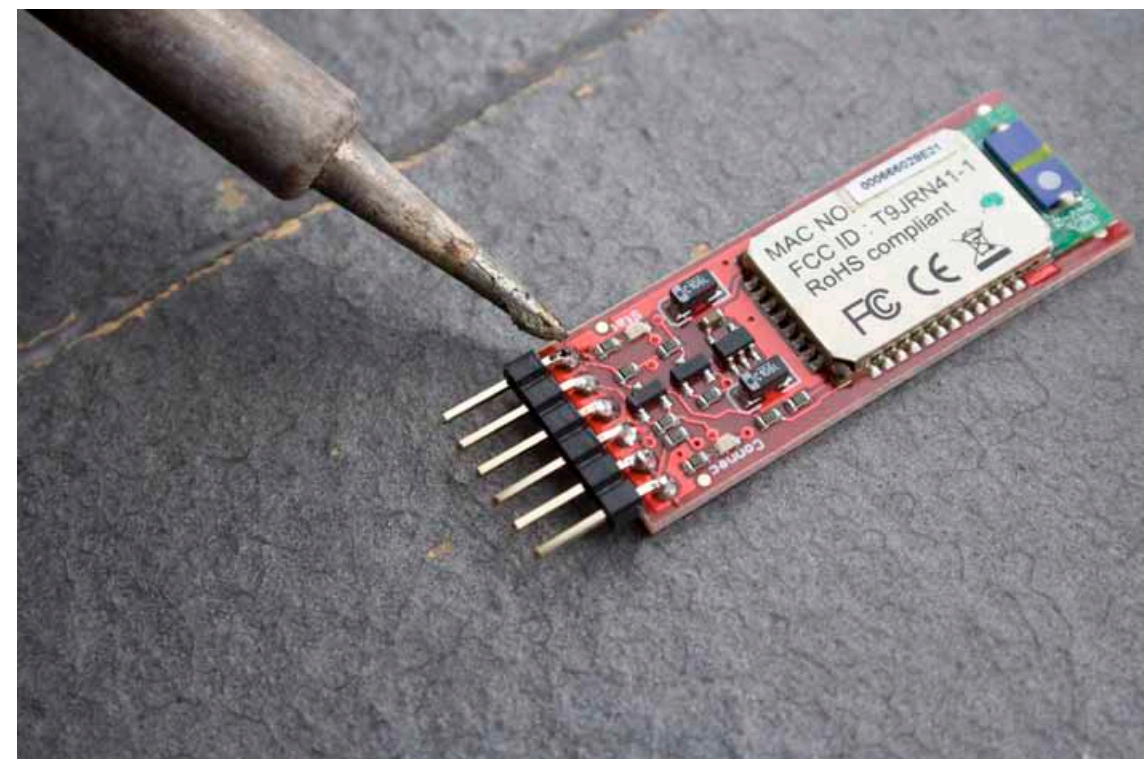
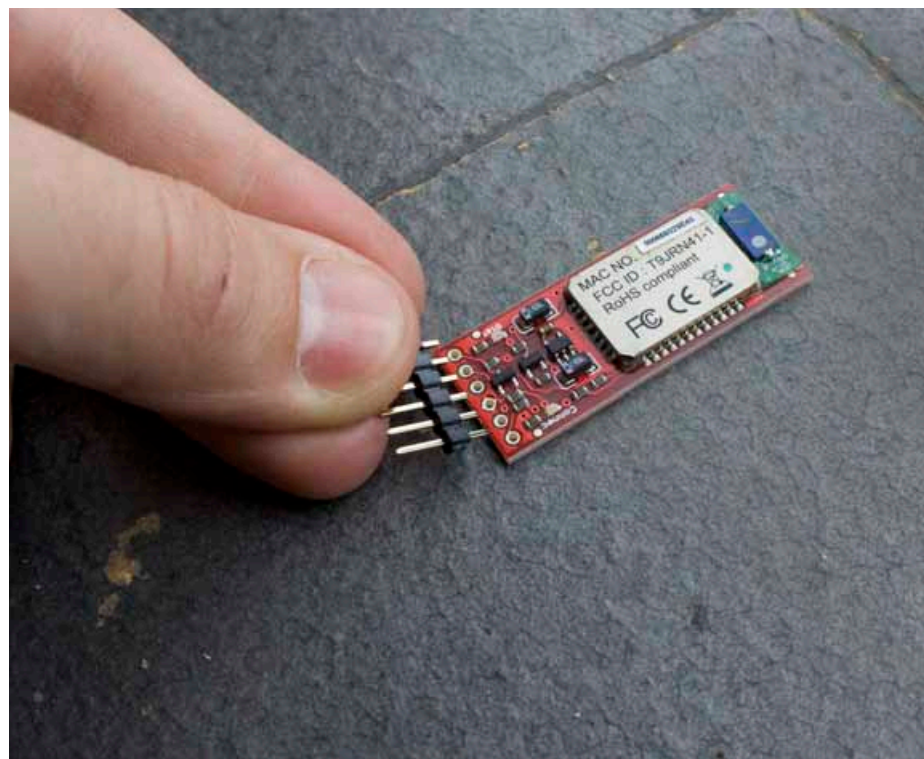
First you must upload your sketch to the Arduino. The sketch opposite will will repeatedly send a brief message (“I’m alive!”) over Bluetooth to any listening application. Note that Bluetooth requires a Serial baud rate of 115200.

