



Arduino Mega and Visuino: Connect AD7606 8 Channel 16 Bit Bipolar Analog to Digital Converter in 16 bit parallel mode

by **BoianM** on October 19, 2016

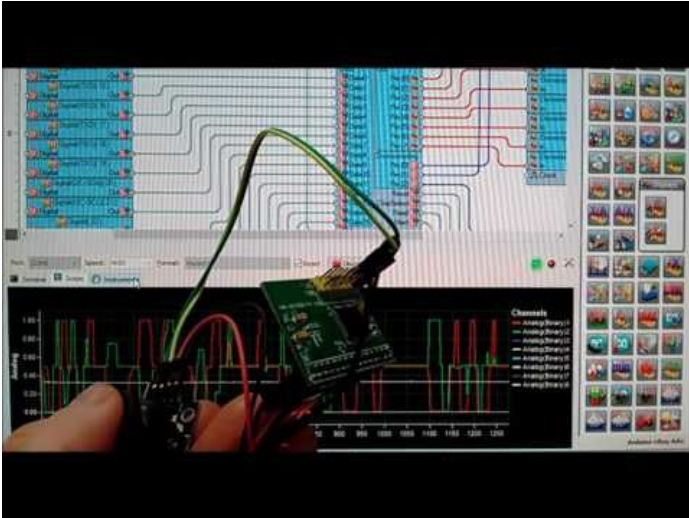
Table of Contents

- Arduino Mega and Visuino: Connect AD7606 8 Channel 16 Bit Bipolar Analog to Digital Converter in 16 bit parallel mode 1
 - Intro: Arduino Mega and Visuino: Connect AD7606 8 Channel 16 Bit Bipolar Analog to Digital Converter in 16 bit parallel mode 2
 - Step 1: Understanding how the AD7606 works 2
 - Step 2: Components 3
 - Step 3: Connect the Data Bus and the Chip Select signals of the AD7606 Module to Arduino 3
 - Step 4: Connect the Busy and Reset signals of the AD7606 Module to Arduino 4
 - Step 5: Connect the Read, CVA, and CVB signals of the AD7606 Module to Arduino 5
 - Step 6: Connect the OS0, OS1, and OS2 signals of the AD7606 Module to Arduino 6
 - Step 7: Connect the Ground and Power wires to the AD7606 Module 7
 - Step 8: Connect the Ground and Power wires between the AD7606 Module and Arduino 8
 - Step 9: Connect the Joystick to the AD7606 Module 8
 - Step 10: Connect separated power to the Joystick 9
 - Step 11: Start Visuino, and select the Arduino Board type 10
 - Step 12: In Visuino: Add AD7606 component, and connect the Data, Oversampling, Busy, and the Reset pins 10
 - Step 13: In Visuino: Connect the AD7606 component's ChipSelect, Read, and the Start pins 11
 - Step 14: In Visuino: Add a Packet component and 8 Binary Analog elements to it 12
 - Step 15: In Visuino: Specify unique packet header 13
 - Step 16: In Visuino: Connect the Packet component 14
 - Step 17: Generate, Compile, and Upload the Arduino code 14
 - Step 18: And play... 15
 - File Downloads 17
 - Related Instructables 17
- Advertisements 17
- Comments 17

Intro: Arduino Mega and Visuino: Connect AD7606 8 Channel 16 Bit Bipolar Analog to Digital Converter in 16 bit parallel mode

AD7606 is a very nice 8 Channel 16 Bit Bipolar Analog to Digital Converter manufactured by **Analog Devices**. The module has great many features, including Sample and Hold for the 8 Channels, per channel Analog filters, shared digital filter, and more. It is also capable of working in 3 different modes - **16 bit parallel mode**, **8 bit parallel mode** and **Serial mode**.

Few weeks ago I was asked to add **AD7606** support for **Visuino**, and **ICStation** generously offered to send me one **AD7606 Module**. The module arrived, and I started working on the **Visuino** support. The module came pre-configured for **16 bit parallel interface**, and I decided to add this first, before I start reconfiguring it for the other modes. The support was added to **Visuino**, but other priorities prevented me from making Tutorial for it. Finally I have found some time to make this Tutorial, and once done, I will see to re-configure the module and add support for the rest of the modes in **Visuino**.



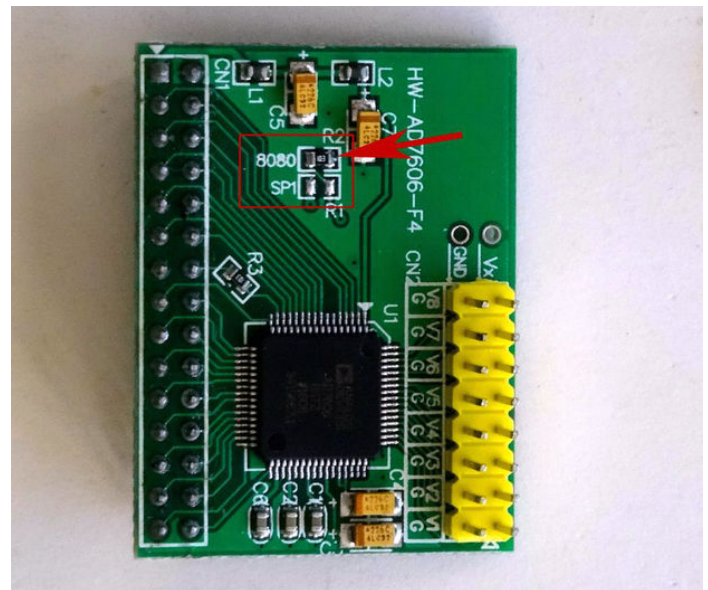
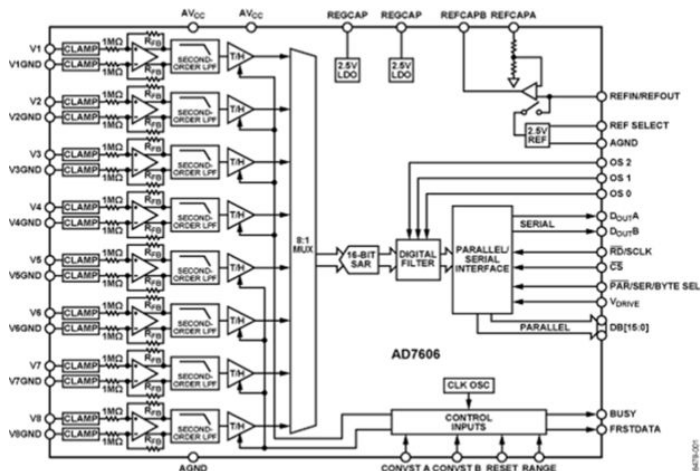
Step 1: Understanding how the AD7606 works

The **AD7606** (Picture 1) is 16 bit ADC with 8 Bipolar channels (Each channel has its own ground, and can measure both positive and negative signals). It has Sample and Hold components for each channel, and individual per channel filters. It also has a shared digital filter.

There are readily available **modules with the AD7606**, and I recently received one generously donated by **ICStation**(Picture 2).

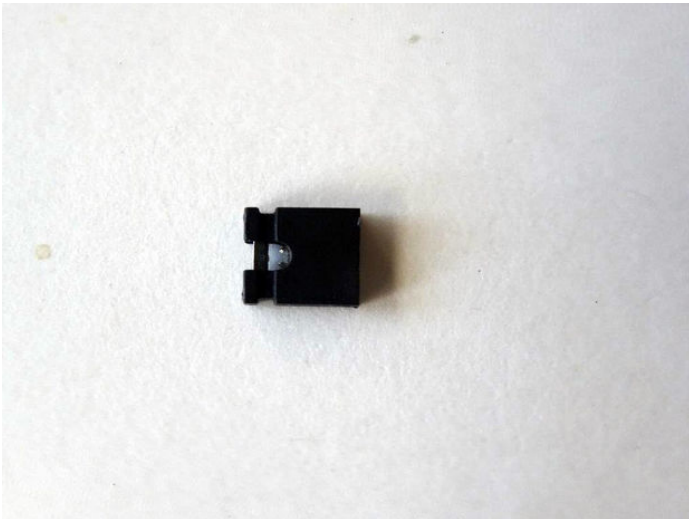
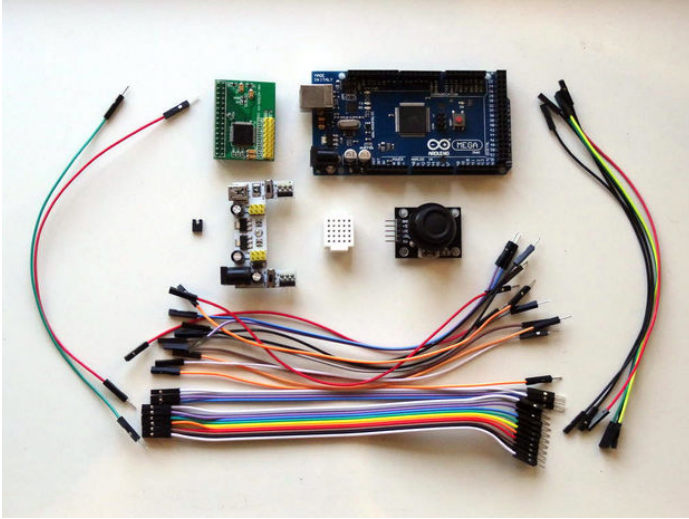
The **AD7606** can be configured to work in 3 different modes. **16 bit parallel**, **8 bit parallel**, and **Serial**.

The **AD7606 Module** that I received has the option to be configured in any of the 3 modes, by an **SMD resistor** (Picture 2). Unfortunately the labeling on the module is confusing or incorrect, and although the module from the picture appears to be configured for 8 bit parallel, it is actually configured for **16 bit parallel mode**. I plan to move the resistor and reconfigure the module, so I can make Tutorials in 8 bit and Serial mode, but since there is a danger to damage the module in the process, I am first making this Tutorial with the **16 bit parallel mode**.



