[DFROBOT]

[DRIVE THE FUTURE]

4Drawing - Interactive Electronics Frame User Manual

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Precautions：

A. This product contains small parts, not suitable for children under 6 years old and use.

B. This product is not waterproof and moistureproof function, please keep or use in a dry environment! Not heavy can be stacked on top.

C. This product uses the USB or supporting the battery box power supply, the use of other power supply if the above 5.5V may cause permanent damage to the products controller.

Preliminary Assembling

1 Preparation

1) 4DrawingKit Parts List

You'll be able to get this kit via DFRobot Online Store or resellers. In this kit you'll find:

| Parts/Components	Introduction	Amount	Image
"Palette" Controller	Based on Atmega32U4, compatible with Arduino	1	
LED Module	LED: Redx2, Greenx2, Orangex2, Bluex2, Whitex2; GNDx1	1	
PIR Motion Sensor	Detects whether a human has moved in or out of the sensors range	1	
Front Frame	Front frame	1	
Back Frame	Back frame	1	
LED Cardboard Holder	Inner cardboard in the frame，it is use to hold LEDs and etc.	1	
Cardboard Corner	Footpad for LED Cardboard Holder	4	
Aluminum Foil	278mm (L) 193mm (W) Aluminum Foil for GND	2	
Aluminum Foil Sticker	84x conductive 20mm x 4mm Aluminum Foil Sticker	1	
Micro USB Battery Box	3x AA Batteries	1	
Cable Set	22-24x Wires with DuPont Head (15cm): M/M：Red、Yellow，Blue. Each about 5x; F/M：Red、Yellow、Blue. Each about 3x		
Traceless Wall Hook	For hanging	2	
Push Pin	For marking	1	
Masking Tape	1cm wide	1	
Stick Glue	Stick glue	1	
Contour	Contour drawing	2	

Drawing			

- Frame Dimension：352x274x30mm
- Canvas Dimension：A4 （210 x 297mm）or 12 x 9inch（228.6 x 304.8mm）
- Frame Window Dimension：287 x 200mm（smaller than A4）
- Frame Material：Paperboard, corrugated paperboard
- Power Supply：3xAA or micro-USB
- Battery Life：30 days with AA batteries（In standby mode, all modules will shut down automatically except zone W.）
- LED Module Interface：4 Channel 40Ma I/O Interface（Zone Z），4 Channel 500mAOutputInterface(Zone X)
- Extension Interface： 4 Channel 3PIN for Sensor/Actuator（Zone S）/1 Channel UART/1 Channel I2C
- Wakeup Interface：1 Channel 3PIN for Sensor (Zone W）

