

Arduino Compatible Do-it-Yourself Kit

Sr. Num.	Topics	Page
1	About Arduino and DIY	3
2	Product Contents and Assembly Instructions	4
3	Important information	12

1. About Arduino & DIY

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software.

It's 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.

Little understanding of C Programming syntax is enough to use the board for making variety of projects and applications.

This product is even recommended for school kids who are aware of C Programming.

This is the most successful method to introduce kids and even elders to the world of microcontrollers and embedded systems.

EmbeddedMarket.com is manufacturing Arduino Compatible boards since many years for now.

The original Arduino board comes from Italy and as said above, the Arduino design is open source. Thus we at EmbeddedMarket.com have modified the Arduino hardware design for some good reasons so that the products will be more powerful and easy to use.

EmbeddedMarket.com makes

1. Arduino Duemilanove compatible Freduino-DU fully assembled board with male headers.
2. Freduino RichBoard which has many advanced features in addition to the core Arduino hardware
3. Do it yourself kit for Arduino (you are reading documentation for this product)
4. Arduino hardware is also included in many other development products like EEDT6.0

The Do it yourself concept helps beginners to start from scratch. You start with soldering the board and then start using the board. It gives you immense pleasure of constructing your own product.

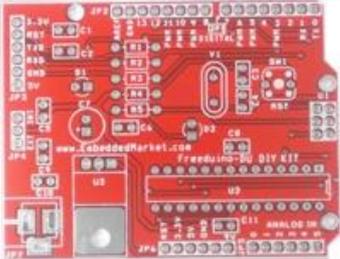
The assembly i.e. soldering process of this Arduino compatible DIY Kit is very simple and is discussed in detail on further pages.

It takes 20 - 30 minutes to assemble the board.

2. Product contents & Assembly Instructions

Warning for kids: The process of soldering & cleaning the PCB requires parents / teachers supervision. The soldering process is not recommended for kids below 13 years old.

List of components included in the kit:

	Printed Circuit Board (PCB)	1
	IC ATmega328 microcontroller with pre-loaded Arduino-DU bootloader	1
	IC 7805	1
	IC Base 28 Pin	1
	Red LED 3mm	1
	Green LED 3mm	1
	Two pin Micro Switch	1
	Ceramic capacitor - 0.1uF (Marked 104 or 0.1 on capacitor)	8
	Resistance - 1KOhm	4

Freeduino DIY Kit - Arduino Compatible Do-it-Yourself Kit

	Resistance - 10K Ohm	1
	Crystal - 16MHz	1
	Ceramic capacitor - 22pf (Marked as 22 on capacitor)	2
	Electrolytic Capacitor - 10uf/40V	1
	Barrel Jack Connector	1
	Two Pin Short Link	1
	Eight Pin Male header	2
	Six Pin Male header Straight	2
	Six Pin Male header Right Angle	1
	Three Pin Male header	1

Soldering the board requires certain additional tools and accessories. These items are not included in the kit and you should keep them ready before beginning the assembly work.

Tools and accessories you will need for assembly:

1. Soldering Gun of 15W to 25W rating.
2. Solder metal wire 22 Gauge
3. Lead cutter
4. Thinner used to clean paint brush or industrial IPA
5. Tooth brush, used or new

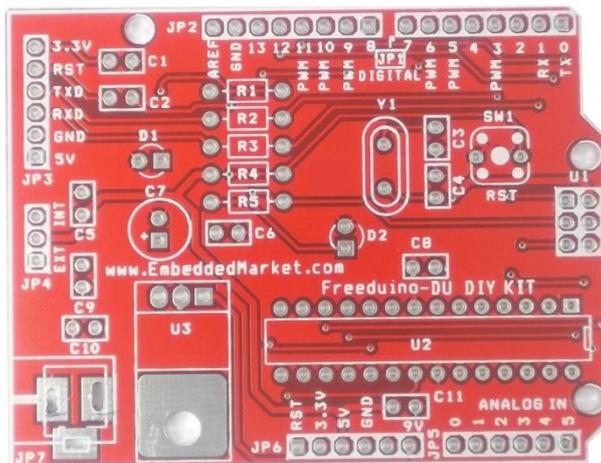
To use the board, you will need the Sketch Loader Circuit (made by EmbeddedMarket.com).