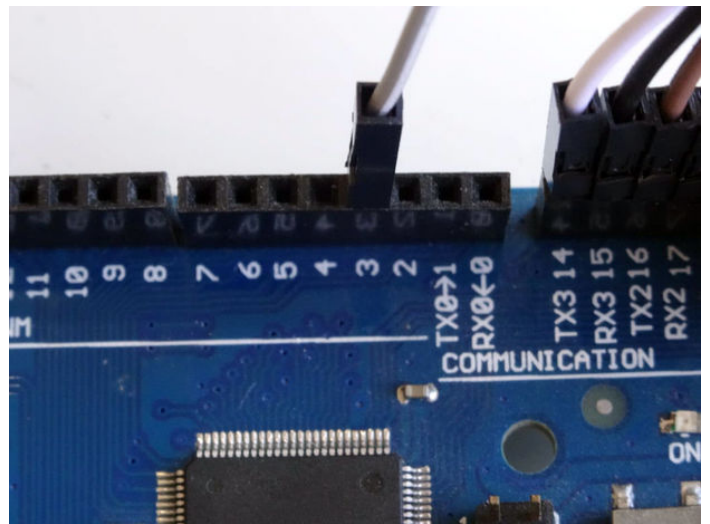
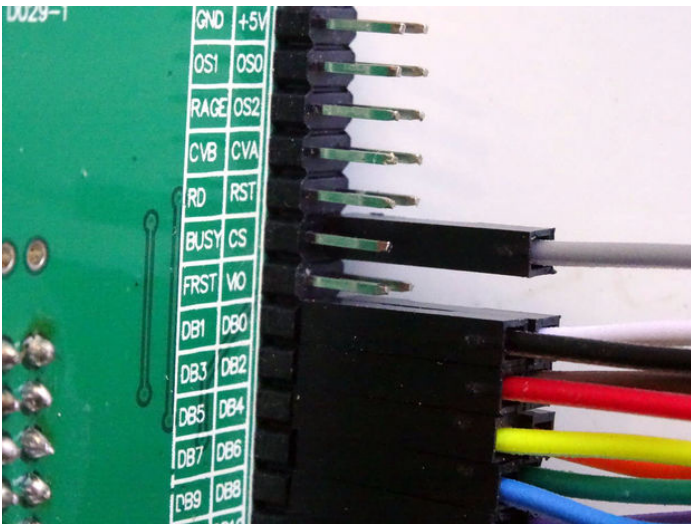
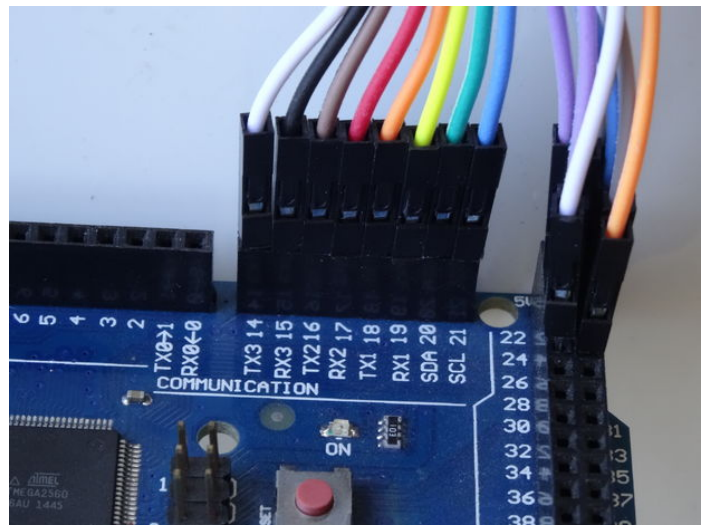
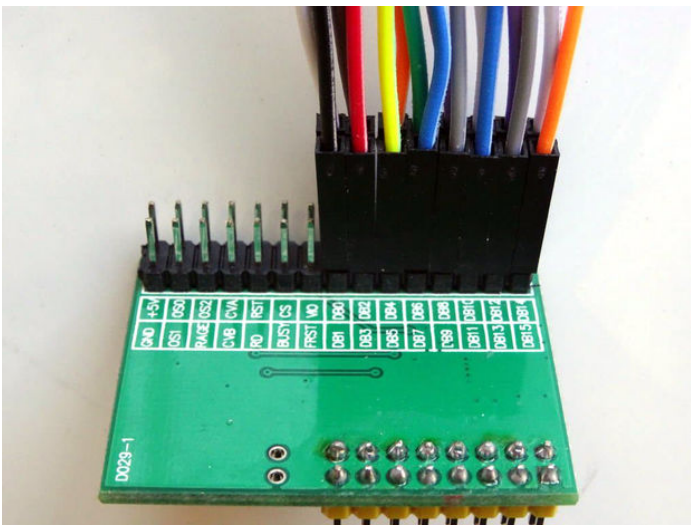
Step 2: Components

1. One **Arduino Mega** - you need enough pins for the 16 bits of the data bus
2. One **AD7606 8 Channel 16 bit Bipolar Analog to Digital Converter Module**
3. One **small Breadboard** (Any breadboard can be used, or any other way to connect 3 wires together)
4. One **Joystick** that I got from this cheap 37 sensors set (I use the Joystick to generate analog signals for the AD7606 Module. You can use any other source of +/- 5 V Analog signal to test)
5. One **K2 Breadboard power supply with adapter (Picture 2)**
6. One **Jumper with open top (Picture 3)** allowing a wire to be inserted from the top side between the pins
7. **17 Female-Female** jumper wires
8. **29 Female-Male** jumper wires
9. **2 Male-Male** jumper wires
10. **5 Female-Female** jumper wires



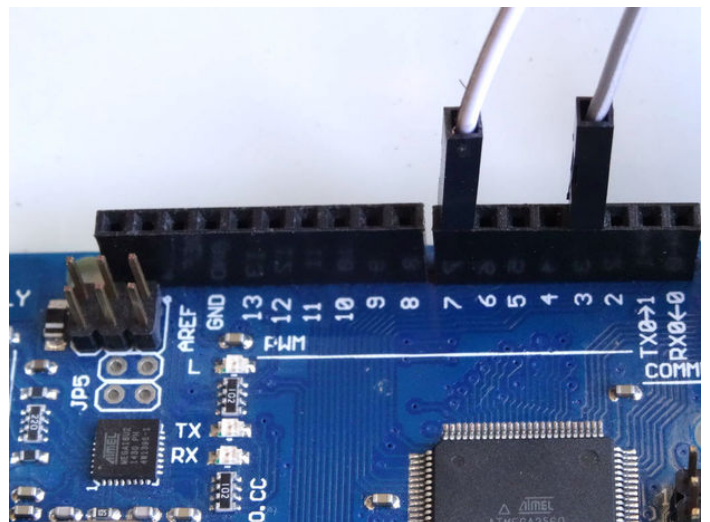
Step 3: Connect the Data Bus and the Chip Select signals of the AD7606 Module to Arduino

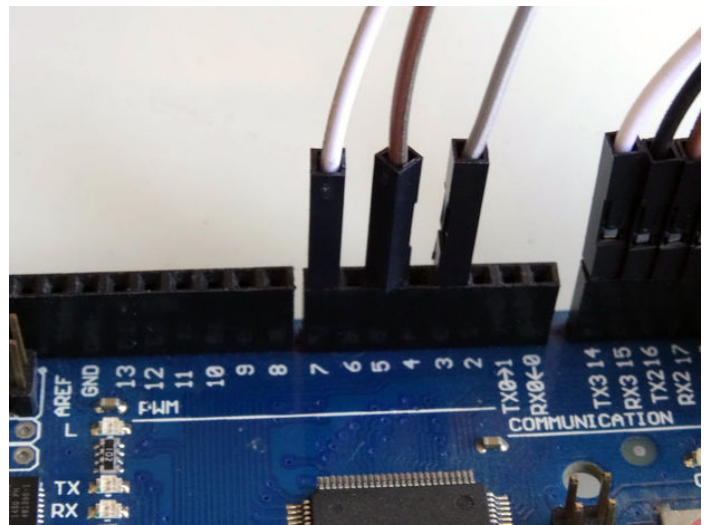
1. Connect the **Female ends** of **16 Female-Male** wires to the **DB0 to DB15** pins of the **AD7606 Module (Picture 1)**
2. Connect the **Male end** of the wires in the same order (**DB0 to Pin 14**) to the **Digital pins 14 to 29** of the **Arduino Mega board (Picture 2)**
3. Connect the **Female end** of a **Female-Male(Gray wire)** to the **CS** pin of the **AD7606 Module (Picture 3)**
4. Connect the **Male end** of the **CS wire(Gray wire)** to the **Digital pin 3** of the **Arduino Mega board (Picture 4)**



Step 4: Connect the Busy and Reset signals of the AD7606 Module to Arduino

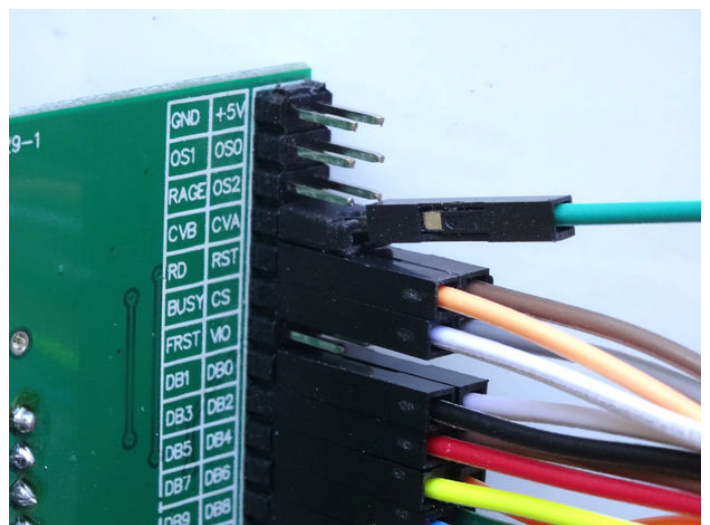
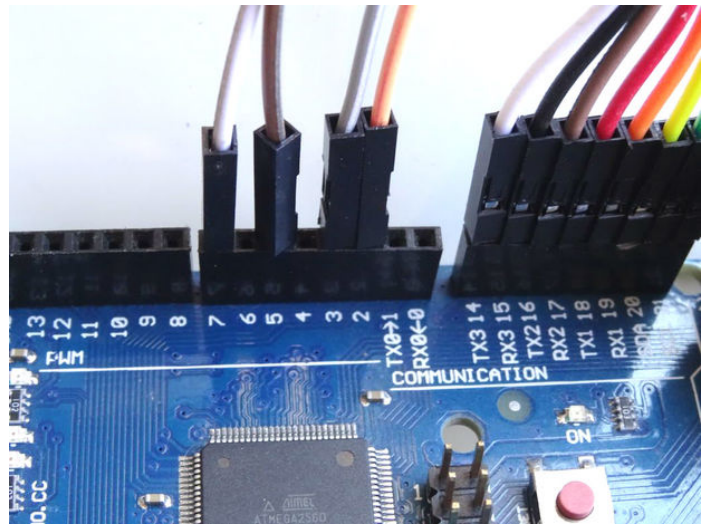
1. Connect the Female end of a Female-Male(White wire) to the Busy pin of the AD7606 Module (Picture 1)
2. Connect the Male end of the Busy wire(White wire) to the Digital pin 7 of the Arduino Mega board (Picture 2)
3. Connect the Female end of a Female-Male(Brown wire) to the RST pin of the AD7606 Module (Picture 3)
4. Connect the Male end of the RST wire(Brown wire) to the Digital pin 5 of the Arduino Mega board (Picture 4)