2　Making the Frame

1）Making Frame Holder: glue the Cardboard Corners onto the LED Cardboard Holder
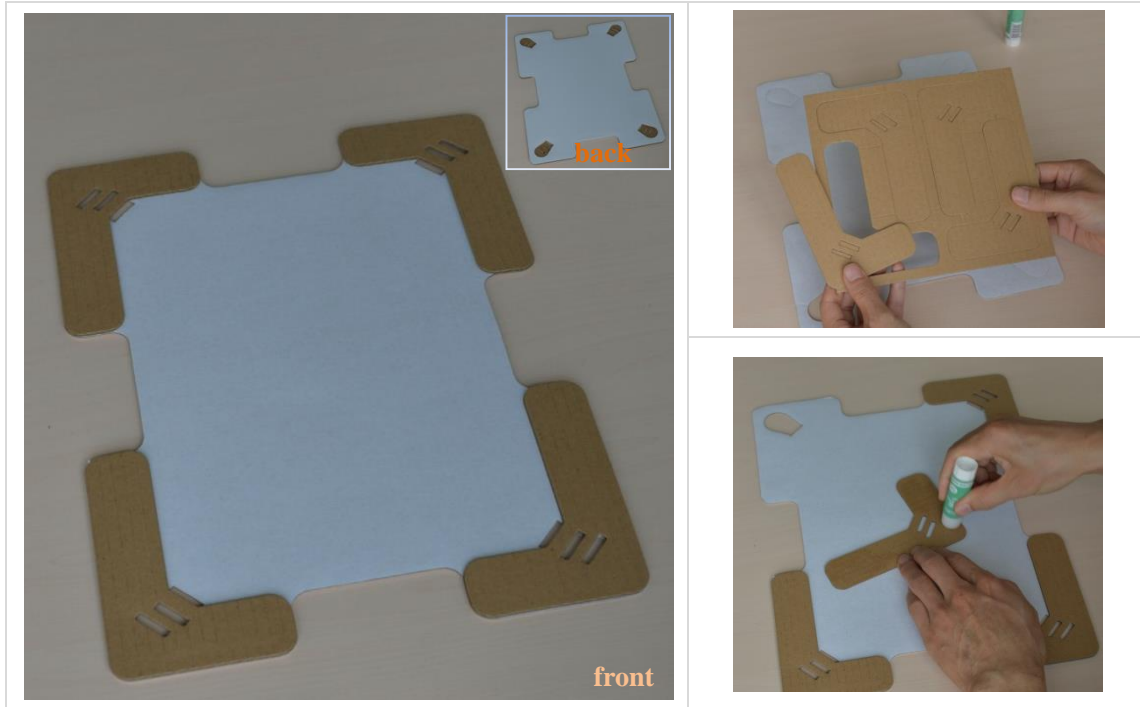
2）Making the pillars of Back Frame: fold to stand, then glue and keep till dry
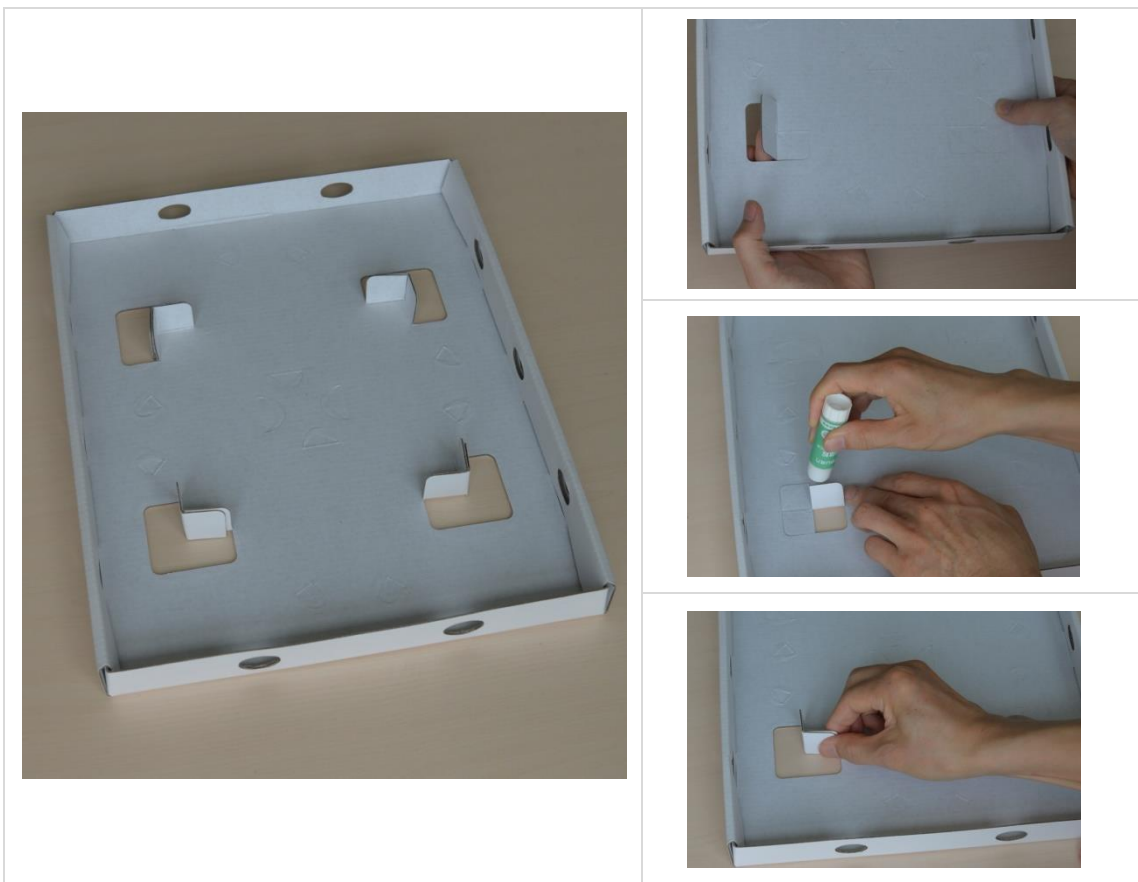
3) Making the Front Frame: remove the dentate cover, separate carefully with knife or tear apart

➕ **Now you should have a paper frame ready!**

3   Hanging the Frame

1)   Choosing hanging position: 4drawing can be hanged vertically or laterally. Locate the nails

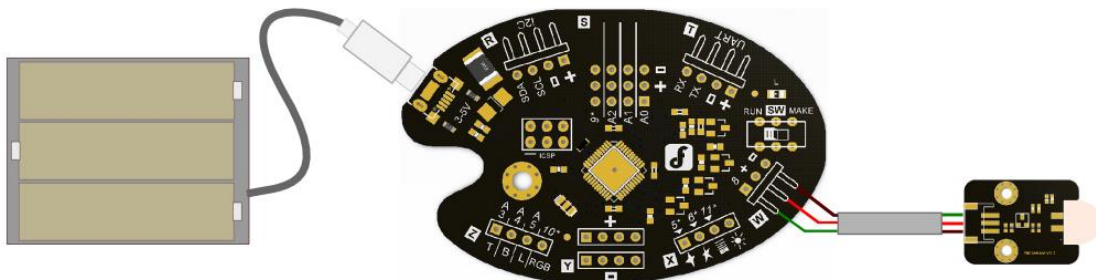with hollow area 🔼 in the back of frame box, as shown in figure
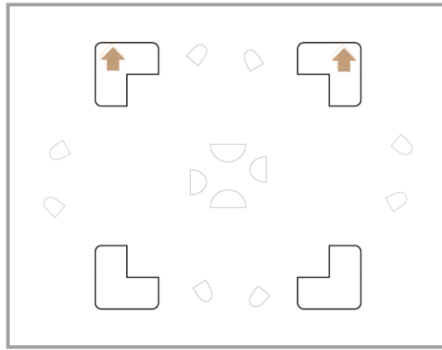
2) Hammer the Traceless Wall Hook and hang the frame onto wall.