After you upload your software, you need to physically connect the BlueSMiRF module to the Arduino board.

```
void setup() {  
  Serial.begin(115200); // Start serial  
                           communication at 115200 bps  
}  
void loop() {  
  Serial.print("I'm alive!"); // Send  
    this message  
}  
  delay(1000); // Wait 1 second for next  
    reading  
}
```

Steps 1-3

Snap off a row of 6 pin headers and solder them to the BlueSMiRF.



Connecting BlueSMiRF to Arduino

Step 4

Press the BlueSMiRF into the breadboard, with each pin in a separate row. Then connect the following wires to your Arduino using the jump wires.

Step 5

CST-1 — RTS-0

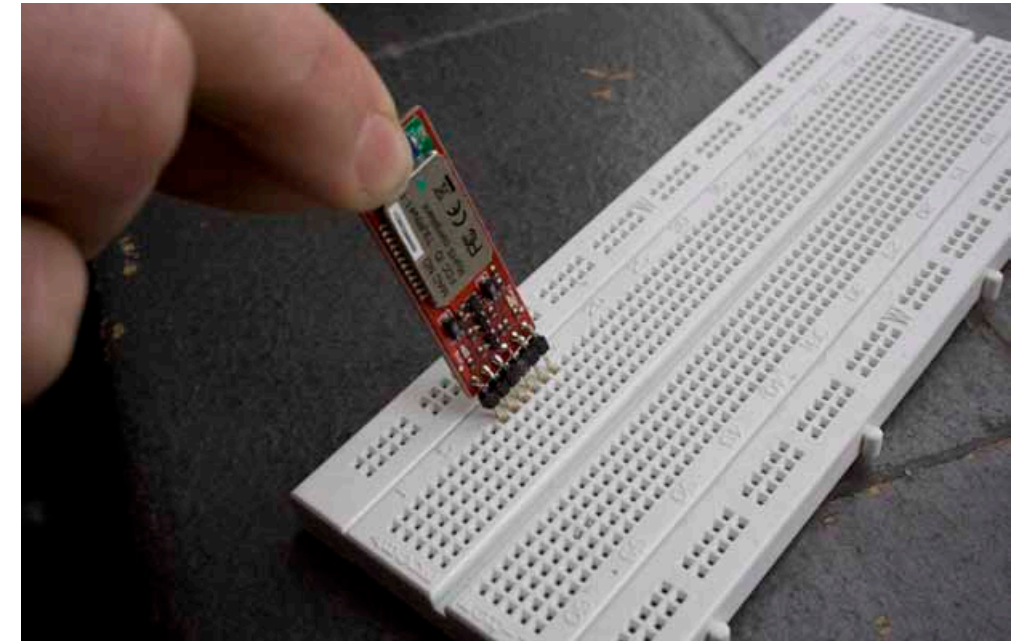
VCC — 5v

GND — GND

TX — RX (digital pin 0)