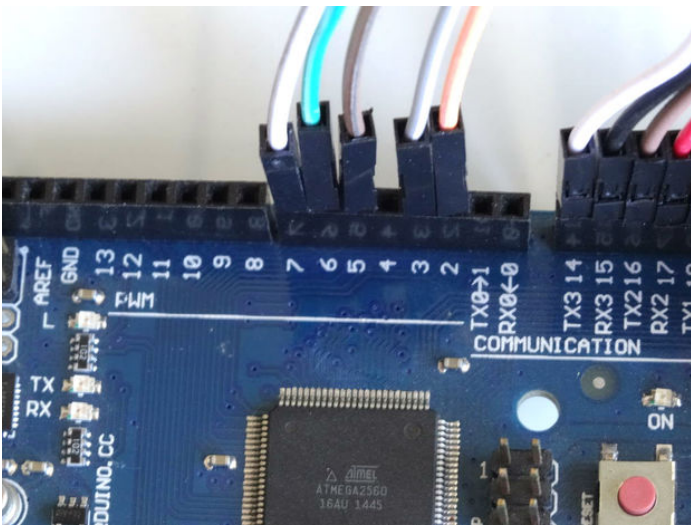




Step 5: Connect the Read, CVA, and CVB signals of the AD7606 Module to Arduino

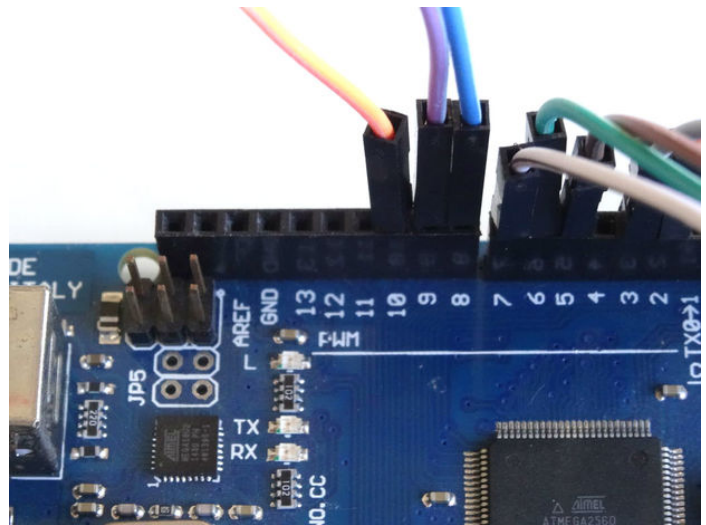
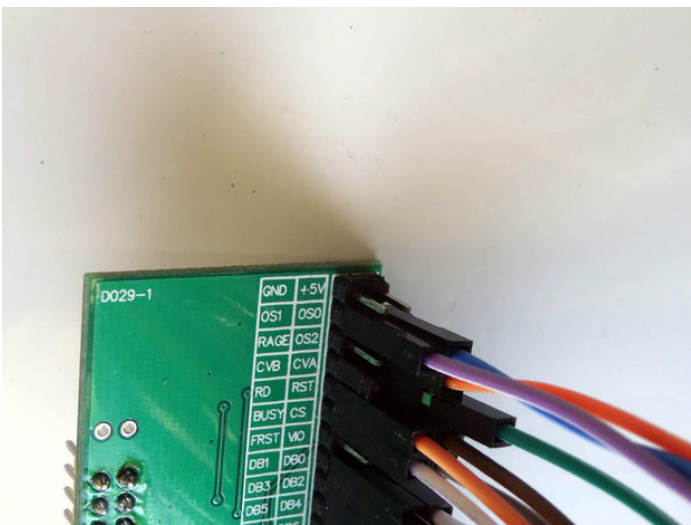
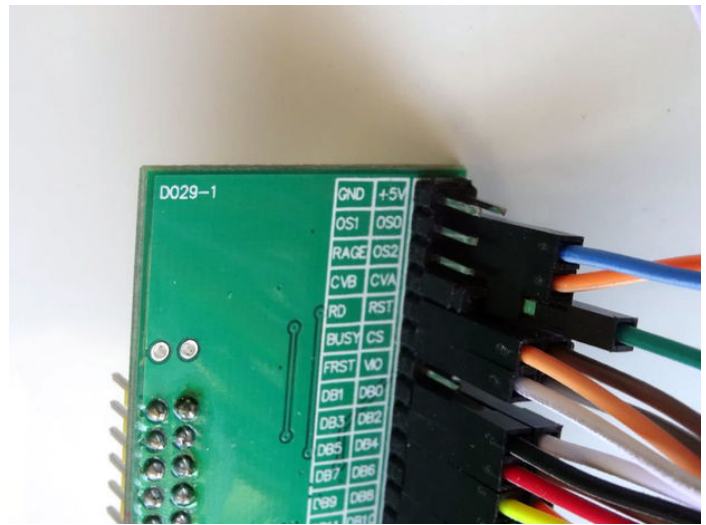
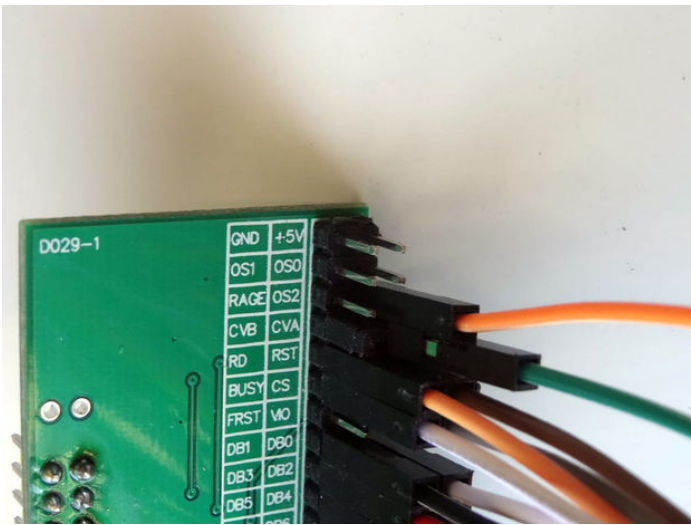
1. Connect the **Female end** of a **Female-Male(Orange wire)** to the **RD pin** of the **AD7606 Module** (**Picture 1**)
2. Connect the **Male end** of the **RD wire(Orange wire)** to the **Digital pin 2** of the **Arduino Mega board** (**Picture 2**)
3. Insert the **Jumper with open top** to connect the **CVA and CVB signals** of the **AD7606 Module** (**Picture 3**)
4. Insert **Male-Male(Green wire)** in the center of the **Jumper with open top** between the **CVA and CVB signals** of the **AD7606 Module** so the wire will make electrical contact with both pins (**Picture 4**)
5. Connect the **Male end** of the **CVA/CVB wire(Green wire)** to the **Digital pin 6** of the **Arduino Mega board** (**Picture 2**)





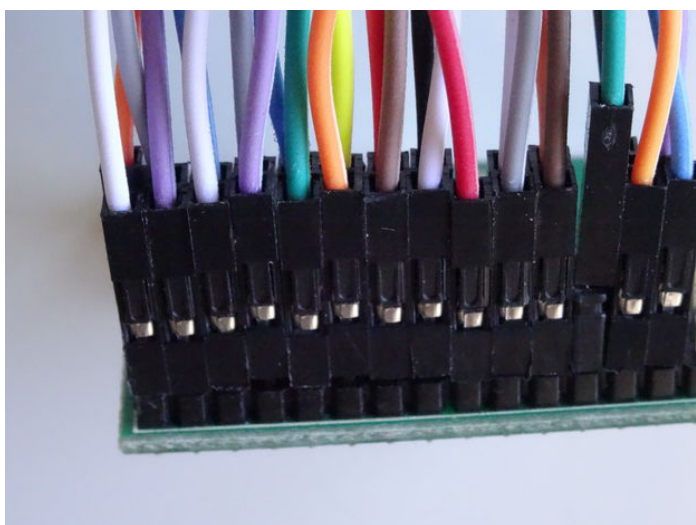
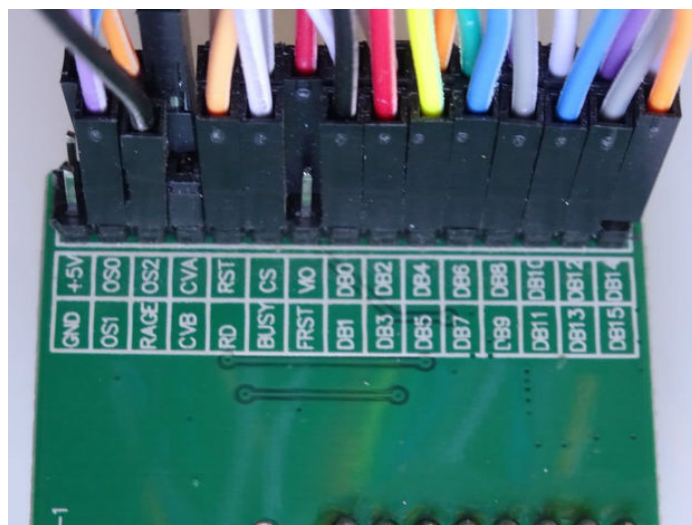
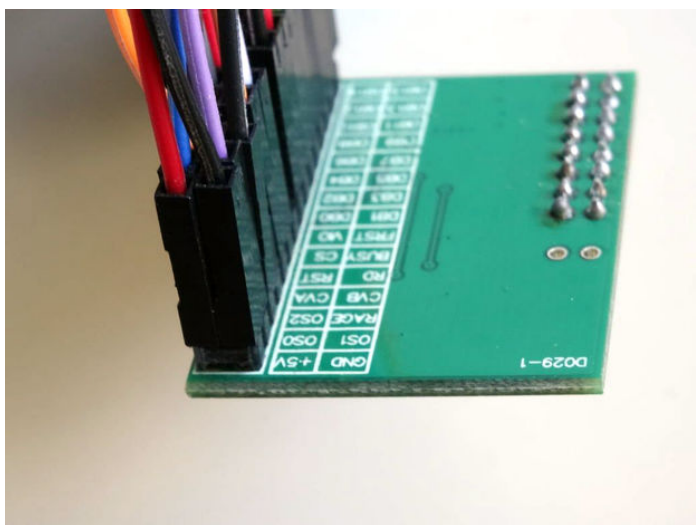
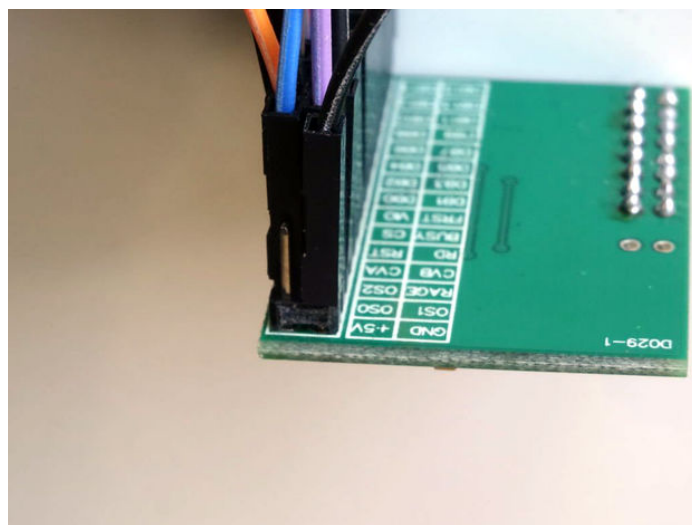
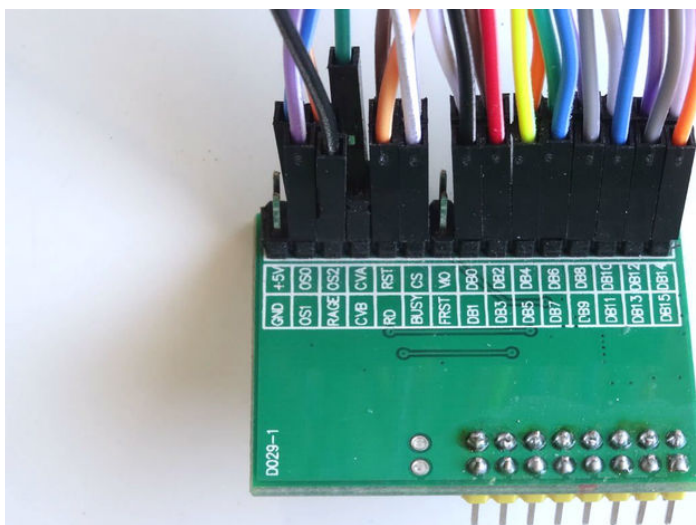
Step 6: Connect the OS0, OS1, and OS2 signals of the AD7606 Module to Arduino

