

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/Compon	Introduction	Amo	Image
ents		unt	
"Palette"	Based on Atmega32U4,	1	
Controller	compatible with Arduino		
LED Module	LED: Redx2, Greenx2,	1	
	Orangex2, Bluex2, Whitex2;		
	GNDx1		
PIR Motion	Detects whether a human	1	
Sensor	has moved in or out of the		
	sensors range		
Front Frame	Front frame	1	
Back Frame	Back frame	1	
LED Cardboard	Inner cardboard in the	1	
Holder	frame, it is use to hold LEDs		
	and etc.		
Cardboard	Footpad for LED Cardboard	4	
Corner	Holder		
Aluminum Foil	278mm (L) 193mm (W)	2	
	Aluminum Foil for GND		
Aluminum Foil	84x conductive 20mm x	1	
Sticker	4mm Aluminum Foil Sticker		
Micro USB	3x AA Batteries	1	
Battery Box			
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	For hanging	2	
Hook			
Push Pin	For marking	1	
Masking Tape	1cm wide	1	
Stick Glue	Stick glue	1	
Contour	Contour drawing	2	

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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

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- 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
- $\label{eq:2} \textbf{2)} \ \ \textbf{Place the Palette Controller on one side}$
- 3) Place the PIR Motion Sensor onto the elliptic hole on the Back Frame, reinforce with tape



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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	Amo unt	Image
DFPlayer Mini	Arduino-compatible mp3 player module	1	Contraction of the second seco
Mini SD card	For file storage	1	
Speaker	Audio speaker	1	
DuPont M/M cable		4	The second
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	Amo	Image
Would	Description	unt	

Analog Ambient Light Sensor	1	S S S S S S S S S S S S S S S S S S S
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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.



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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

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

4Drawing supports three modes of controlling:

1 Plug & Play

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

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

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School		sensor	system	
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2 Graphical Programming

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

2 1	Dra		4:00
Z.1	Pre	para	uon

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

2.2 Software Installation

- 1) Install Arduino IDE: <u>http://arduino.cc/en/Main/Software</u> (Arduino 1.0.5)
- 2) Install ArduBlock: download ZIP file from 4Drawing product page and get ardublock-all.jar. Install it by <u>http://blog.ardublock.com/engetting-started-ardublockzhardublock/</u>
- 3) Install 4Drawing Library : get library from ZIP file or get latest version from https://github.com/DFRobot/4Drawing

1 commit	₽ 1 branch	📎 0 releases	l contributor	<> Code
				() Issues
P branch: master •	4Drawing / +		I	🕅 Pull Requests
it V1.0				EE Wiki
LeoYan authored 9 minutes a	ago		latest commit dd5c07d146 🗟	
Player	init V1.0		9 minutes ago	
Timer	init V1.0		9 minutes ago	In Graphs
iDrawing	init V1.0		9 minutes ago	S.S. Madaunda
public	init V1.0		9 minutes ago	& INELWOIK
We recommend adding a RE	ADME to this repository to help	give people an overview of your proj	ect. BE Add a README	X Settings
				SSH clone URL
				git@github.com:DFF
				You can clone with HTTPS, SSH, or Subversion. 🔊
				Clone in Desktop