➕ **Now you have a way of showing off your paintings!**

4 Electronic Setup

1.1 Wiring the Modules
1）Insert batteries into battery box
2）Connect battery box with micro USB port on Palette
3）Connect PIR Motion Sensor with Zone W on Palette

1.2 Placing the Modules
1）Place the battery box in the middle of Back Frame, reinforce with sticky tape
2）Place the Palette Controller on one side
3）Place the PIR Motion Sensor onto the elliptic hole on the Back Frame, reinforce with tape
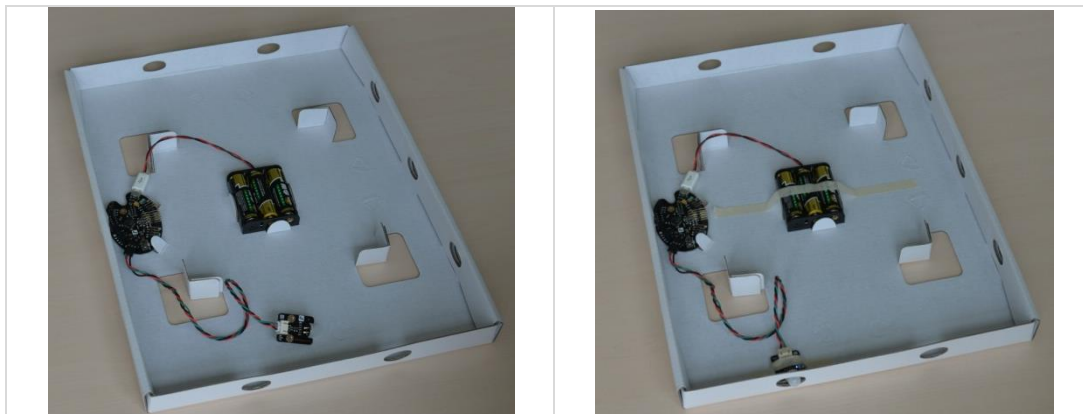
5   Installing LED Modules

1.1 Installing LEDs

1）Fix the aluminum foil, if too large use scissors to cut to paper size (aluminum foil for circuit "GND")
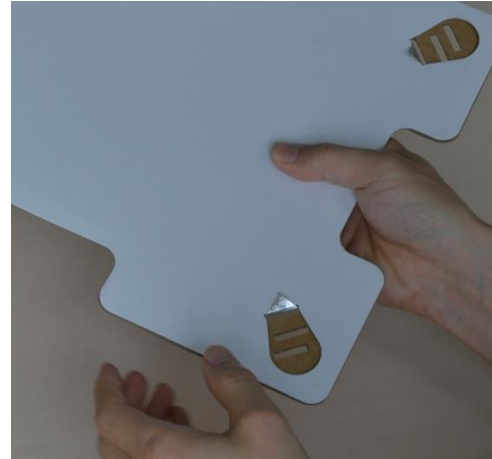
2）Fixing painting to Frame Holder: It support A4 and 9 "x 12" two paper specifications of the installation; If painting is smaller than A4 size, can use A4 hollow out worked on ways to use.
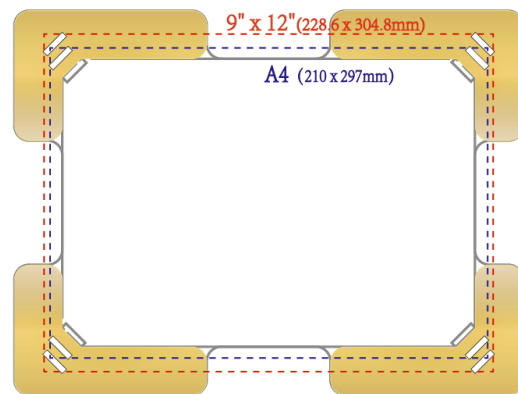
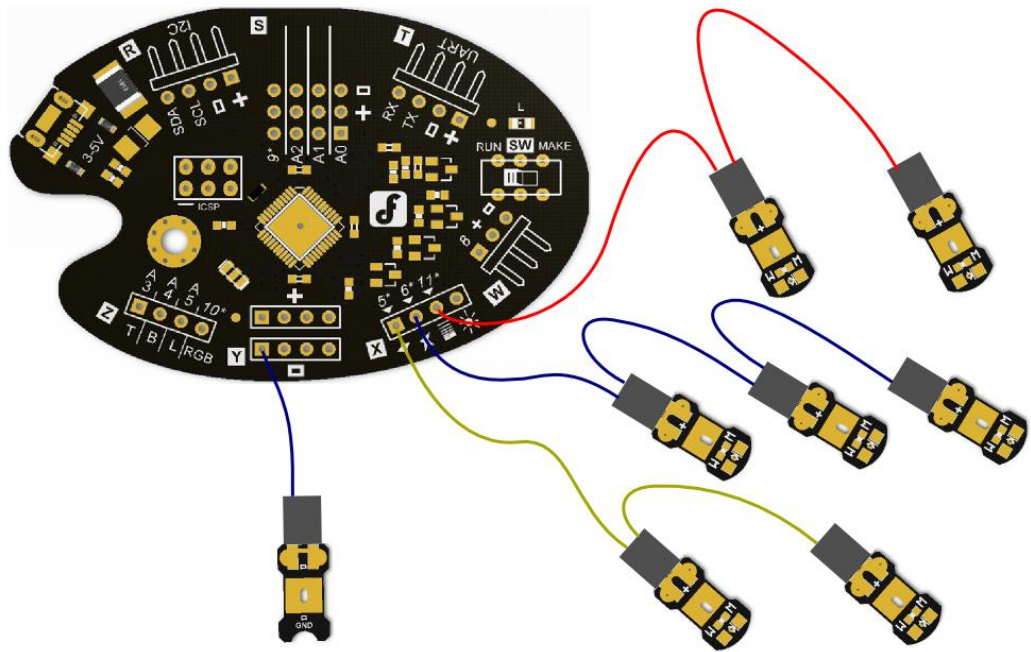3）Placing the LEDs, make a small hole on the planned area, and mark it for later use.
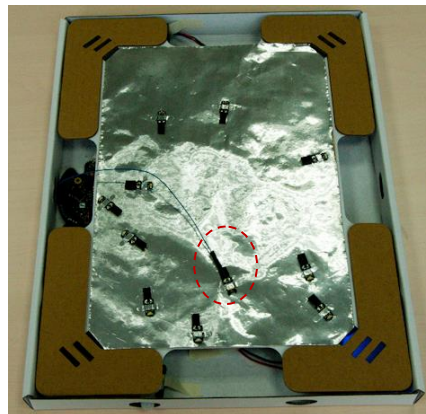
4）Stick the LEDs with Aluminum Foil Sticker　onto the foil
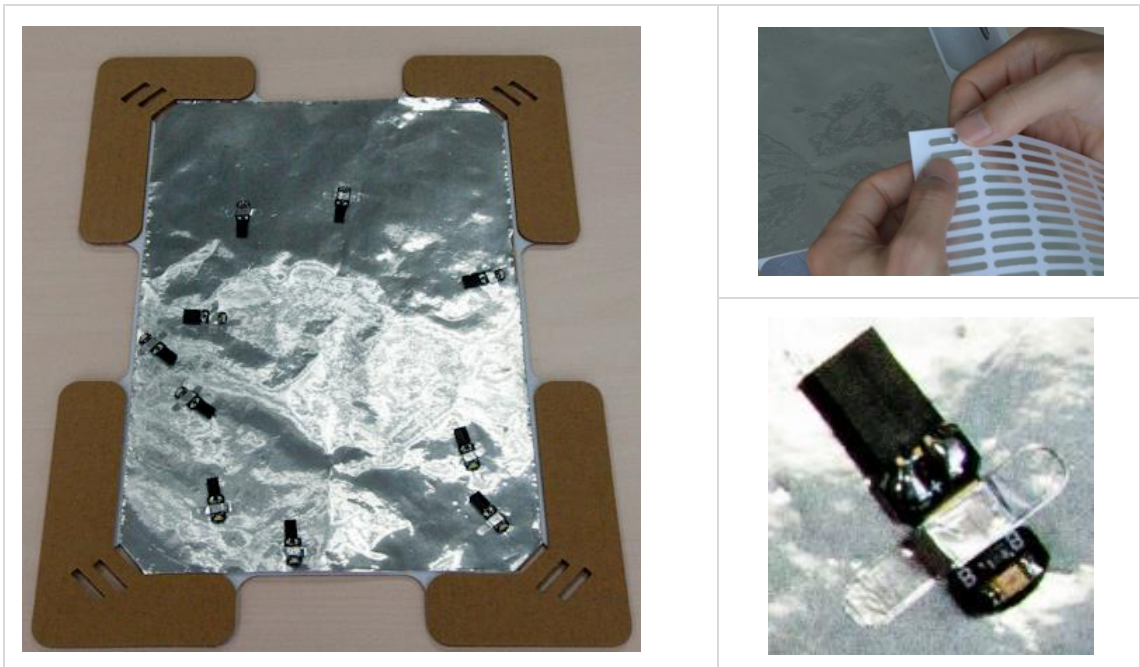
1.2 **Connecting LED Modules**