1. Connect the Female end of a Female-Male(Orange wire) to the OS2 pin of the AD7606 Module (Picture 1)
2. Connect the Female end of a Female-Male(Blue wire) to the OS0 pin of the AD7606 Module (Picture 2)
3. Connect the Female end of a Female-Male(Purple wire) to the OS1 pin of the AD7606 Module (Picture 3)
4. Connect the Male end of the OS0 wire(Blue wire) to the Digital pin 8 of the Arduino Mega board (Picture 4)
5. Connect the Male end of the OS1 wire(Purple wire) to the Digital pin 9 of the Arduino Mega board (Picture 4)
6. Connect the Male end of the OS2 wire(Orange wire) to the Digital pin 10 of the Arduino Mega board (Picture 4)



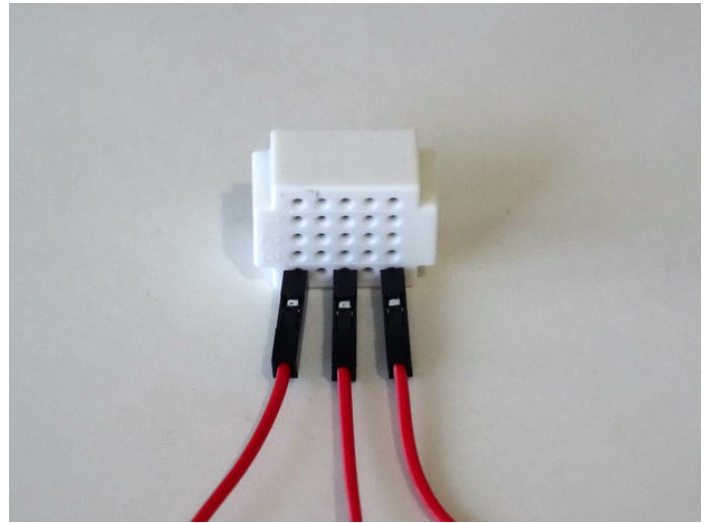
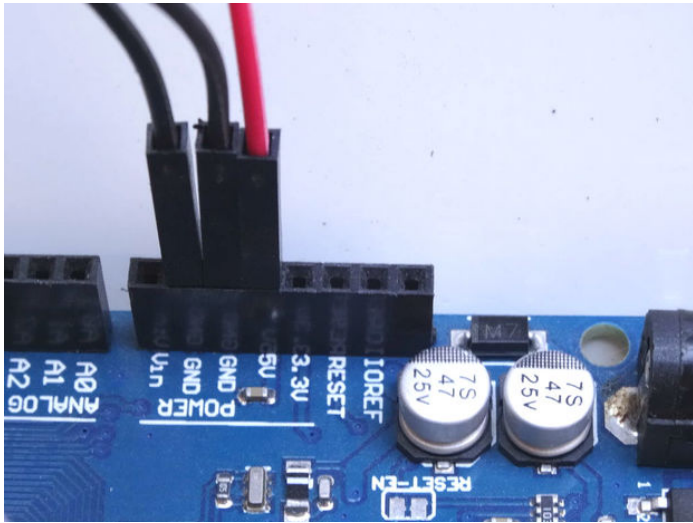
Step 7: Connect the Ground and Power wires to the AD7606 Module

1. Connect the **Female end of a Female-Male(Black wire)** to the **RAGE** pin of the AD7606 Module (Picture 1)
2. Connect the **Female end of a Female-Male(Black wire)** to the **GND** pin of the AD7606 Module (Picture 2)
3. Connect the **Female end of a Female-Male(Red wire)** to the **+5V** pin of the AD7606 Module (Picture 3)
4. Connect the **Female end of a Female-Male(Red wire)** to the **VIO** pin of the AD7606 Module (Picture 4 and 5)



Step 8: Connect the Ground and Power wires between the AD7606 Module and Arduino

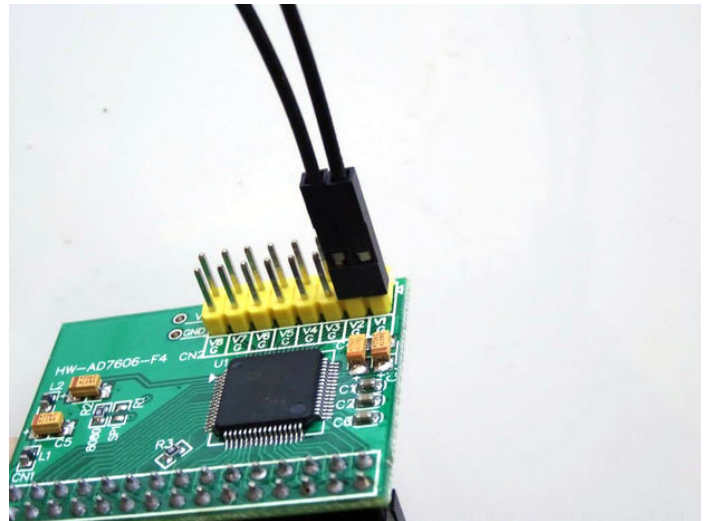
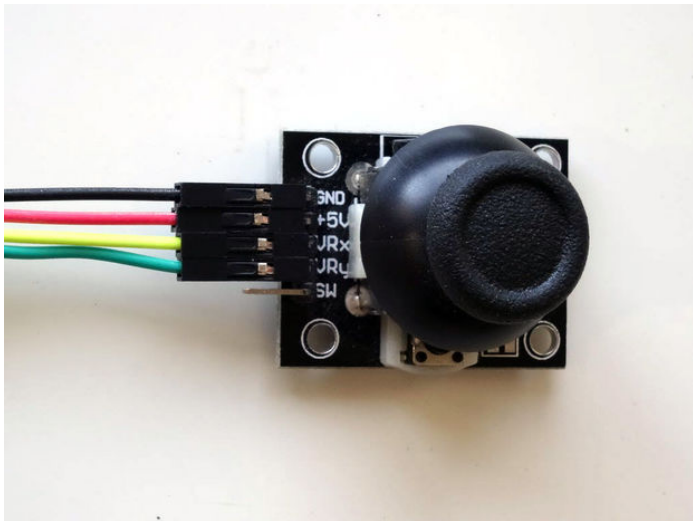
1. Connect the **Male ends** of the **Ground Wires(GND and RAGE)** (**Black wires**) to the **Ground pins** of the **Arduino Mega** board (**Picture 1**)
2. Connect the **Male end** of a **Male-Male Power wire (Red wire)** to the **5V Power pin** of the **Arduino Mega** board (**Picture 1**)
3. Connect the **Male ends** of the **3 Power wires(Red wires)** - the 2 wires(**+5V** and **VIO**) from the **AD7606 Module**, and the one from **Arduino** together as example with the help of a **Breadboard** (**Picture 2**) - In my case I used a small Breadboard

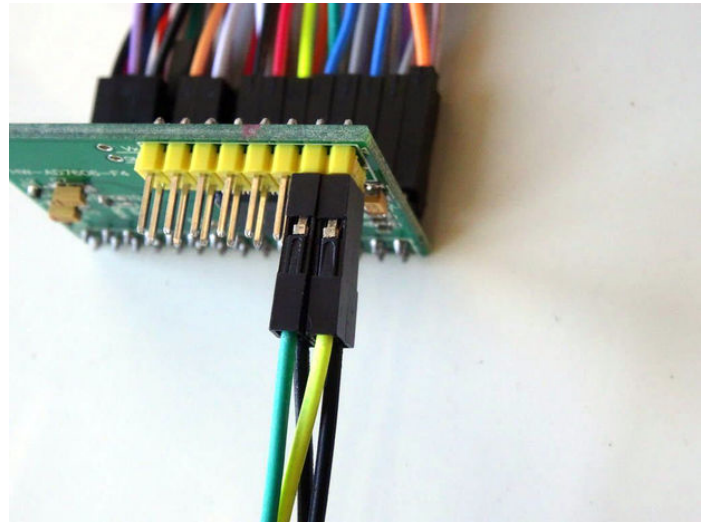
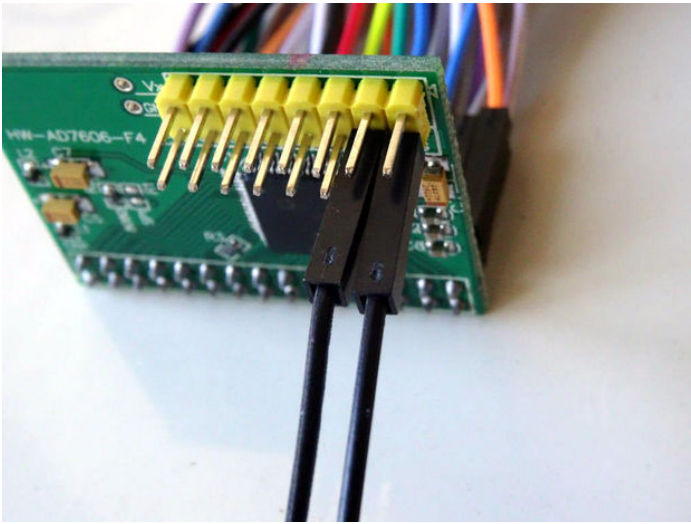


Step 9: Connect the Joystick to the AD7606 Module

To test the AD7606 Module we can use a **Joystick**. We will connect it to the first 2 Analog inputs, and will leave the rest unconnected. If you want, you can connect other analog signal sources to the rest of the channels.