4) Copy libray to sketchbook location of Arduino IDE

Note: ArduBlock and library file location

\Arduino Sketchbook location \



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--tools\ArduBlockTool\tool\

--ardublock-all.jar

2.3 Graphical Programming

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

Module	Description	Parameter
Take condition Set 4Drawing 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 INTER or low pulse 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 cottings
Run 4Drawing	Run4Drawing according to operation parameters, this module should be placed into "loop". Start rule, the actuator trigger into actionwhen	 Trigger: The trigger, rule trigger execution (rules)
Actuator	condition is satisfied	 Actuator: Actuator, rule (rules) to execute actions
Trigger Stop 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 > Pin Name: Trigger binding port, can be taken as 9,10, A0, A1, A2, A3, A4, A55tatus input state value Immediate interface			~	
Pin Name 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 > logic : Logical relation between analog input and values,equal Value : expected value, range 0-100 > Value : expected value, range 0-100 Image Prin Name Mode Period(ms) 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 > Player Mode Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue > Mode : operation mode, value: random > Pin Name: Trigger binding interface, UARTvalue > Mode : operation mode, value: random > Pin Name: Trigger binding interface, UARTvalue	Digital input Status	Irigger : 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
Prin Name Weltwe (0=100) interface port, can be taken as A0, A1, A2, A3, A4, A5 > Logic : Logical relation between analog input and values,equal isiger > Value : expected value, range 0-100 Prin Name Mode Period(as) 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=Flash value of 5, 6, 11, 10, 9 > Mode : Operation mode, value - Flash > Period: period time, range 200-9000ms Player Mode Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue > Mode : operation mode, value : random > walue: random Actuator: DFPlayer Mini player module > Song: In Single mode, the	e e	Trigger: analog input	A	Pin Name: Trigger binding
A1, A2, A3, A4, A5 Value(0=100) A1, A2, A3, A4, A5 Logic : Logical relation between analog input and values,equal is bigger Image: Simple - Control -	Pin Name	interface		port, can be taken as A0,
Image: Song Actuator: DFPlayer Mini player module > Logic : Logical relation between analog input and values,equal is bigger Image: Song Actuator: LED > Value : expected value, range 0-100 Image: Song 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 Image: Song Actuator: DFPlayer Mini player module > Period: period time, range 200-9000ms Image: Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue Image: Song: In Single audio Song: In Single mode, the > Song: In Single mode, the	Kalue (0-100)			A1, A2, A3, A4, A5
Pin Neare 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=Flade value of 5, 6, 11, 10, 9 Mode Period(as) Mode Period(as) Actuator: DFPlayer Mini player module Pin Name: Trigger binding port; at Mode=Flash value of 5, 6, 11, 10, 9 Mode Actuator: DFPlayer Mini player module Pin Name: Trigger binding interface, UARTvalue Mode Song Actuator: DFPlayer Mini player module Player Mode Song Mode Song Node Song In Single mode, the	hardelo 100/			Logic : Logical relation
Values,equal bigger Values,equal bigger Smaller > Value: expected value, range 0-100 Fin Nome Actuator: LED Mode 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 Period(ms) Actuator: DFPlayer Mini player module Period: period time, range 200-9000ms Player Mode Actuator: DFPlayer Mini player module Pin Name: Trigger binding interface, UARTvalue Mode : operation mode, value: random Emotion mode, value: random Emotion mode, value: random Emotion and single audio Single				between analog input and
Pin Name 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=Flade value of 5, 6, 11, 10, 9 Period(ms) > Mode: Operation mode, value - Flash > Period: period time, range 200-9000ms Player Mode Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue Actuator: DFPlayer Mini player module > Din Name: Trigger binding interface, UARTvalue > Mode : operation mode, value: random interface, UARTvalue Mode Song Song: In Single mode, the > Song: In Single mode, the				values,equal 🔲 bigger
Pin Neme > Value : expected value, range 0-100 LED Mode > 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 Period(ms) Mode > Mode : Operation mode, value - Flash Plash orfade Period: period time, range 200-9000ms Player Mode > Pin Name: Trigger binding interface, UARTvalue Mode Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue Mode Song: In Single mode, the and single audio Single				smaller
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Fin Neme LED 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=Flade value of 5, 6, 11, 10, 9 Mode Period(ms) Mode : Operation mode, value - Flash Plin Neme Flash Mode Period: period time, range 200-9000ms Plin Neme Trigger binding interface, UARTvalue Mode Song Actuator: DFPlayer Mini player module Pin Name: Trigger binding interface, UARTvalue Mode operation mode, value: random and single audio Single				range 0-100
LED Mode Period(ms) Period(ms) Mode Fin Newe Player Mode Song Actuator: DFPlayer Minin Pin Name: Trigger binding interface, UARTvalue Mode : operation mode, value: random and single audio Song: In Single mode, the	Pin Name 🕻	Actuator: LED		Pin Name: Trigger binding
Period(ms) A3, A4, A5; at Mode=Fade A3, A4, A5; at Mode=Fade value of 5, 6, 11, 10, 9 Mode : Operation mode, value - Flash value - Flash Plash orfade Fade 200-9000ms Period: period time, range 200-9000ms Pin Name: Trigger binding player Mode Node : operation mode, value - rade Node : operation mode value Song Actuator: DFPlayer Mini player module Mode : operation mode, value: random Randos and single audio Single	LED Mode			for 5.6.9.10.11 A0 A1 A2
Player Mode grade Mode grade Actuator: DFPlayer Mini player module Player Mode grade Mode grade > Period: period time, range 200-9000ms Player Mode grade Mode grade > Mode : operation mode, value Song Actuator: DFPlayer Mini player module Pin Name: Trigger binding interface, UARTvalue Mode : operation mode, value: random and single audio Single	Period(ms)			A3. A4. A5: at Mode=Fade
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Value - Flash value - Flash orfade Pade > Period: period time, range 200-9000ms Player Mode Song Actuator: DFPlayer Mini player module > Pin Name: Trigger binding interface, UARTvalue > Mode : operation mode, value: random and single audio single Song: In Single mode, the			\triangleright	Mode : Operation mode,
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Pin Name Actuator: DFPlayer Mini > Pin Name: Trigger binding player module > Mode : operation mode, value: random and single audio Single > Song: In Single mode, the				200-9000ms
Player Mode Song player module interface, UARTvalue Mode : operation mode, value: random and single audio Song: In Single mode, the	E Pin None	Actuator: DFPlayer Mini	\triangleright	Pin Name: Trigger binding
Song Mode : operation mode, value: random and single audio Single Song: In Single mode, the	Player Mode	player module		interface, UARTvalue
value: random and single audio Single	Song			Mode : operation mode,
and single audio				value: random Random
Song: In Single mode, the				and single audio
			\blacktriangleright	Song: In Single mode, the
song name must be				song name must be
0001*-0199*, such as				0001*-0199*, such as
0001dog.mp3, 0101.wav;				0001dog.mp3, 0101.wav;
designated song in your				aesignated song in your
as the input of the song in				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
Digital Output Mode	Actuator: Digital output	►	Pin Name : The Trigger
	interface		binding port, can be taken
			as 5,6,9,10,11, A0, A1, A2,
			A3, A4, A5
		۶	Mode: Output mode, value
			- high pulse
			pulse
			pulse
			negative pulse
			Low 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"



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 <u>http://arduino.cc/en/Guide/Windows#toc4</u>



- 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

💿 sketch_jun18a Ar	duino 1.0.5 🛛 🗖 📉 🕺
File Edit Sketch Tools Help	Control
	Pins Pins
sketch_jun18a §	Tests
PALETTE_PIN_UART, FUNCTION_PLAY	ER_MINI, sizeof (_ABVAR_5_aPa: ^ Math Operators
) ,);	Generic Hardware
Drawing.init(ruleTbl, sizeof(ruleTbl)/sizeof(PaletteRuleConfigRe Storage
}	Networking Code Blocks
<pre>void loop()</pre>	TinkerKit
{ Drawing.run(); }	DFRobot
<	> Vdafruit Motorshield
Done uploading.	Makeblock
Binary sketch size: 16,788 bytes (of a	28,672 byte maximum) Insect Bot
	4Drawing
	Бтодг

3 Freestyle

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