1） Switch to "MAKE" on the Palette Controller, place the Frame Holder into frame box
2） Connect "-" in Zone Y with GND module, and place them in properly. This will connects the foil with "GND" on the Palette controller.

3） Connect the first LED in cascade to Zone X or Zone Z accordingly, and wire them together. In the demo, two red LEDs are grouped together, others will be grouped randomly.
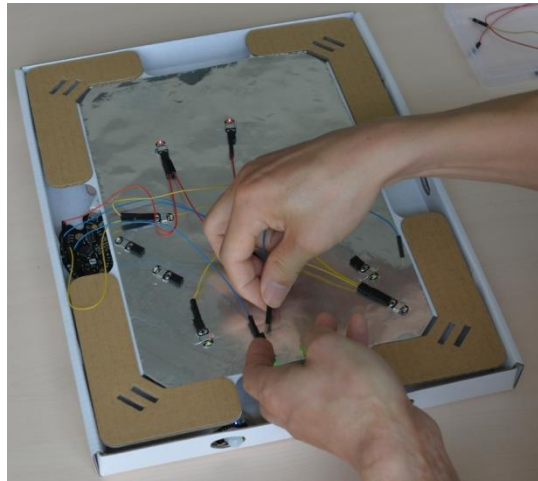
4）Put wires in order and reinforce with sticky tape.
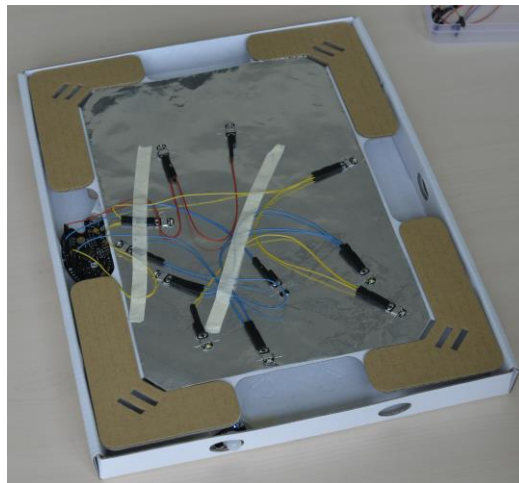
5）After testing, switch to "RUN" on Palette controller.