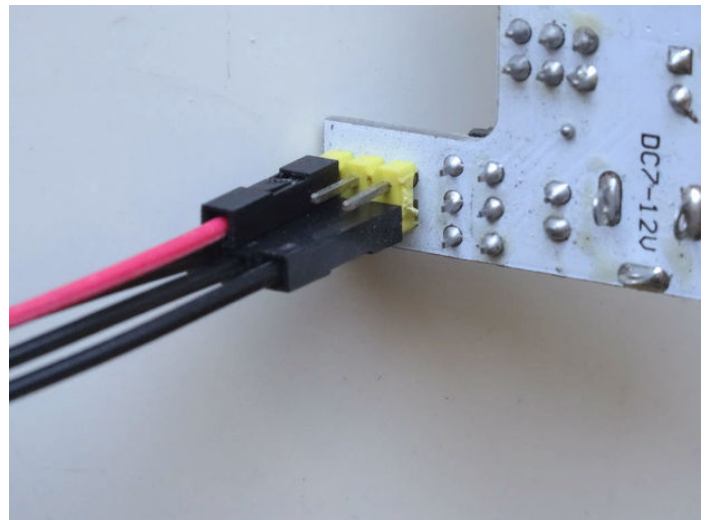
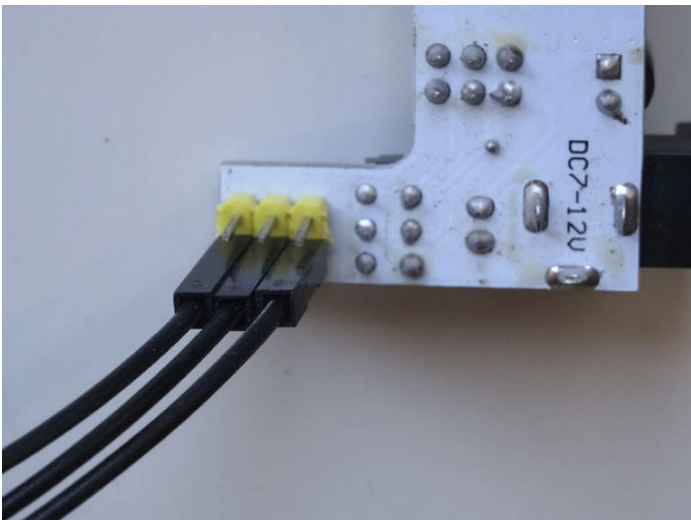
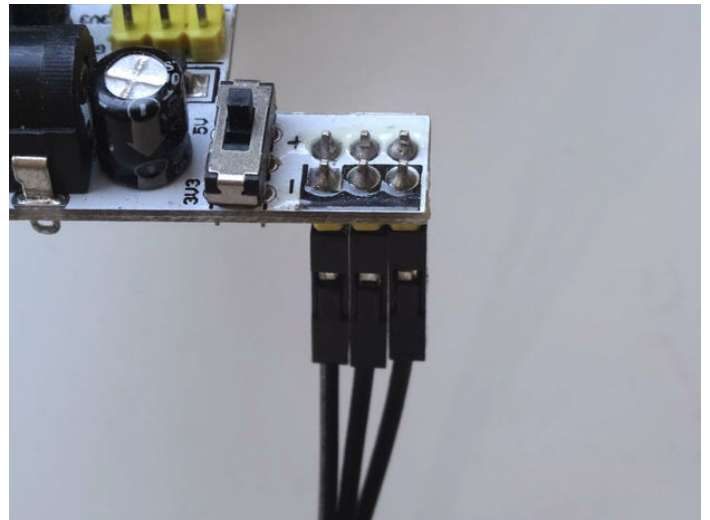
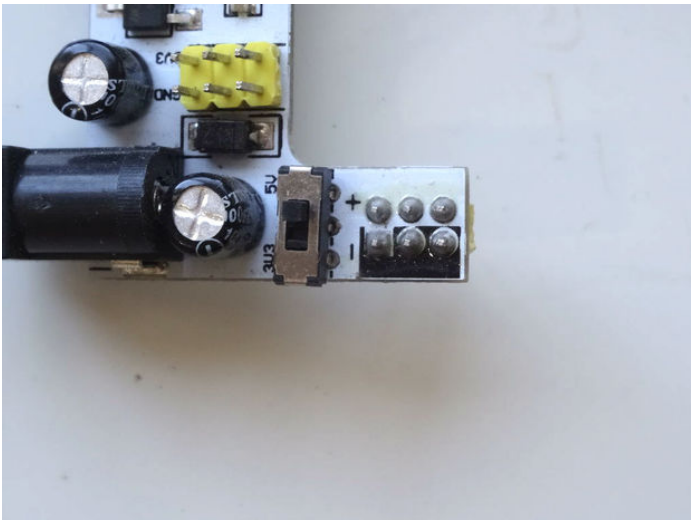
1. Connect **Female-Female** wires to the **Ground(Black wire)**, **Power(Red wire)**, **VRx(Yellow wire)**, and **VRy(Green wire)** of the **Joystick** (**Picture 1**)
2. Connect **2 Female-Female(Black wires)** wires to the **Ground pins** of the first **2 Analog Channels V1** and **V2** of the **AD7606 Module** (**Picture 2 and 3**)
3. Connect the other end of the **VRx wire(Yellow wire)** to the **Signal(Vx)** pin of the first **Analog Channel V1** of the **AD7606 Module** (**Picture 4**)
4. Connect the other end of the **VRy wire(Green wire)** to the **Signal(Vx)** pin of the first **Analog Channel V2** of the **AD7606 Module** (**Picture 4**)





Step 10: Connect separated power to the Joystick

1. Make sure the Power Selection Switch of the K2 power supply is set to 5V (Picture 1)
2. Connect the other end of the 3 Ground wires (Black wires) from the Joystick and the AD7606 Module to the "-" Ground pins of the K2 Power supply (Pictures 2 and 3)
3. Connect the other end of the Power wire (Red wire) from the Joystick to the "+" Power pins of the K2 Power supply (Picture 4)



Step 11: Start Visuino, and select the Arduino Board type

To start programming the Arduino, you will need to have the **Arduino IDE** installed from here: <http://www.arduino.cc/> .

Make sure that you install 1.6.7 higher, otherwise this Tutorial will not work!

The **Visuino**: <https://www.visuino.com> also needs to be installed.

1. Start **Visuino** as shown in the first picture
2. Click on the **"Tools"** button on the Arduino component (**Picture 1**) in **Visuino**
3. When the dialog appears, select **"Arduino Mega 2560"** as shown in **Picture 2**

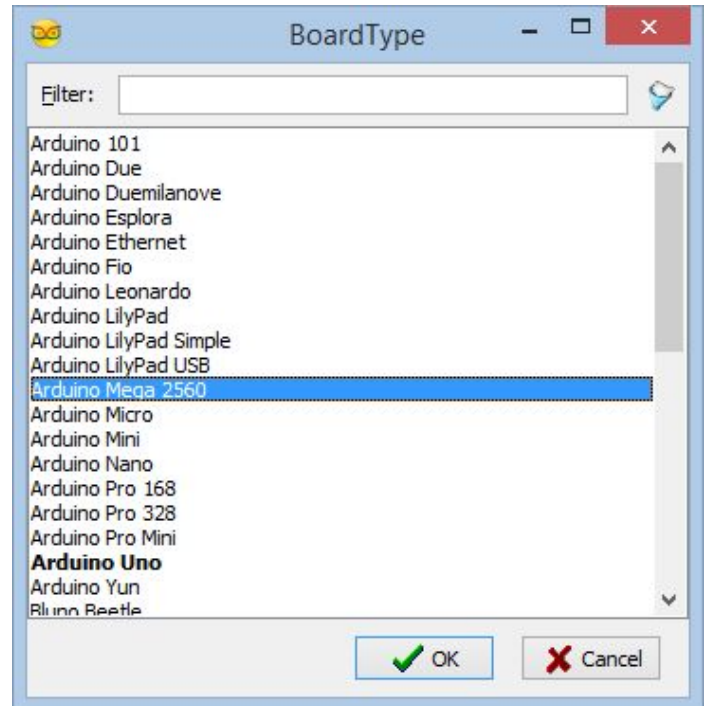
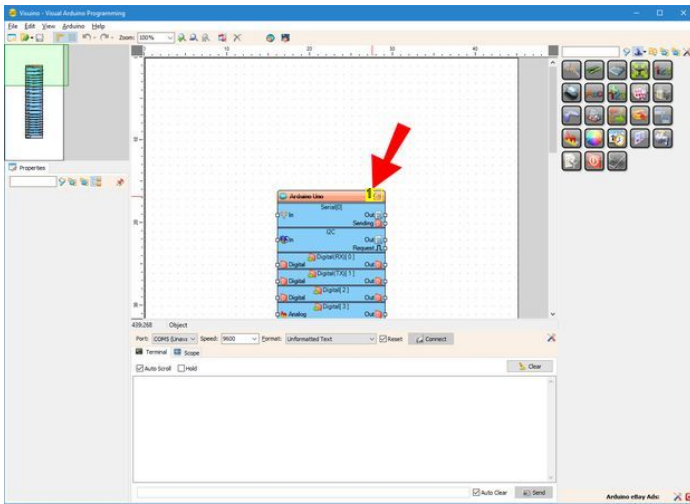


Image Notes

1. Click here

Step 12: In Visuino: Add AD7606 component, and connect the Data, Oversampling, Busy, and the Reset pins

1. Type **"ad76"** in the Filter box of the Component Toolbox then select the **"Analog Devices AD7606 8 Channel ADC Parallel"** component (**Picture 1**), and drop it in the design area (**Picture 2**)
2. Click in the **"Data"** pins box of the **AD7606ADC1** component to start connecting all the Data pins at once (**Picture 2**)
3. Move the mouse over the **"Out"** output pin of the **"Digital[13]"** channel of the **Arduino** component. The **Visuino** will automatically spread the wires so they will connect correctly to the rest of the pins (**Picture 2**)
4. Click in the **"Oversampling"** pins box of the **AD7606ADC1** component to start connecting all the Oversampling pins at once (**Picture 3**)
5. Move the mouse over the **"Digital"** input pin of the **"Digital[8]"** channel of the **Arduino** component. The **Visuino** will automatically spread the wires so they will connect correctly to the rest of the pins (**Picture 3**)
6. Connect the **"Busy"** input pin of the **AD7606ADC1** component to the **"Out"** output pin of the **"Digital[7]"** channel of the **Arduino** component (**Picture 4**)
7. Connect the **"Reset"** Output pin of the **AD7606ADC1** component to the **"Digital"** input pin of the **"Digital[5]"** channel of the **Arduino** component (**Picture 5**)