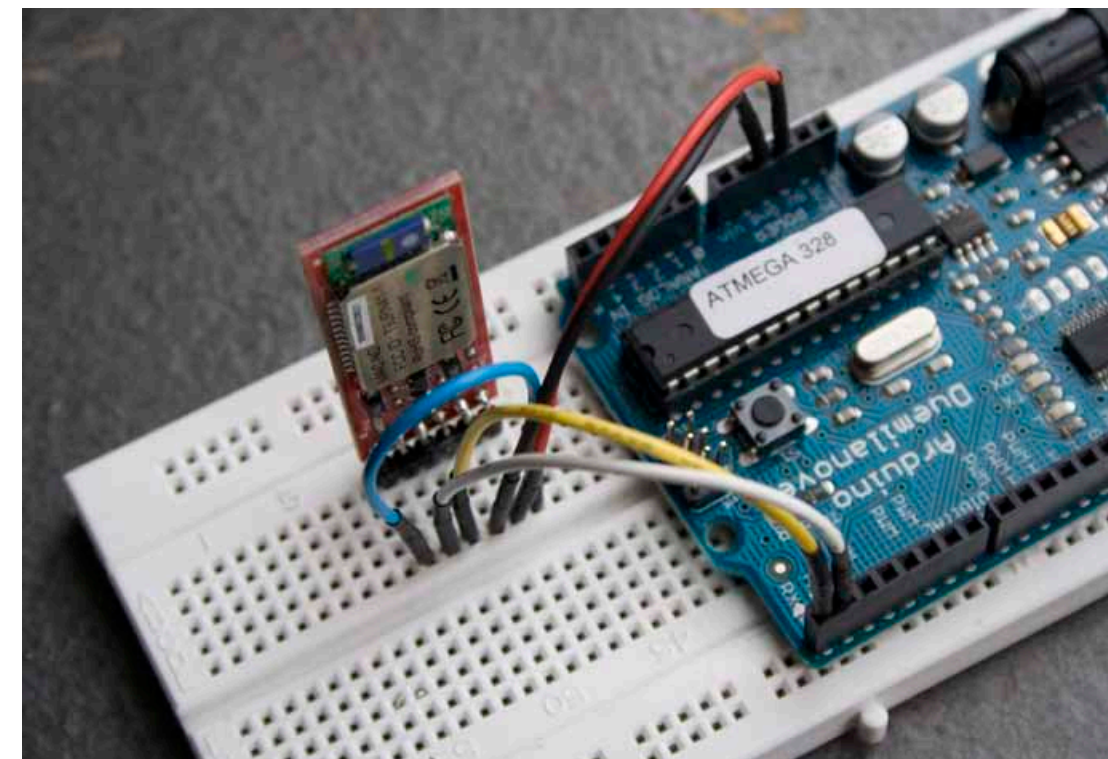
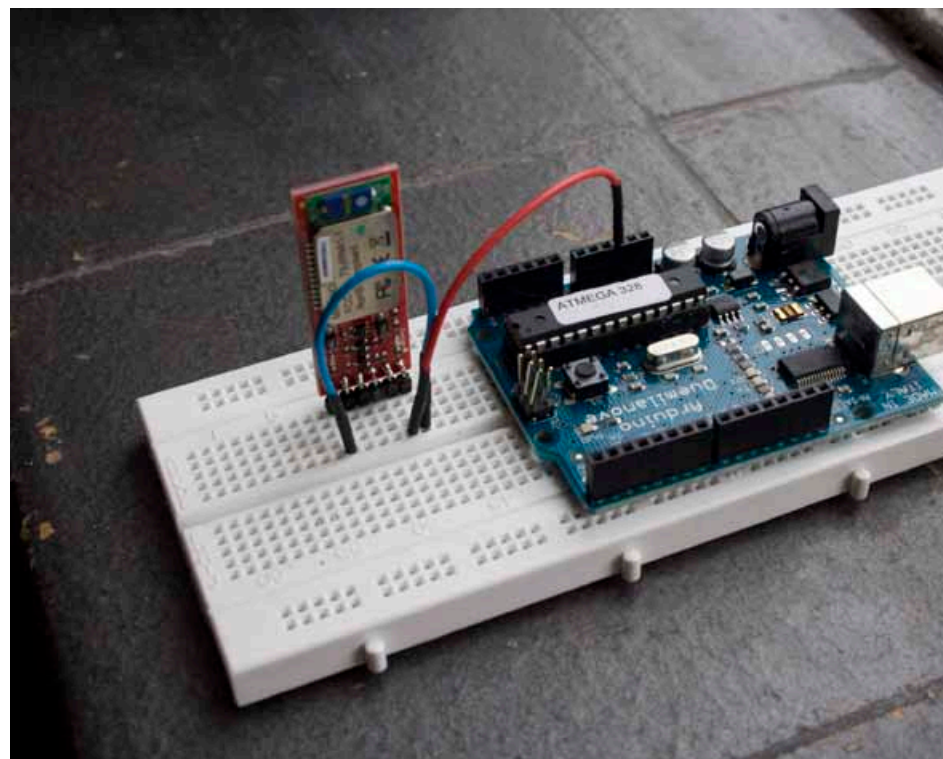