➕ Now you will have a blinking drawing!
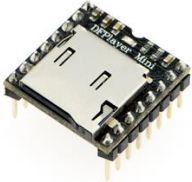
Further Steps

4-Drawing kit is more than a frame: it can be a platform on which you can unleash your creativity with adding more interaction modules. This chapter demonstrates some examples with audio and light interactions.
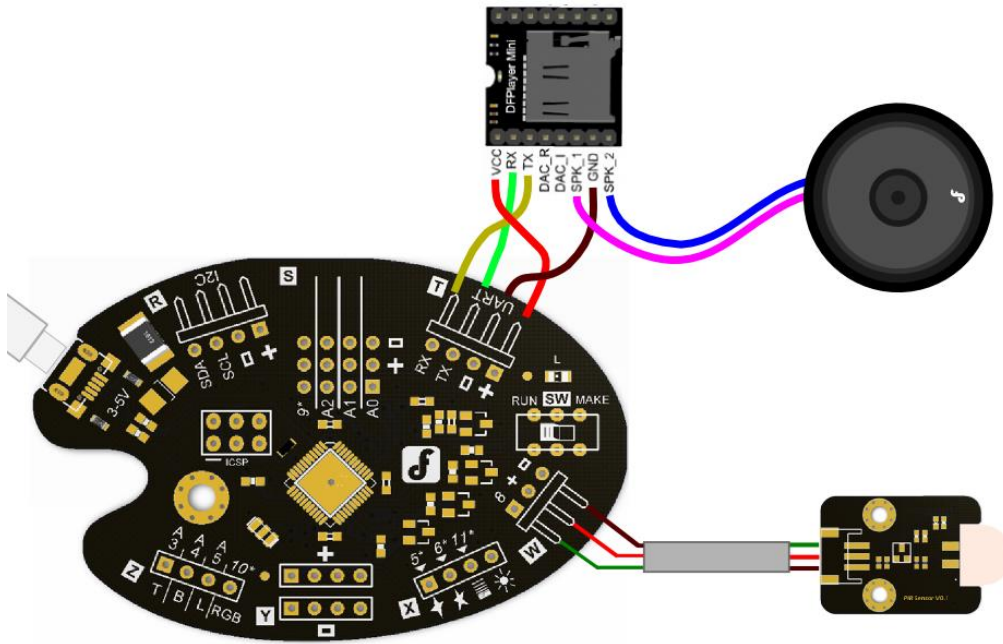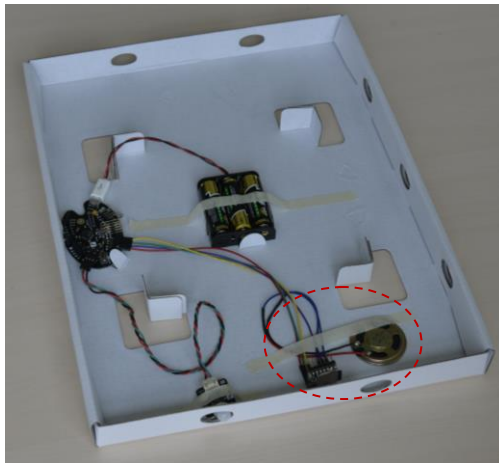
1   Audio Interactions

1.1 **Preparation**

Module	Description	Amount	Image
DFPlayer Mini	Arduino-compatible mp3 player module	1	
Mini SD card	For file storage	1	
Speaker	Audio speaker	1	
DuPont M/M cable		4	
Mini SDWriter	For writing audio files into SD card	1	

1.2 **Assembling**

1）Put the music/audio file into MiniSD card, and insert the card into DFPlayer Mini.

2）Connect the DFPlayer Mini to UART in Zone T and the speaker to DFPlayer Mini

3）Fix the speaker and DFPlayer Mini at the bottom of frame box with sticky stape.

Note: Random play of audio files in format (mp3,WAV,etc) are supported in Palette Controller.
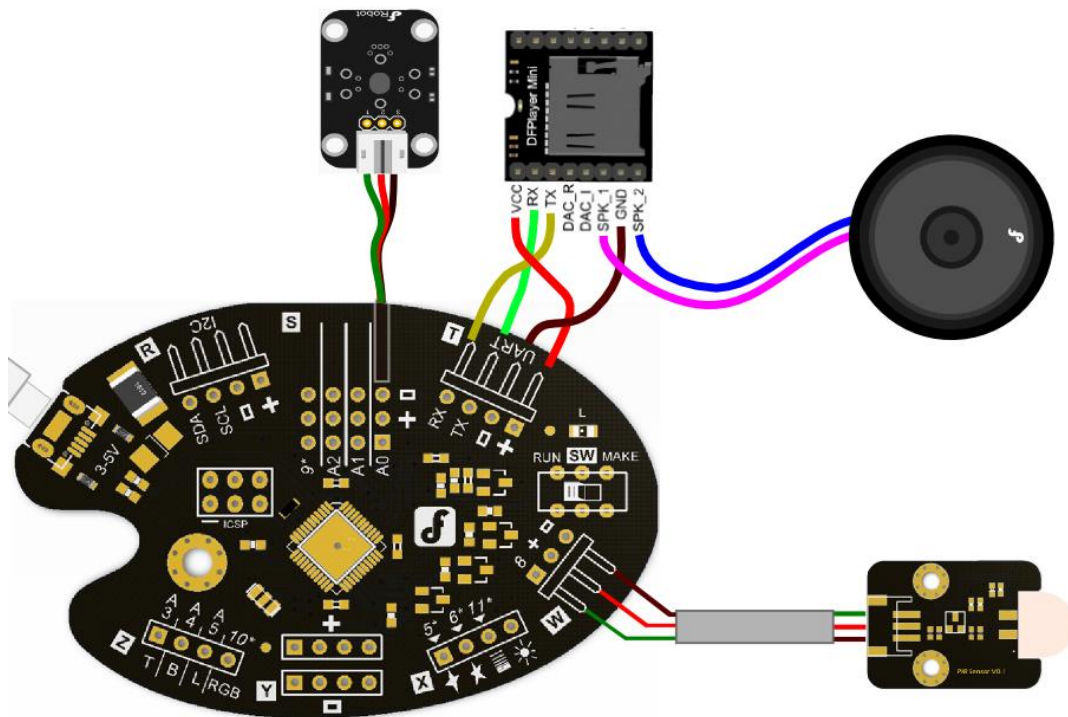
2 Ambient Light Interaction