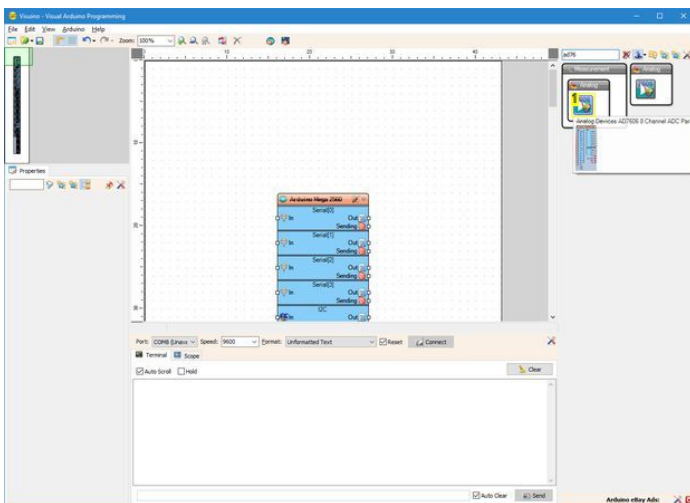


Image Notes

1. Select this component

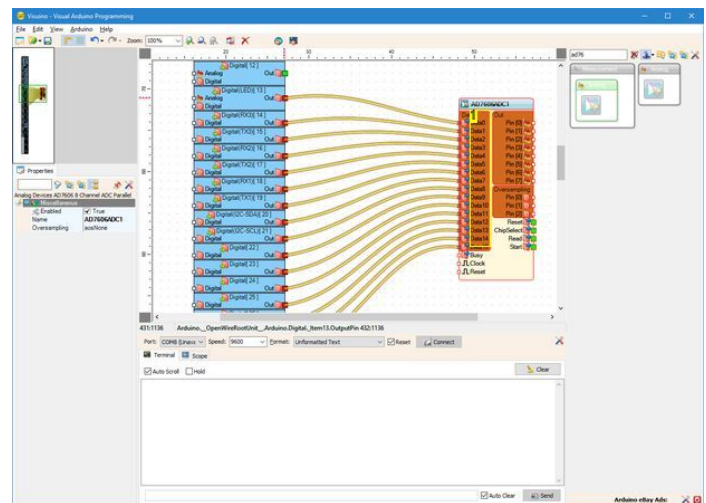


Image Notes

1. Click here to start connecting all the pins at once

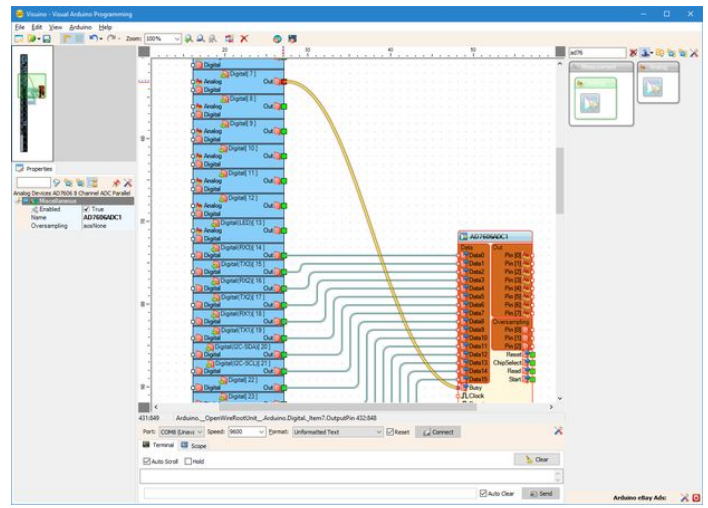
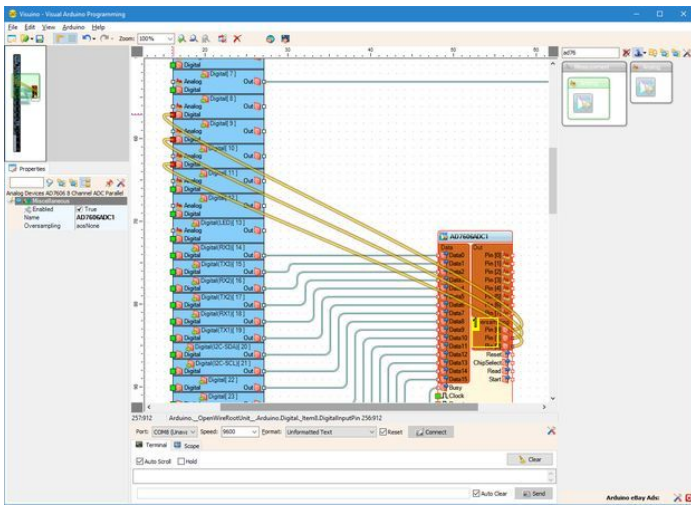
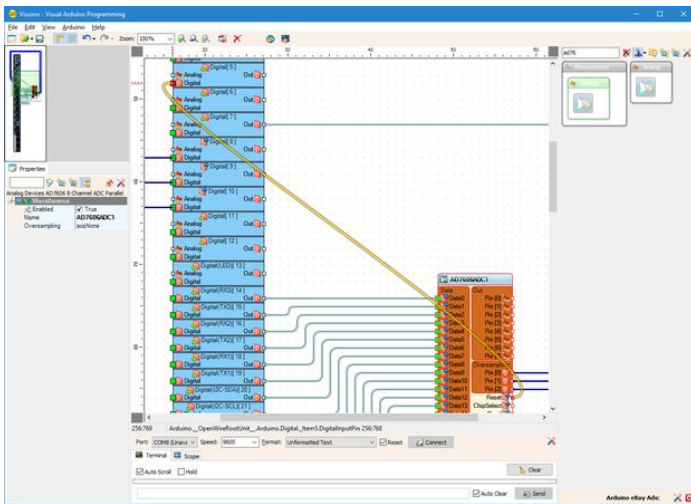


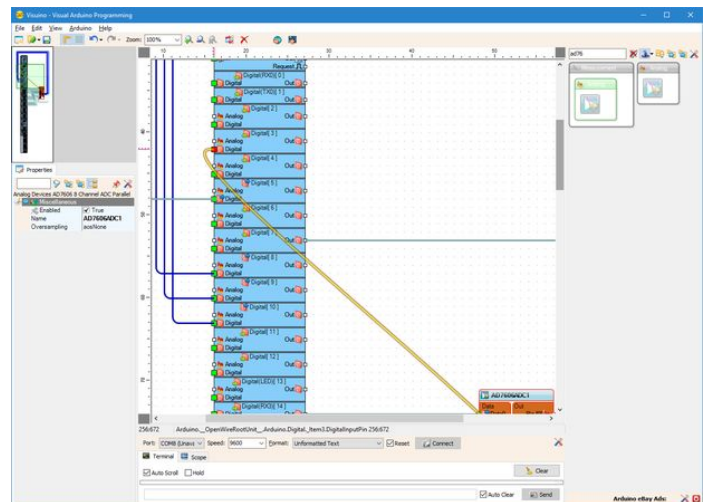
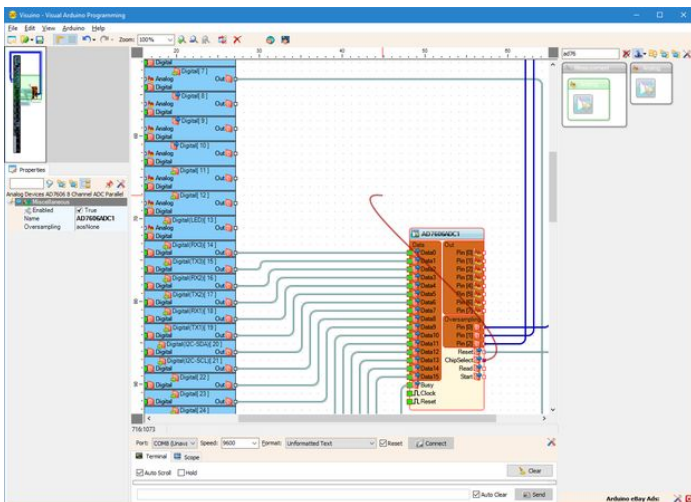
Image Notes

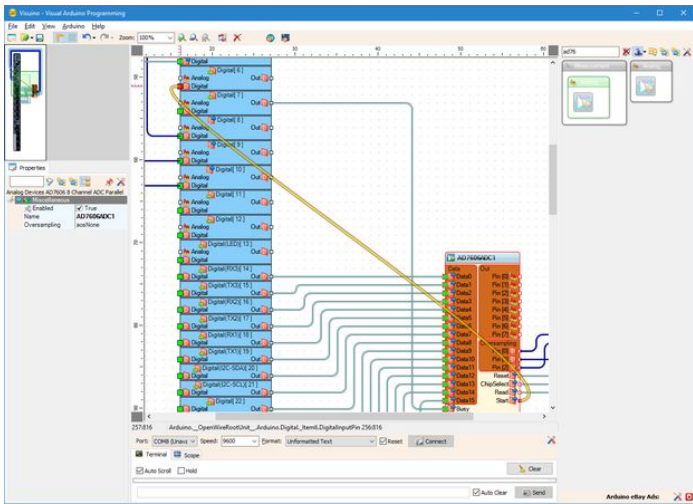
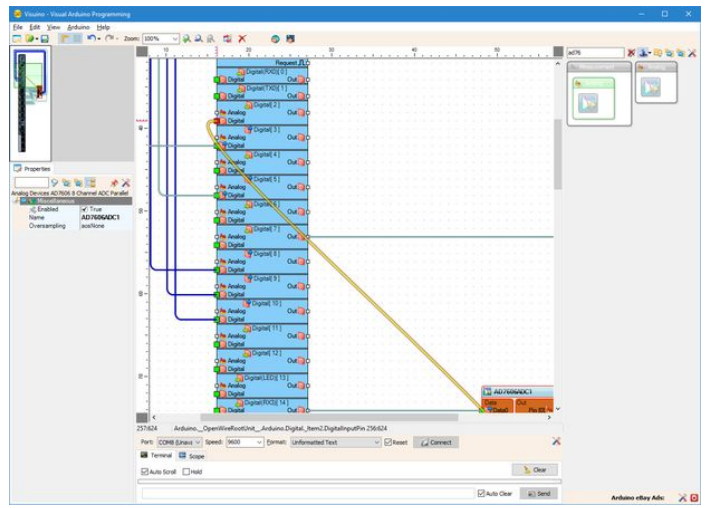
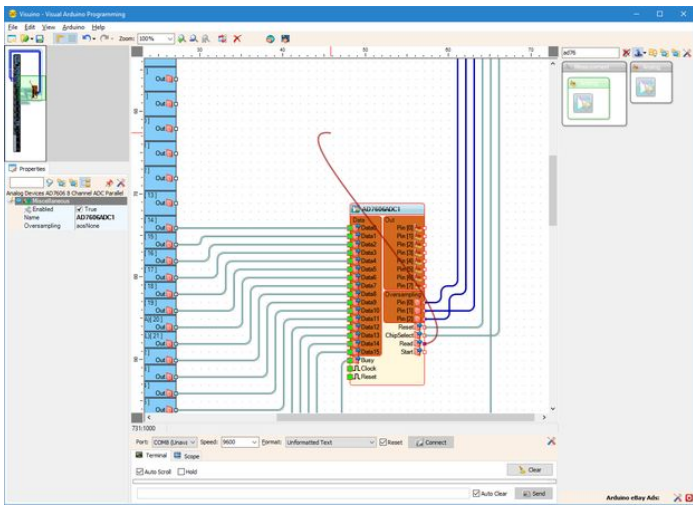
1. Click here to start connecting all the pins at once



Step 13: In Visiuno: Connect the AD7606 component's ChipSelect, Read, and the Start pins

1. Connect the "ChipSelect" Output pin of the AD7606ADC1 component (Picture 1) to the "Digital" input pin of the "Digital[3]" channel of the Arduino component (Picture 2)
2. Connect the "Read" Output pin of the AD7606ADC1 component (Picture 3) to the "Digital" input pin of the "Digital[2]" channel of the Arduino component (Picture 4)
3. Connect the "Start" Output pin of the AD7606ADC1 component to the "Digital" input pin of the "Digital[6]" channel of the Arduino component (Picture 5)





Step 14: In Visiuno: Add a Packet component and 8 Binary Analog elements to it

1. Type "pack" in the Filter box of the Component Toolbox then select the "Packet" component (Picture 1), and drop it in the design area
2. Click on the "Tools" button of the Packet1 component (Picture 2)
3. In the "Elements" editor select the "Binary Analog" element, and then click 8 times on the "+" button (Picture 3) to add 8 Analog elements (Picture 4)
4. Close the "Elements" dialog

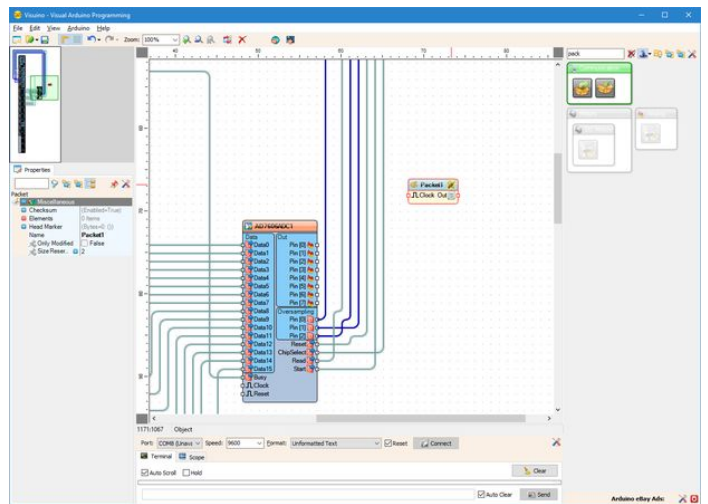
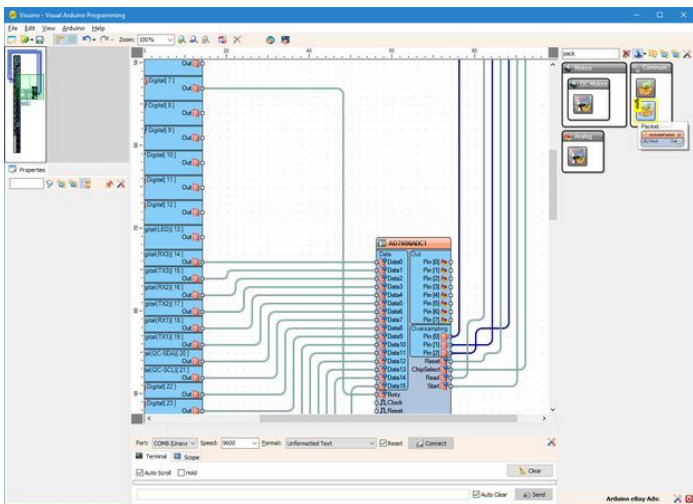