Note:

1. Soldering gun's tip should be clean. Wipe it on damp sponge in between soldering
2. If your soldering gun is not temperature controlled then let the soldering gun heat up to the fullest. It takes couple of minutes.
3. To check soldering gun's temperature, touch the soldering tip to the soldering metal wire and see if it melts easily and quickly.
4. After soldering component, cut component's lead at safe distance from PCB. Not all component leads requires cut.
5. Safe guard your eyes and nose from the fumes generated while soldering. If possible, use a fume extractor or use a simple fan of any type to drive the fumes in opposite direction so that they won't come to your face.
6. Do not use plastic chairs for sitting during the soldering process. Such chairs carry static charge. Such static charge can damage electronics component easily.
7. Do not store finished PCB in to plastic bags. Static charge from plastic bags can also damage the end product.
8. Use antistatic bags or paper bags to store bare electronic products.

Freeduino DIY Kit - Arduino Compatible Do-it-Yourself Kit

Below chart shows component placement. Follow the same sequence which is defined, based on component's height.



Soldering Sequence	Component Marking	Component Value	Polarity Importance
1	R1, R2, R3, R5	Resistance 1K Ohm	None
2	R4	Resistance 10K Ohm	None
3	C3, C4	Ceramic capacitor 22pf	None
4	C1, C2, C5, C6, C8, C9, C10, C11	Ceramic capacitor 0.1 uf	None
5	U2	IC Base 28 Pin (Do not solder IC directly)	Match the notch of IC Base with the notch mark on the PCB.
6	SW1	Two pin Micro Switch	None
7	Y1	Crystal - 16MHz	None
8	D1	Green LED 3mm	Insert longer lead in square pad on PCB.
9	D2	Red LED 3mm	Insert longer lead in square pad on PCB.
10	U3	IC 7805	Bend IC's legs and match the hole of metallic part of the IC and the bigger hole on the PCB
11	C7	Electrolytic Capacitor 10uf/40V	Insert longer lead into Square pad on PCB. The square pad is also marked with + sign.
12	JP1	Eight pin male header	None.
13	JP2	Eight pin male header	None
14	JP5	Six pin male header straight type	None
15	JP6	Six pin male header straight type	None
16	JP3	Six pin male header right angle type	None
17	JP4	Two pin male header	None
18	JP7	Barrel Jack Connector	None

No component to be inserted at U1. U1 is 6 pin ISP port, not required for the regular usage of the board

Cleaning the PCB after soldering:

This process is to be done only by adults / parents / teachers. Kids should not attempt to clean the PCB.

Soldering metal wire contains flux (rosin). Flux helps better quality soldering. After soldering the same flux looks very dirty on the soldering side of the PCB. Thus the PCB needs cleaning.

There are various methods used to clean the PCB.

Below is the simplest one as the cleaning liquid used is easily available in any hardware shop.

Ask for "thinner to clean paint brush" in any hardware or paint shop. Buy a small quantity of it, 50ml is what you will need, but the hardware shop may sell half a liter minimum.

Note that PCB may get damaged if inappropriate thinner or a strong thinner is used. Before beginning the cleaning process, apply a drop of it on corner of PCB and wait for 10 minutes to see the results. If you don't see change in the color of PCB, then you may go ahead with the cleaning process.

Wear a clear glass goggle before starting the cleaning job. This will safeguard your eyes from sprinkles of the thinner. Dip the toothbrush in to this thinner and rub it on the bottom (solder side) of the PCB. Repeat the process for couple of times and keep PCB in direct sunlight or under fan to dry.

The thinner is inflammable and has strong smell. It is dangerous if not handled properly. Do not let it touch to your face and eyes. Do not taste it. Do not smell / inhale inside the bottle.

Wash hands immediately after you are done with cleaning work.