2.1 Preparation

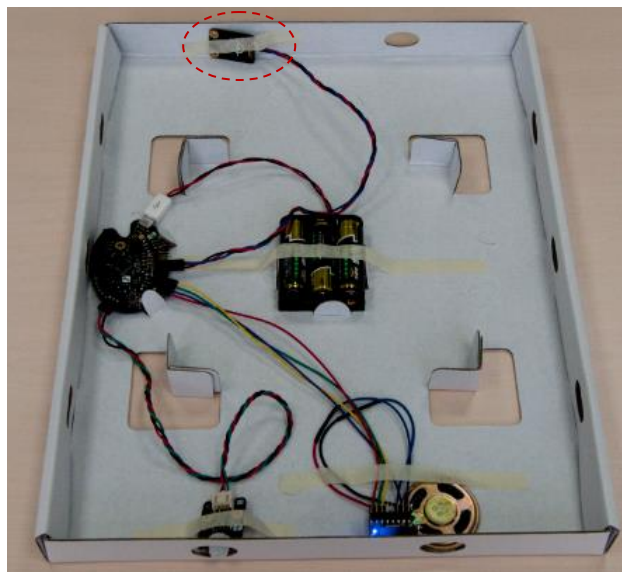| Module	Description	Amount	Image

Analog Ambient Light Sensor	This sensor can capture even the slightest change of light.	1	

2.2 Wiring

1）According to the wiring map below, connect the ambient light sensor to A0 in Zone S on the Palette Controller.

2）Place the ambient light sensor on the edge of frame, where light comes in.

Note：When the analog input A0 is smaller than 1/100 of its peak value, the Palette Controller

will automatically switch to sleep mode, thus saving energy.Controlling & Programing

4Drawing supports three modes of controlling:

Mode	Description	Scenario	Difficulty
Plug and Play	Assembling the frame	Using premade light/audio interactions	Easy
Graphical programming	1）Install Arduino IDE 2）Install Ardublock 3）Visual programming 4）Upload sketch	Using sensors and acturators in the set.	Intermediate
Freestyle	Make your own code based on 4Drawing sample code	Plug and control anything you like, make magic!	Intermediate+

1 Plug & Play

There are premade program in the Palette Controller of 4Drawingkit, as shown in below chart.

Zone	Port	Description	Default	Note
X	5	SMT LED modules ready	Slow flash	10 LEDs maximum in cascade
	6		Fast flash	
	11		Fade	
	☀		Always on	
Z	A3		Fast flash with A4 alternatively	2 LEDs maximum in cascade
	A4		Fast flash with A3 alternatively	
	A5		Slow flash	
	10		Fade	
T	UART	Compatible with DFPlayer Mini	Audio player	
S	A0 + -	Compatible with 3 pin sensors	System auto sleeps when value small than1%	
W	8 + -	Connect and wakeup 3 pin	High output awakens the	

		sensor	system	

2 Graphical Programming

Ardublock is an opensource software based on Arduino IDE, more information please check http://blog.ardublock.com/

2.1 Preparation

Module	Description	Amount	Image
PC	Installing and running program	1	
MicroUSB Cable	Communication	1	

2.2 Software Installation

1) Install Arduino IDE：http://arduino.cc/en/Main/Software （Arduino 1.0.5 ）

2) Install ArduBlock：download ZIP file from 4Drawing product page and get ardublock-all.jar. Install it by http://blog.ardublock.com/engetting-started-ardublockzhardublock/

3) Install 4Drawing Library：get library from ZIP file or get latest version from https://github.com/DFRobot/4Drawing
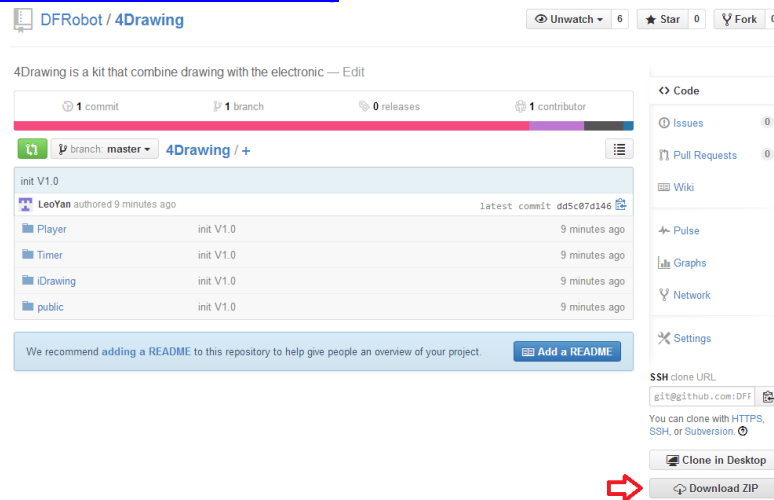
4) Copy libray to sketchbook location of Arduino IDE