Image Notes

1. Select this component

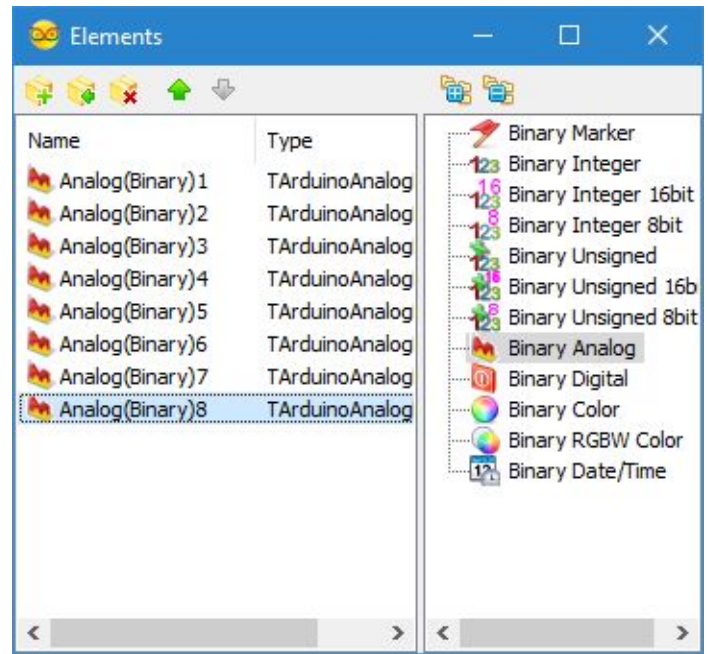
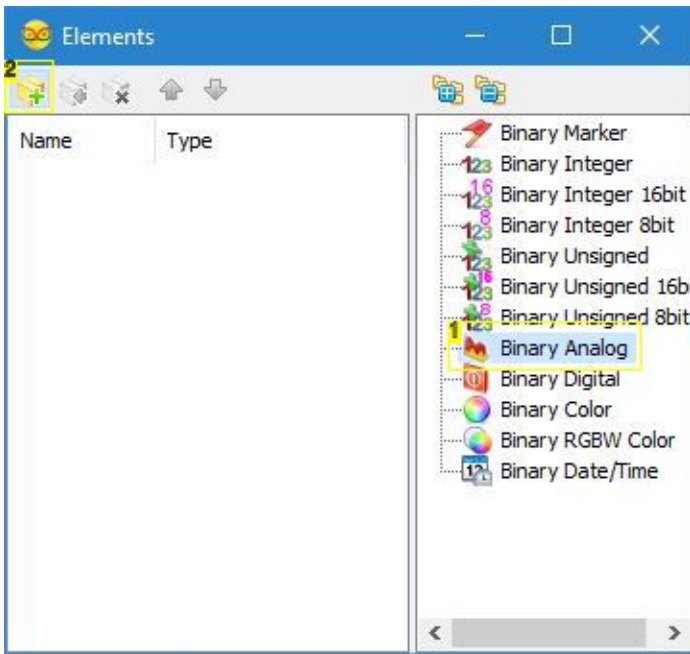


Image Notes

1. Select this
2. Click here 8 times

Step 15: In Visuino: Specify unique packet header

To make sure that Visuino will find the starting point of the packet, we need to have a unique header. The Packet component uses special algorithm to ensure that the header marker does not appear in the data.

1. Select the **Packet1** component (**Picture 1**)
2. In the Object Inspector expand the **"Head Marker"** property (**Picture 1**)
3. In the Object Inspector click on the **"..."** button (**Picture 1**)
4. In the Bytes editor type some numbers, as example **55 55** (**Picture 2**)
5. Click on the **OK** button to confirm and close the editor

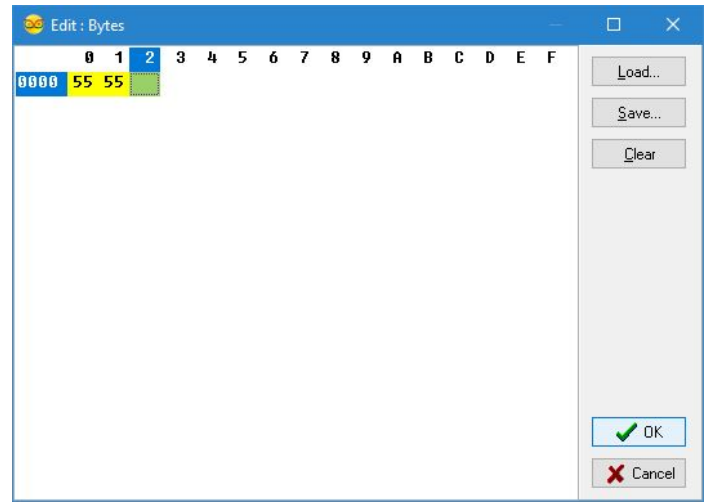
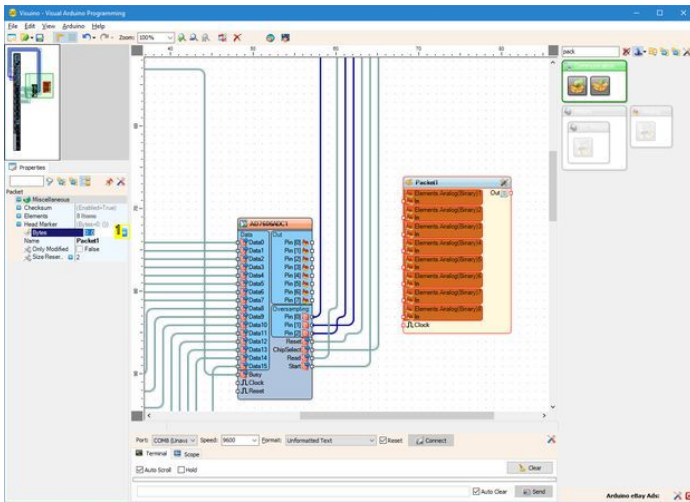


Image Notes

1. Click here

Step 16: In Visuino: Connect the Packet component

1. Click in the "Out" pins box of the **AD7606ADC1** component to start connecting all the Out pins at once (**Picture 1**)
2. Move the mouse over the "In" input pin of the "Elements.Analog(Binary)" channel of the **Packet1** component. The **Visuino** will automatically spread the wires so they will connect correctly to the rest of the pins (**Picture 1**)
3. Connect the "Out" output pin of the **Packet** component (**Packet 2**) to the "In" input pin of the "Serial[0]" channel of the "Arduino" component (**Picture 3**)

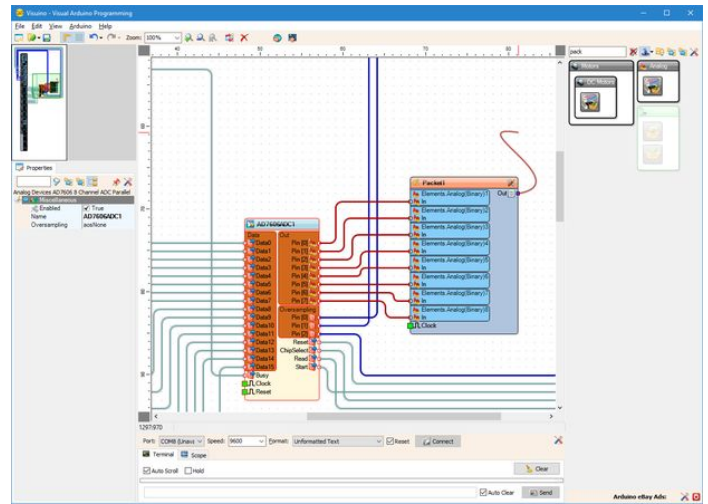
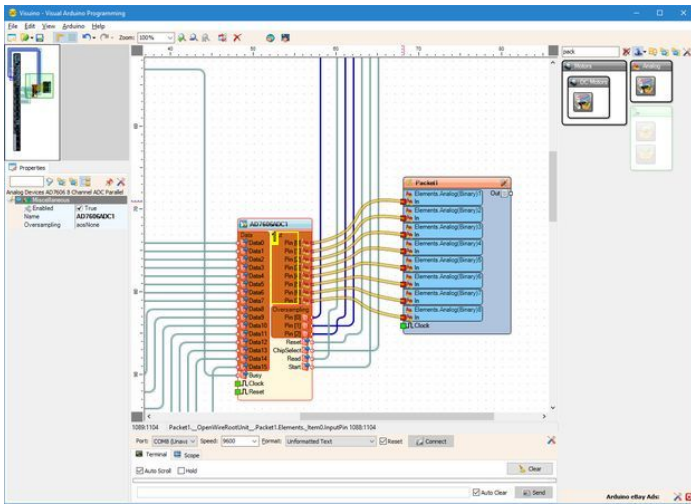
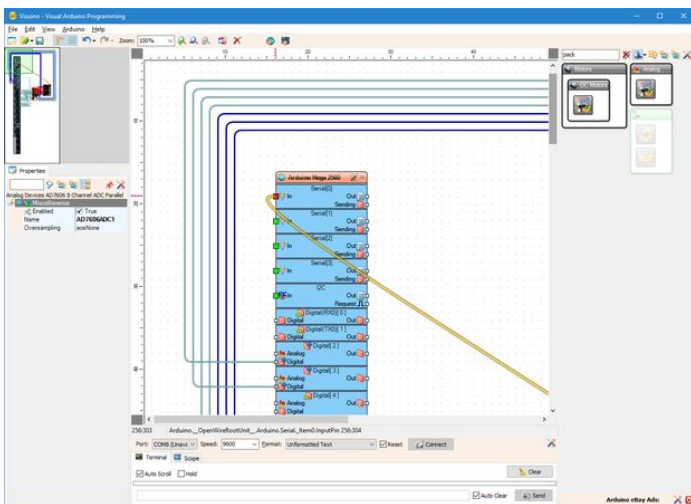


Image Notes

1. Click here to start connecting all the pins at once



Step 17: Generate, Compile, and Upload the Arduino code

1. In Visuino, Press **F9** or click on the button shown on **Picture 1** to generate the Arduino code, and open the Arduino IDE
2. In the **Arduino IDE**, click on the **Upload** button, to compile and upload the code (**Picture 2**)



Image Notes

1. Click here or press F9 to generate the code

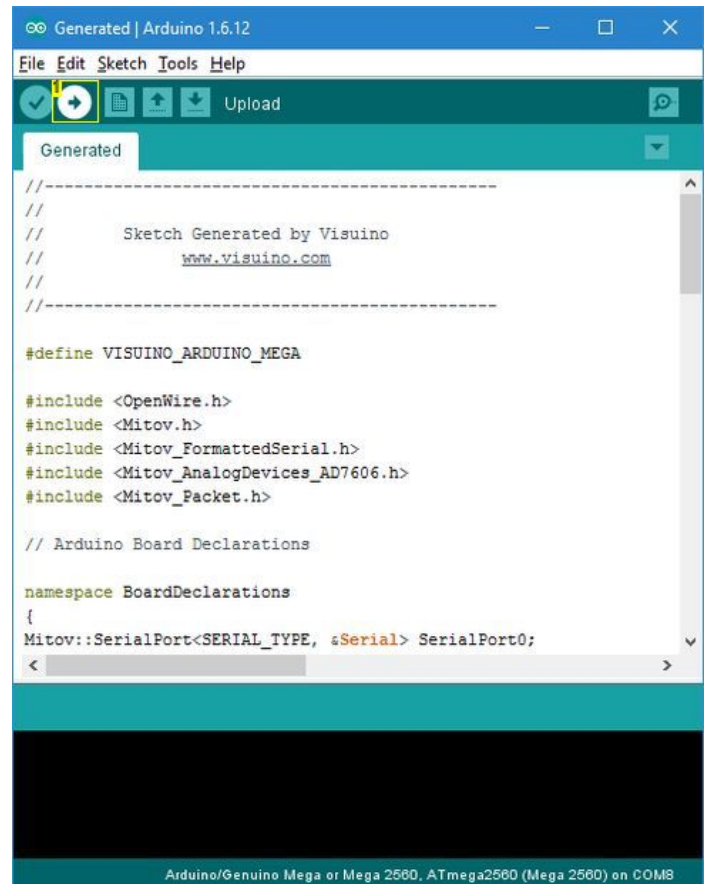


Image Notes

1. Click here to compile and upload the code

Step 18: And play...