Final step before using the board:

As your board is assembled and cleaned, you may complete the last step and start using it.

1. Locate JP4 connector on the board. You have assembled a three pin male header here. It has "INT" & "EXT" markings on either side of it. Connect "two pin short link" between center pin and the pin marked with "EXT".



2. Now you are left with only one part i.e. ATmega328 controller. This controller has some firmware (piece of software) loaded in it. This piece of software is called as boot-loader.

Pick up the ATmega328 IC and match the notch of IC and notch of the 28 pin IC Base. Push the IC into the IC Base gently. Ensure that none of the IC's leg comes out of the IC Base.

In case if the legs bends, then DO NOT try to straighten with hands. This may break the leg. Instead use Nose pliers to straighten it.

Your board is now ready to be used.

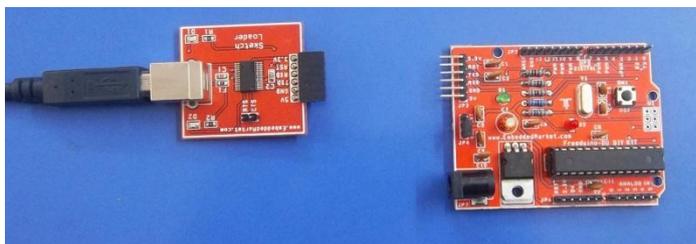
Let's start using it:

1. Keep the **Sketch Loader Circuit** ready to begin actual usage of the board. The Sketch loader circuit is made by EmbeddedMarket.com and needs to be purchased separately. It is not included in this product. The Sketch Loader Circuit comes with USB Cable.
2. Download latest Arduino Software from <http://arduino.cc/en/Main/Software> website
3. Unzip the downloaded file. No installation required.
4. Run arduino.exe
5. Connect one end of USB cable to PC / Laptop

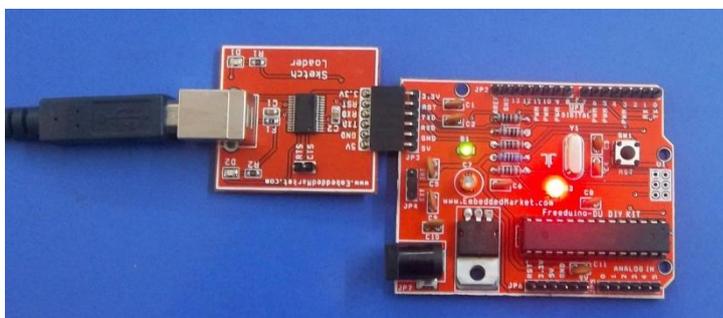


Freduino DIY Kit - Arduino Compatible Do-it-Yourself Kit

6. Connect the Sketch Loader Circuit to other end of the USB Cable. Two LEDs on the Sketch Loader Circuit will blink momentarily and will remain off thereafter.



7. If PC / Laptop ask for driver, then in the driver installation wizard, select driver file from sub directory "drivers\FTDI USB Drivers" located under the above unzipped Arduino software folder. The latest FTDI drivers are available at <http://www.ftdichip.com/Drivers/VCP.htm>
8. After driver installation is over, look into the Arduino Software's menu, Tools => Serial Port.
9. Select the Serial Port number COMxx where xx is unique number generated on your computer. In case you find multiple COMxx entries in this menu then observe which disappears after disconnecting the USB Cable from computer. The disappearing one is the correct to select.
10. Again in the Arduino Software menu, Tools => Board, select "Arduino Duemilanove or Nano w/ ATmega328". This is the type of board you have built above.
11. Now connect your board to the Sketch Loader Circuit as shown in the picture below. DIY Board receives power from your computer's USB port.