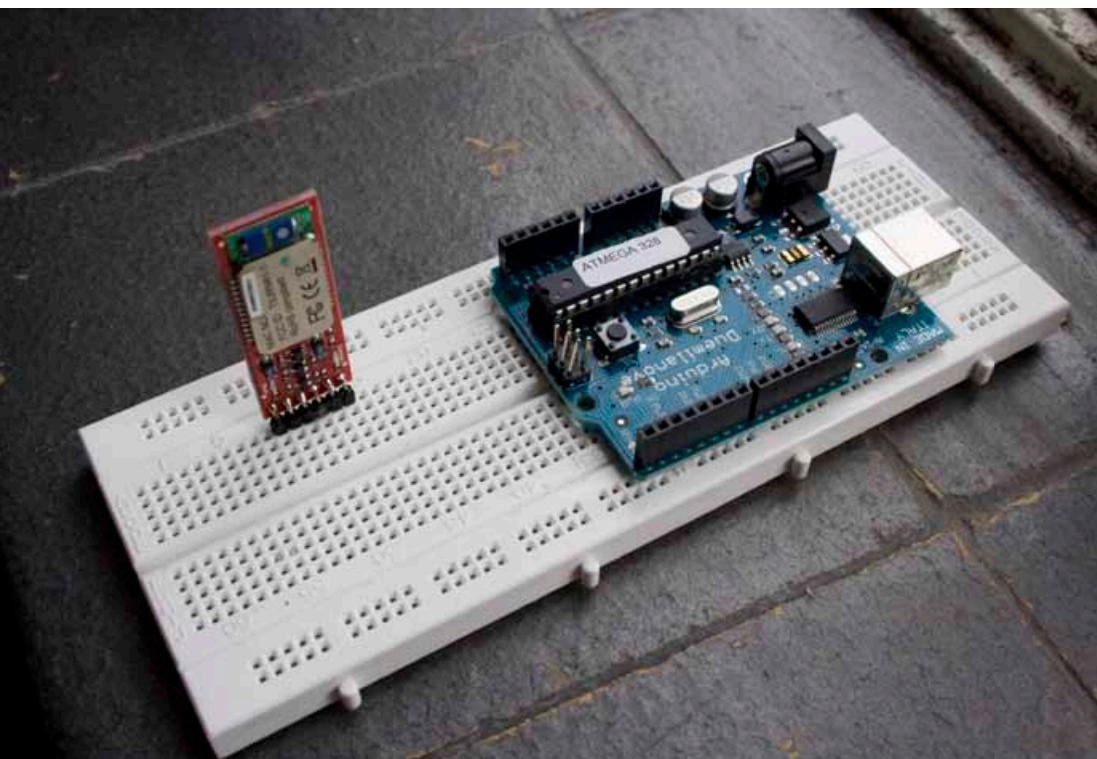
RX — TX (digital pin 1)