Note：ArduBlock and library file location

\Arduino Sketchbook location \

--libraries\

--iDrawing

--Player

--Timer

--public
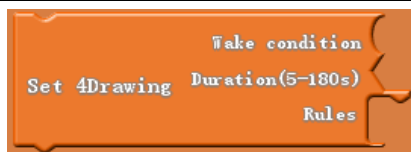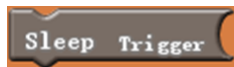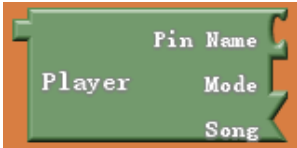
2.3   Graphical Programming

1)   Module Description：Open Ardublock, find " findock" findockscriptioningTool\ there are several modules as explained below

Module	Description	Parameter
Set 4Drawing — Wake condition / Duration(5-180s) / Rules	Set the 4Drawing parameter, the modules need to be placed in the main program "setup"	➢ Wake condition ： the condition that wakes system, for example high pulse HIGH or low pulse LOW system wake up will be triggered by sensor connected to Zone W ➢ Duration ： Runtime duration. System enters a low-power sleep state after a timeout. ➢ Rules：Rules of interaction settings.
Run 4Drawing	Run4Drawing according to operation parameters, this module should be placed into "loop".	
Start — Trigger / Actuator	Start rule, the actuator trigger into actionwhen condition is satisfied	➢ Trigger: The trigger, rule trigger execution (rules) ➢ Actuator: Actuator, rule (rules) to execute actions
Stop — Trigger / Pin Name	Stopping rule, stop already running Actuator, can be used to start rule, starting the rules must be set before stopping rule	➢ Pin Name ： In the corresponding activation rules in Actuator bound port
Sleep Trigger	Rules of system autosleep	
Time Second	Trigger：time	➢ Second：Wake up after the system running time, range from 0-180 seconds

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	Trigger：Digital input interface	➢ Pin Name：Trigger binding port, can be taken as 9,10, A0, A1, A2, A3, A4, A5Status：input state value -high pulse low pulse
	Trigger：analog input interface	➢ Pin Name：Trigger binding port, can be taken as A0, A1, A2, A3, A4, A5 ➢ Logic：Logical relation between analog input and values,equal bigger smaller ➢ Value： expected value, range 0-100
	Actuator：LED	➢ Pin Name：Trigger binding port; at Mode=Flash values for 5,6,9,10,11, A0, A1, A2, A3, A4, A5; at Mode=Fade value of 5, 6, 11, 10, 9 ➢ Mode：Operation mode, value - Flash orfade ➢ Period：period time, range 200-9000ms
	Actuator：DFPlayer Mini player module	➢ Pin Name：Trigger binding interface, UARTvalue ➢ Mode：operation mode, value: random and single audio ➢ Song：In Single mode, the song name must be 0001*-0199*, such as 0001dog.mp3, 0101.wav; designated song in your MP3 directory; here as long as the input of the song in

|		front of the four numbers can be, for example the 0001dog.mp3 input 0001 and 0101.wav input 0101
	Actuator：Digital output interface	➢ Pin Name： The Trigger binding port, can be taken as 5,6,9,10,11, A0, A1, A2, A3, A4, A5 ➢ Mode：Output mode, value – high pulse 、low pulse 、 positive pulse negative pulse

2) Use instructions: here for example "firecracker.abp"（at tools\4DrawingExample from ZIP file） to illustrate its usage, with its interactive scene and rules embodied: a child lit fireworks into the sky, festive sounds and colorful scenes fills the sky afterwards.

a) Open Arduino IDE，select Tools - Ardublock
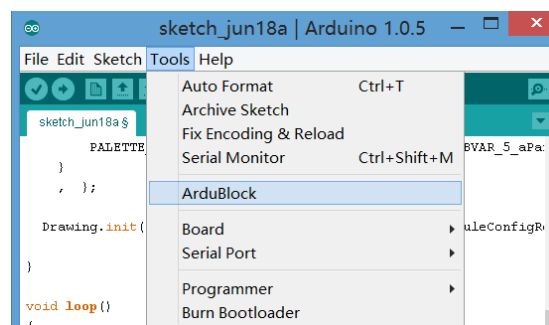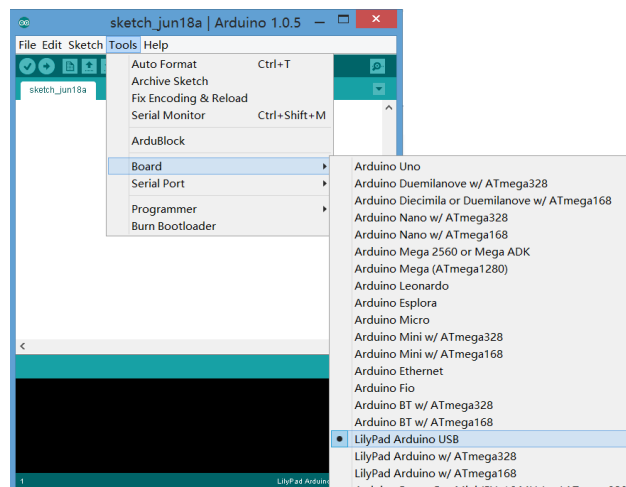

b) Open sample "firecracker.abp"