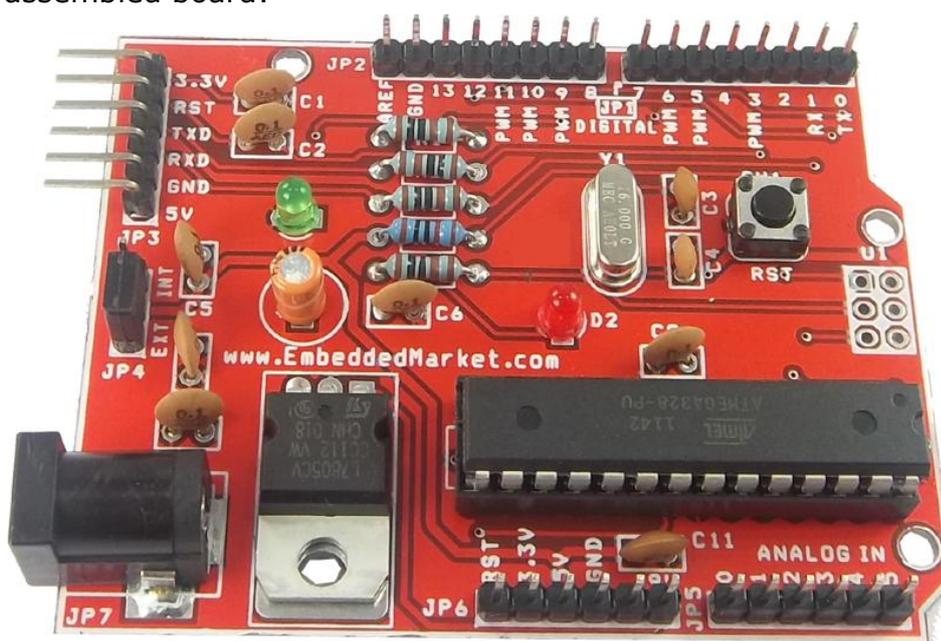
12. Again in the Arduino Software menu select, File => Examples => Basic =>Blink. This will open the Arduino code for Blinking the Red LED on the board. The RED LED is connected to Digital Pin 13.
13. To upload the LED Blink code to your own built Arduino board, click menu File => Upload to I/O Board from the Arduino Software. Alternatively you may also click Upload button from Arduino software toolbar.
14. You will find that LED is blinking every second.
15. You may experiment in the code by adding more delay commands in the code on separate lines and upload again to the board.

For more experiments, you will need additional I/O boards and shields.

These are available at EmbeddedMarket.com

Points to note while using the board for first time:

1. Two LEDs of Sketch Loader Circuit should blink for a moment immediately after connecting it to PC, later both will remain off. These LEDs blinks when there is some data transfer to & from PC.
2. On the Arduino DIY board, the Green LED (D1) will glow always when connected to the Sketch Loader Circuit. This indicates Power ON
3. The Red LED D2 will glow only if your Arduino code is written it to do so.
4. While uploading the code to your board, if you encounter communication error then check the connections from PC to the board via USB cable and the Sketch Loader Circuit. Also check the orientation of the ATmega328 IC, you might have pushed it wrongly. In such case you may safely remove the IC using a very small tip screw driver.
5. If green LED on the Arduino DIY board is not glowing even after connecting to the Sketch Loader Circuit, then check location of "Two pin Short Link" (also called as Jumper Pin) is on EXT side.
6. If you want to power the board from external power source instead of the PC, then shift the "Two pin Short link" to INT Side on JP4. Ensure that you connect regulated 9V DC Power Source to the barrel connector JP7.
7. Ref image of assembled board:



3. Important information

1. The “Freduino DIY Kit - Arduino Compatible Do-it-Yourself Kit” product is designed for experiments and is not suitable to be used in life support and mission critical products. It should be assembled and soldered under expert supervision.

2. Manufactured by:

Embedded Market

205 Decision Tower

Next To CityPride

Satara Road

Pune 411037 India

Ph:+91 20 24228818

For Support- Login to your account at EmbeddedMarket.com and post Support request via Support request Link

Email for Sales – sales@embeddedmarket.com

Website – www.EmbeddedMarket.com

3. For Product Customization & Bulk orders, contact sales@embeddedmarket.com

4. Arduino is trademark of Arduino.cc

5. Some text on page 3 is copied from arduino.cc