Bear in mind that while RX and TX are connected to the Bluetooth module you cannot upload a new sketch.



Step 6

This is your basic hardware setup for communicating via Bluetooth. You can communicate directly from your computer once you are paired with the device.



Connecting the Bluetooth to your Computer

Mac

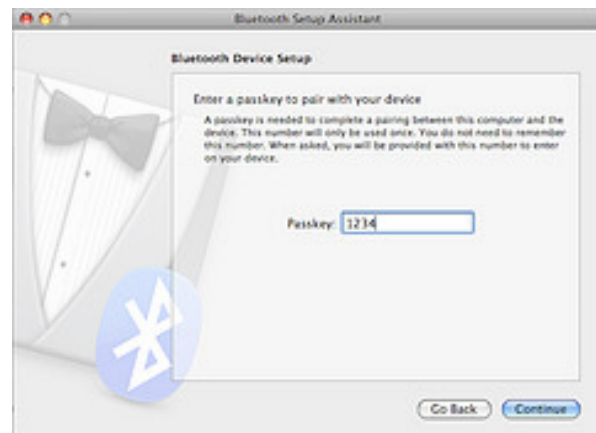
Step.1

a) Open Bluetooth Preferences from System Preferences or the Menu Bar.



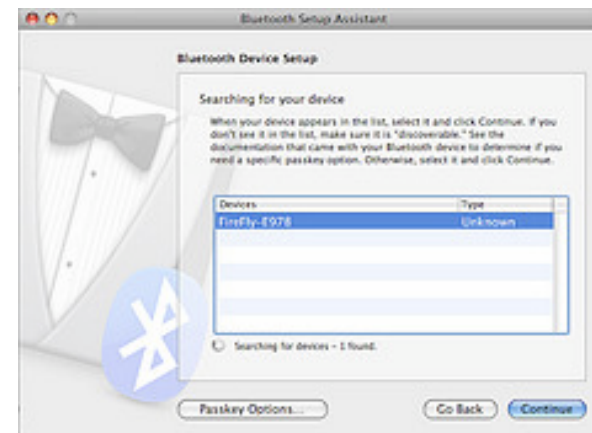
Step.2

Click “+” to add a new device.



Step.3

Click continue.

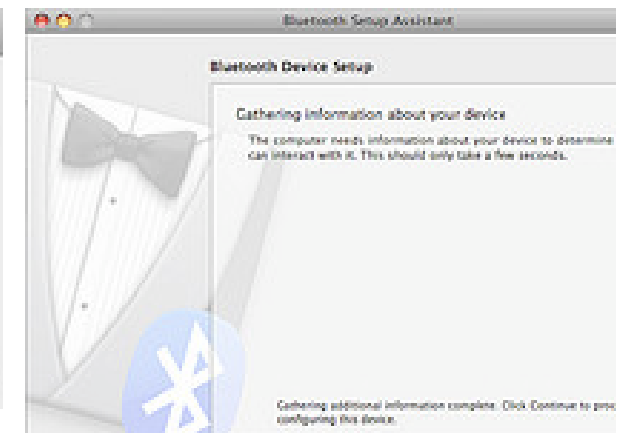
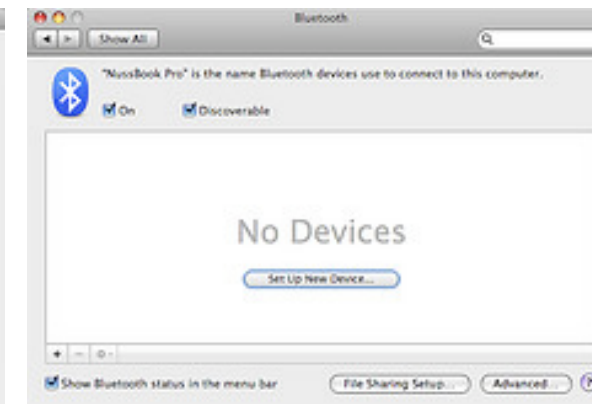


Step.4

Select “Any device”, click continue. A list of Bluetooth devices in range will be populated. Search for your devices serial number, which should be on a sticker on your device.

Step.5

This should refresh after a time to “FireFly-XXXX”, where XXXX is the last last four digits of the serial number. Select and click continue.