fire

sound of cracker

fireworks in the
sky

play music
randomly
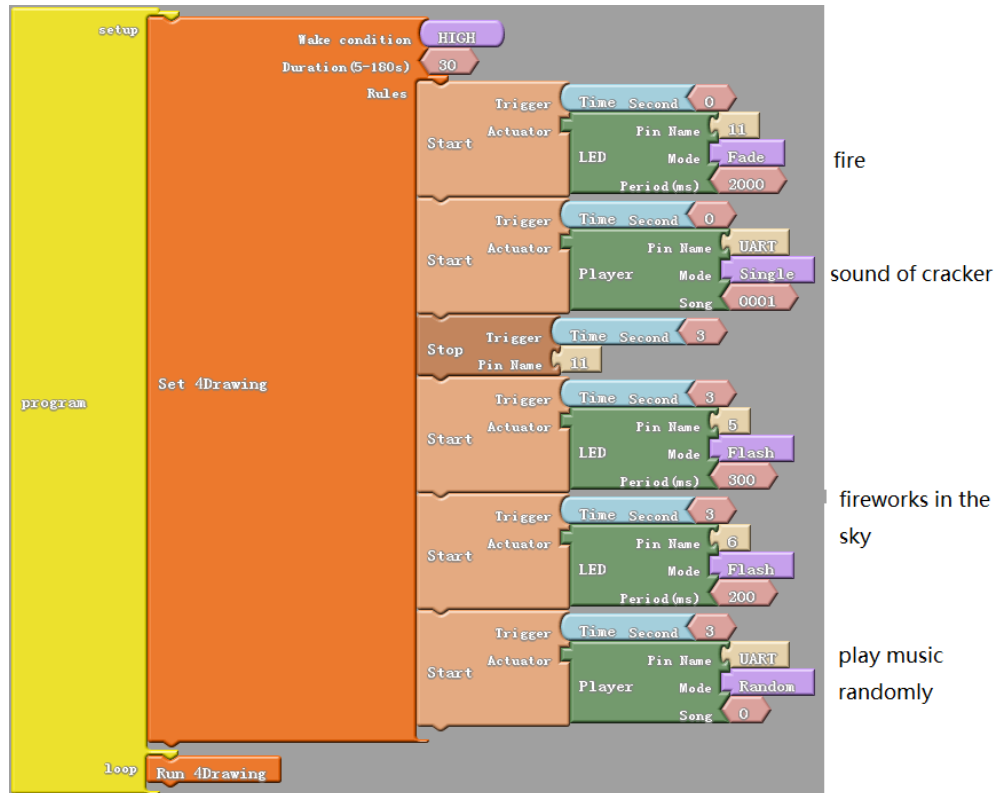
2.4 Uploading Sketch

1) Open Arduino IDE, choose board as：LilyPadArduoino USB

2) Switch the Palette board to "oard"

3) Connect PC with Palette board via micro-USB

4) Check in Arduino IDE for the corresponding serial port connection, if there is no corresponding serial, you need to manually install the driver, please refer to http://arduino.cc/en/Guide/Windows#toc4
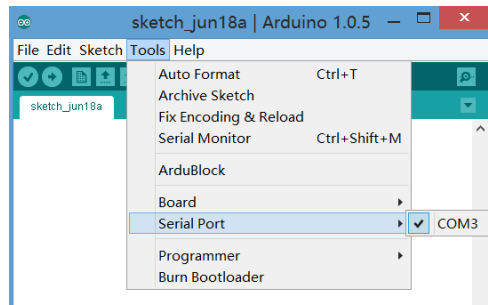
5) Click "lick//arduino.cc/ein Ardublock

6) In the Arduino IDE showed no error message Done uploading and the output window, then uploaded is successful
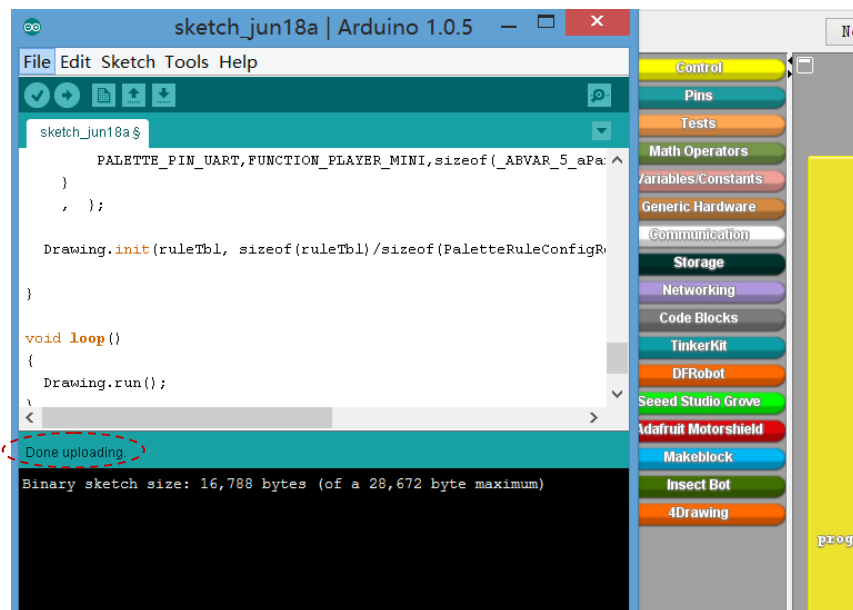
3 Freestyle

You can find source codes at https://github.com/DFRobot/4Drawing, modify or add your own codes in Trigger（Sensor.cpp,Sensor.h）and Actuator（Actuator.cpp,Actuator.h）Enjoy!