Congratulations! You have created an **AD7606 8 Channel 16 bit Bipolar Analog to Digital Converter** measuring project in **Arduino**, with **Visual Instrumentation**.

On **Picture 1** you can see the complete **Visuino** diagram.

1. In **Visuino** select the **ComPort**, and then click on the **"Format:"** drop down box, and select **Packet1 (Picture 2)**
2. Click on the **"Connect"** button (**Picture 2**)
3. If you select the **"Scope"** tab, you will see the the Scope plotting the values from the 8 Analog Channels over time (**Picture 3**)
4. If you move the **Joystick** up and down, you will see the values of the first channel changing, and if you move it left and right you will see the values of the second channel changing. In the remaining 6 channels, you will see some small noise, as we did not connect any signal to them
5. If you select the **"Instruments"** tab, you will see the Gauges showing the same information (**Picture 4**)

You can see the connected and running **AD7606 8 Channel 16 bit Bipolar Analog to Digital Converter** on **Picture 5**.

Also attached is the **Visuino** project, that I created for this Instructable. You can download and open it in **Visuino**: <https://www.visuino.com>

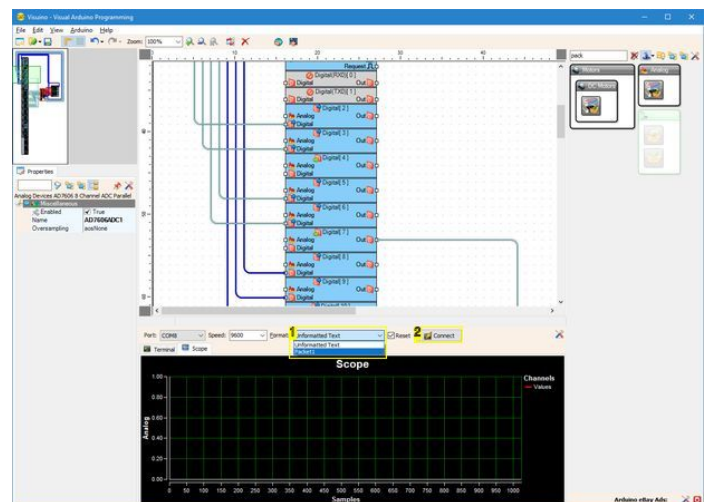
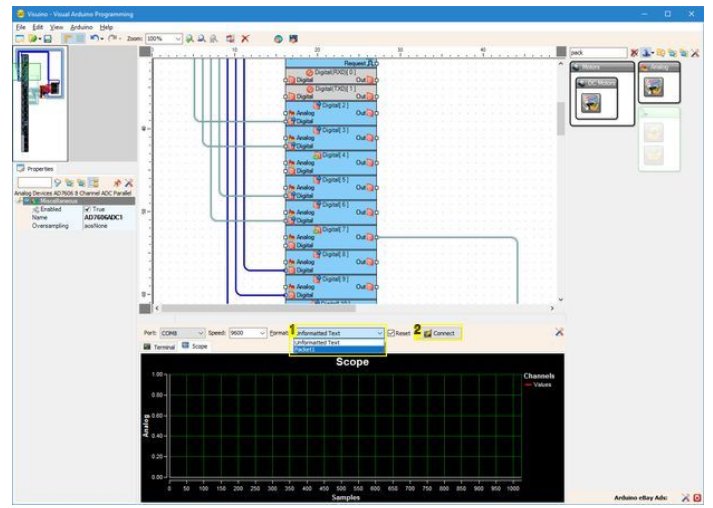
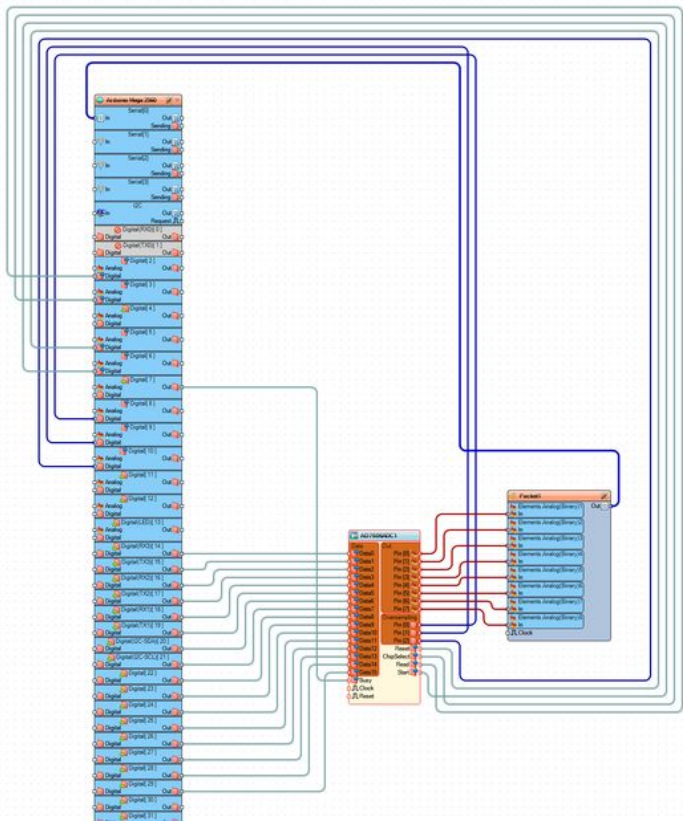
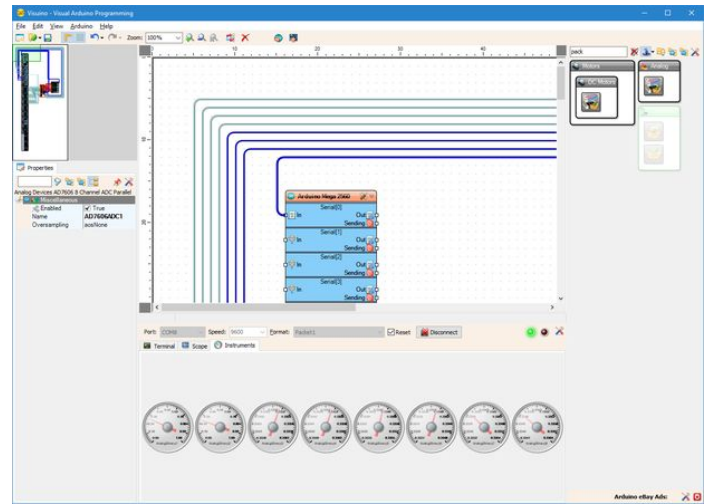
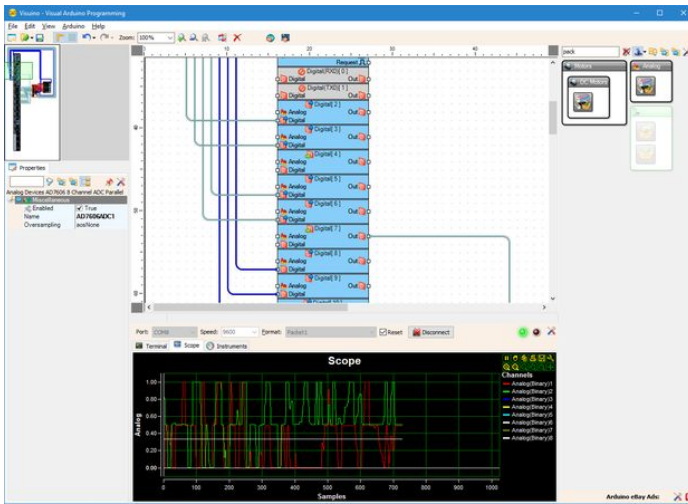
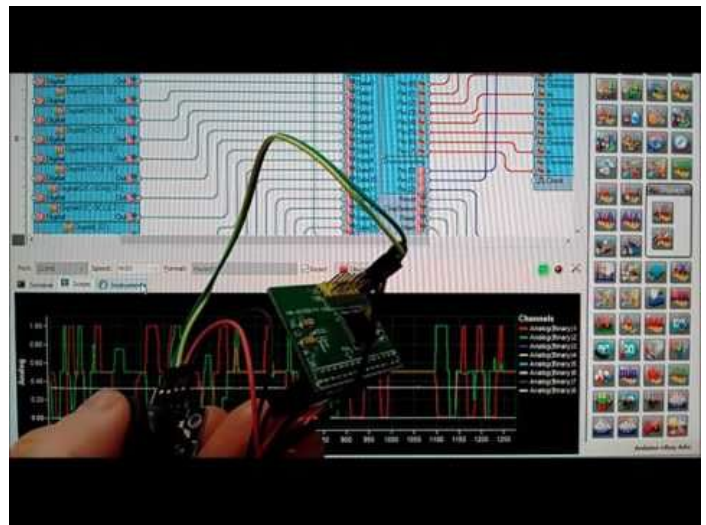
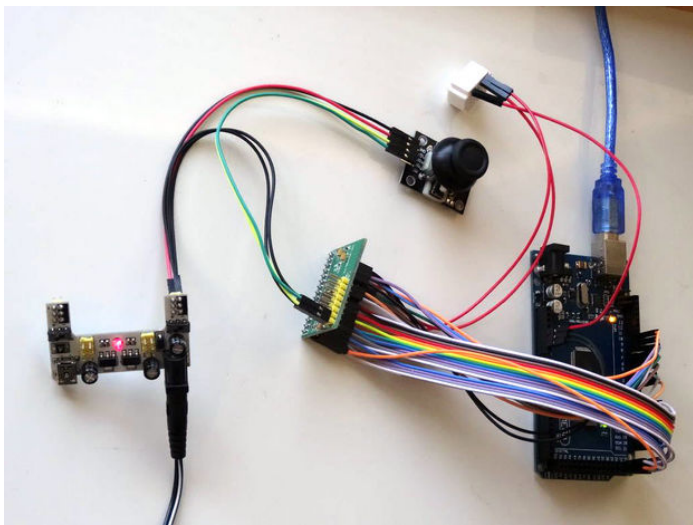


Image Notes



1. 1. Select Packet1
2. 2. Click to connect





File Downloads



VisuinoAD7606Parallel8Tutorial.zip (1 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'VisuinoAD7606Parallel8Tutorial.zip']

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Arduino Mega 2560 based LDR Light Intensity Control by syedhamzahasan



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