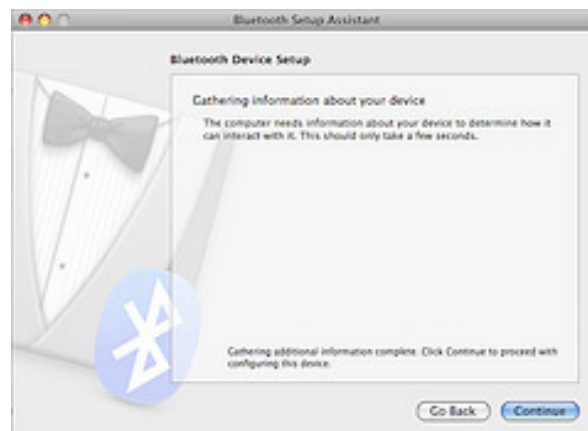
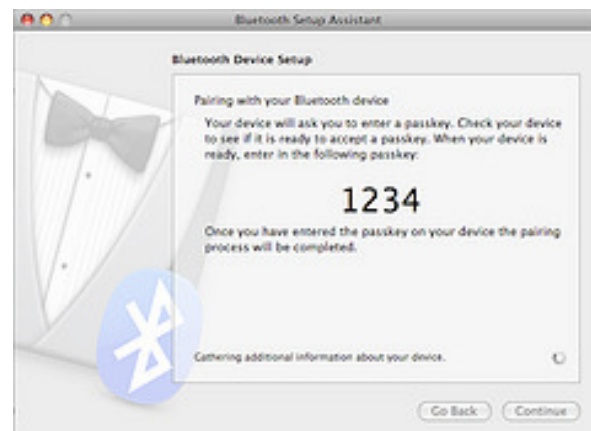


Step.7

You’ll be prompted for your device passkey. The (new) blue-antenna version’s passkey is “1234” and the (old) white-antenna version’s passkey is “default”.

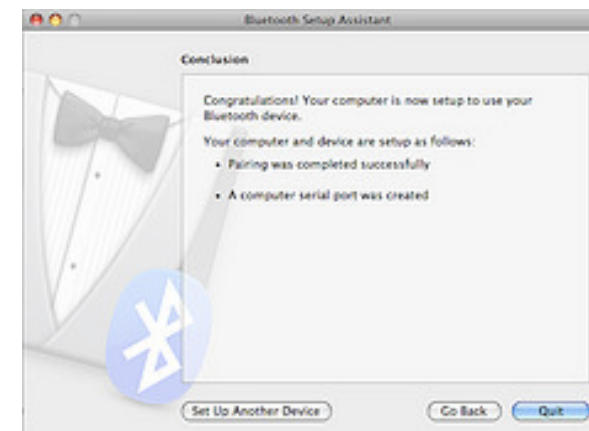
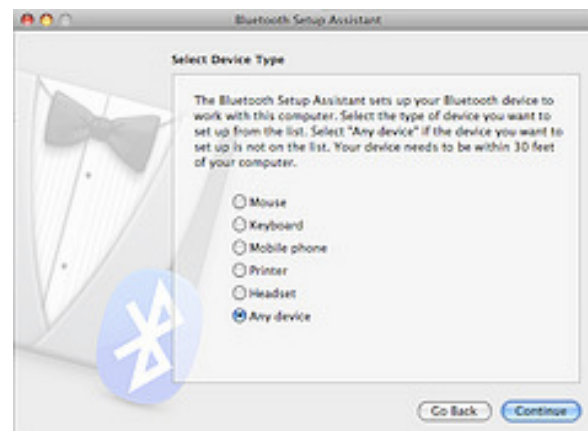
Step.6

Once information has been gathered about the device click continue.



Step.8

Follow the prompts and your device should now be paired with your computer.

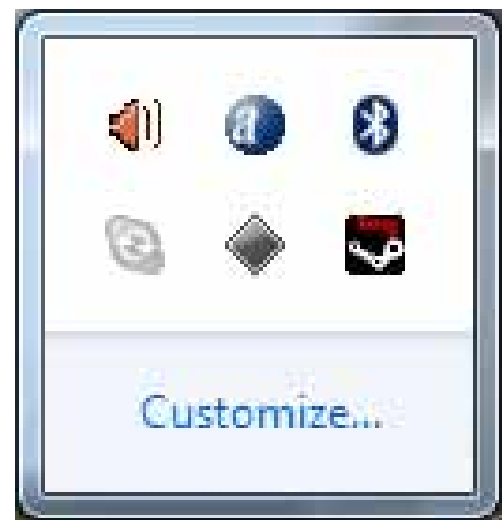


Connecting the Bluetooth to Your Computer

PC

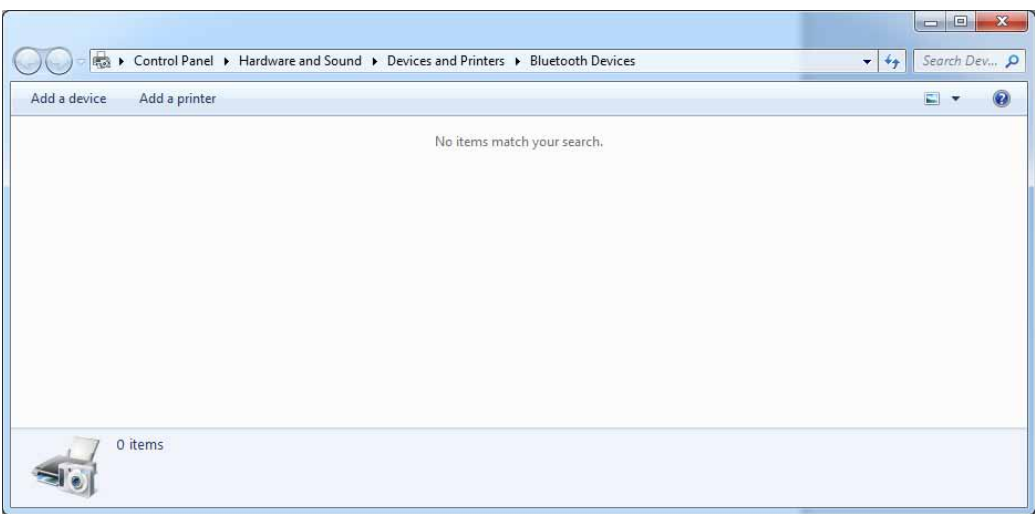
Step.1

Open Bluetooth Preferences from System Preferences or the Menu Bar.



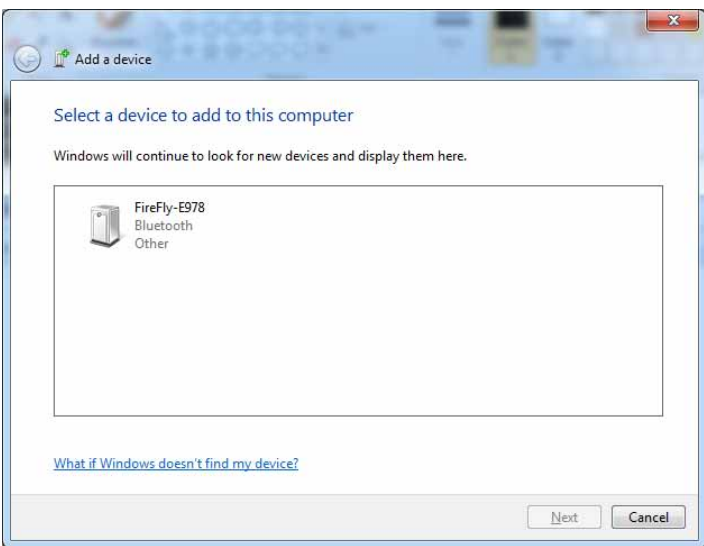
Step.2

Click “+” to add a new device.



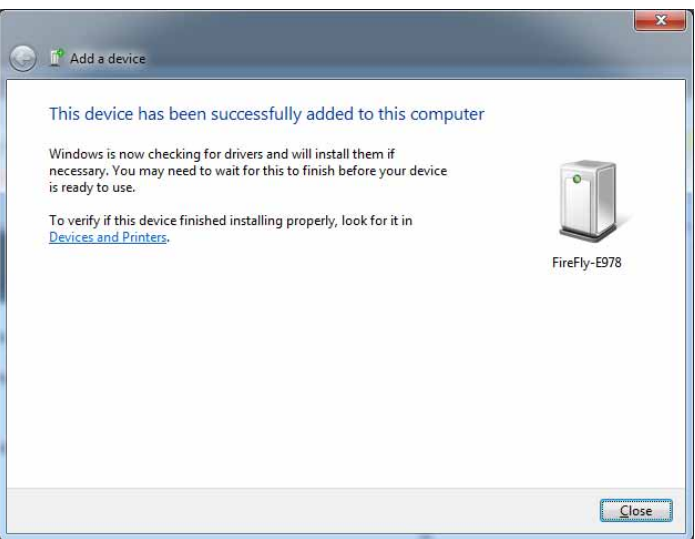
Step.3

Click continue.



Step.4

Select “Any device”, click continue.



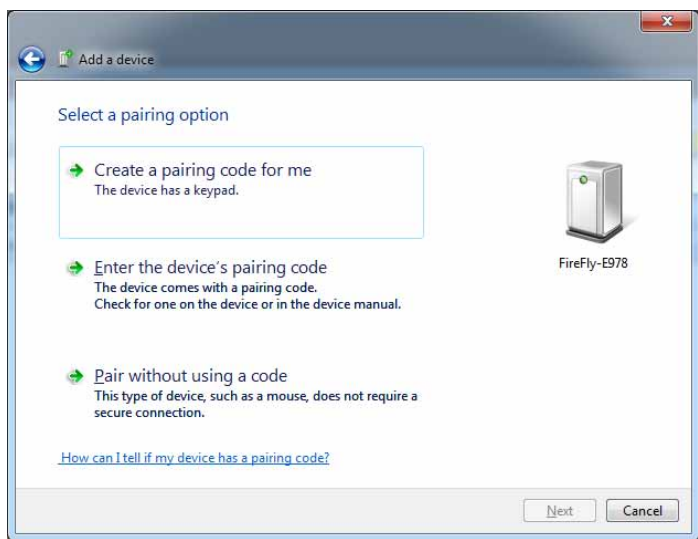
Step.5

A list of Bluetooth devices will be populated. Search for your device’s serial number, which should be on a sticker on your device. This should refresh after a time to “FireFly-XXXX”, where XXXX is the last last four digits of the serial number. Select and click continue.



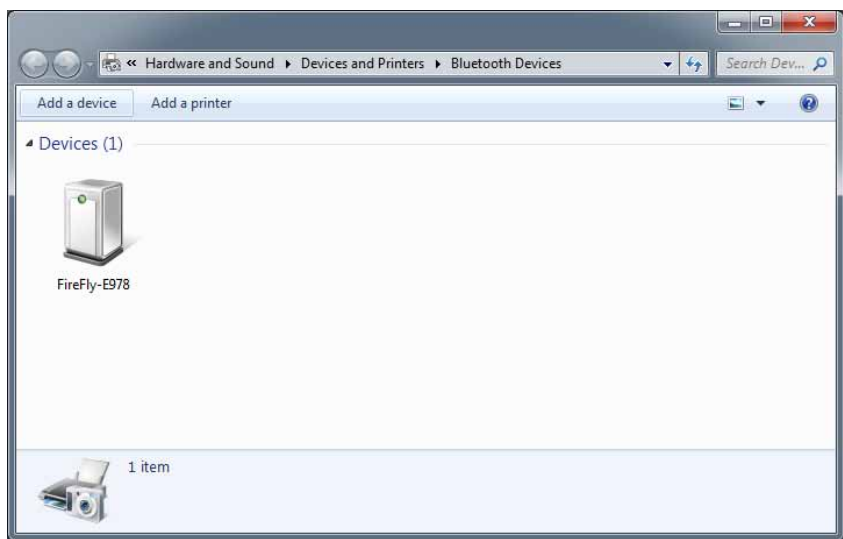
Step.6

Once information has been gathered about the device click continue.



Step.7

You’ll be prompted for your device passkey. The (new) blue-antenna version’s passkey is “1234” and the (old) white-antenna version’s passkey is “default”.



Connecting the Bluetooth to Your Phone

Step.1

From the the desktop, click the 'Menu' tab in the top left corner.



Step.2

In the menu click on 'Settings'.



Step.3

Scroll down and click on 'Bluetooth'.



Step.4

If you have never used Bluetooth before on the phone, you will need to click 'Bluetooth on' and 'Visible', then click 'Devices' to begin pairing.



Step.6

There should be a blank list, click the 'New' button next to it.



Step.6

Wait for a moment while the N900 searches for Bluetooth devices and update device names. Yours should be FireFly-XXXX, where XXXX is the last 4 digits of your Bluetooth devices address. Select your device, then continue.



Step.7

Enter the Passcode 1234 and press pair.



Step.8

You should receive a confirmation and your device will be listed.

You should now be able to receive incoming Serial data in a properly configured application.

