# Grove AI HAT for Edge Computing SKU 102991187



The Grove AI HAT for Edge Computing(hereafter called 'Grove AI HAT') is built around Sipeed MAix M1 AI MODULE with Kendryte K210 processor inside. It's a low cost but powerful raspberry pi AI hat which assists raspberry pi run the AI at the edge, it also can work independently for edge computing applications.

The MAix M1 is a powerful RISC-V 600MHz AI module features dual core 64-bit cpu, 230GMULps 16-bit KPU(Neural Network Processor), FPU(Float Point Unit) supports DP&SP, and APU(Audio Processor) supports 8 mics.

In addition to the powerful Kendryte K210 processor, the Grove AI HAT for Edge Computing board provide a wealth of peripherals: I2C/UART/SPI/I2S/PWM/GPIO. The hat also offers LCD and camera interface, which support the Sipeed 2.4inch QVGA LCD and DVP camera, it will be helpful and convenience with your AI vision project. Just like the Sipeed MAix BiT Kit for RISC-V AI+IoT, we will release the kit with camera and LCD soon. For AI voice recognition applications, we add a high-quality microphone. And for robot or motion applications, there is a onboard 3-axis accelerometers sensor, which is more accurate and easy to use compared to external sensors.

We have released varies of SIPPED AI products, we believe it is time to make it Grove, and bring all our hundreds of grove senors and grove acvotors to your AI applications. So here comes the Grove AI HAT for Edge Computing. We've added 6 grove connectors to this hat, including 1xDigital IO, 2xAnalog IO, 1xI2C, 1xUART and 1xPWM. On top of that, based on kendryte-standalone-sdk, we added the full ArduinoCore-API

interface to support Arduino IDE, Linux, Windows, Mac OS X and other development environments. Which means you can run Grove Arduino Libraries and many excellent Arduino libraries on this board easily.

We hope this board may help you with your edge computing, AI vision, voice recognition, and other AI projects, just enjoy it.

https://www.youtube.com/embed/5BF3ExL1HOQ

### Features

- Processor: Sipeed MAIX-I module w/o WiFi (1st RISC-V 64 AI Module, K210 inside)
- 1x USB 2.0 Device, Type C(Power and Programming)
- 6x Grove Interface: include 1x Digital IO, 1x PWM, 1x I2C, 1x UART, 2x ADC
- 1x Power LED, 1x Boot LED
- 1x Reset Button, 1x Boot Button
- 1x LCD Interface
- 1x Camera Interface
- 1x Digital Mic
- 1x Accelerometers Sensor
- 1x JTAG & ISP UART Pin Header
- 2x 20 Pin Header with I2C, UART, SPI, I2S, PWM, GPIO

# Specification

Parameter	Value				
CPU	K210 RISC-V Dual Core 64bit, 400Mh(Max. 600Mhz)				
FPU	IEEE754-2008 compliant high-performance pipelined FPU				
KPU(Neural Network Processor )	<ul> <li>Supports the fixed-point model that the mainstream training framework trains according to specific restriction rules</li> <li>Support for 1x1 and 3x3 convolution kernels</li> <li>Support for any form of activation function</li> <li>The maximum supported neural network parameter size for real-time work is 5MiB to 5.9MiB</li> </ul>				
APU(Audio Processor)	<ul> <li>Up to 192kHz sample rate</li> <li>Up to 8 channels of audio input data, ie 4 stereo channels</li> </ul>				
Debugging Support	High-speed UART and JTAG interface for debugging				
Supply Voltage	5V can not exceed 5.5V				
IO Voltage	3.3V				
Operating Ambient Temperature	-20 – 70°C				
ADC	Onboard 16-bit ADC				

Parameter	Value
3-Axis Accelerometers	ADXL345 ±2 g/±4 g/±8 g/±16 g
Micrephone	Sensitivity:-26 dB;SNR:61 dB
GPIO	2x 20 Pin Header compatible with Raspberry Pi
Grove Interface	1x Digital IO, 1x PWM, 1x I2C, 1x UART, 2x ADC
USB Interface	USB 2.0 Device, Type C(Power and Programming)
LCD Interface	8bit MCU LCD 24P 0.5mm FPC connector
DVP Camera Interface	24P 0.5mm FPC connector
Button	1x Reset Button, 1x Boot Button (can be used as User Button)
LED	1x Power LED, 1x Boot LED(can be used as User LED)

!!!Attention - All digital and analog IO interface levels are 3.3V. Please do not input more than 3.3V, otherwise the CPU may be damaged.

- The input power supply voltage is 5V and cannot exceed 5.5V.

# Applications

- Al for Edge Computing
- Smart Building
- Medical equipment
- Automation & Process Control
- Robot

# Hardware Overview



1: J2, Grove, Digital IO 2: J1, LCD Interface 3: J3, Grove, PWM 4: SW1, Reset Button 5: SW2, Boot Button 6: LED1, 3.3V LED; LED2, Boot LED 7: J5, USB Type C 8: J7, Grove, I2C 9: J8, Grove, UART 10: U9, Accelerometers Sensor 11: J12, Grove, ADC A1 12: J10 , 2x4 Pin Header , JTAG & ISP UART
13: J9 , Camera Interface
14: J11 , Grove , ADC A0
15: U8 , MIC
16: U6 , I2C to ADC IC
17: J6 , 2x20 Pin Socket
18: J4 , Toggle Switch for RPI 5V
19: U1 , USB to UART IC
20: U4 , Sipeed AI Module
21: Camera mounting slot

### Figure 1. Grove AI HAT for Edge Computing hardware overview



# **Platforms Supported**

# **Getting Started**

!!!ReadMe - When the board is used in standalone mode, please turn the toggle switch J4 to the ON terminal. Then the Pin2 and Pin4 of the 2x20Pin socket J6 will connect to 5V power.

- When the board is plugged into the Raspberry Pi, if only one board is powered, J4 needs to be dialed to the ON end; if the board and the Raspberry Pi use different USB power at the same time, J4 needs to be dialed to the OFF end to disconnect The two sets of 5V connections on the J6 avoid the two USB power supplies being directly connected.

Play With Arduino

!!!Attention If this is the first time you work with Arduino, we strongly recommend you to see Getting Started with Arduino before the start.

In theory, Grove AI HAT can be compatible with all Grove modules, but inevitably there will be compatibility issues. If you find a Grove module that is not compatible with the Grove AI HAT, please submit it to our Github Page.

#### Arduino config

Step 1. Configure the Arduino Board Manager URL.
 Click File --> Preference, copy the following URL into the Additional Boards Manager URLs

htt Sti	tps://raw.githubusercontent.com/Seeed- udio/Seeed_Platform/master/package_seeeduino_boards_index.json	
	File       Edit       Sketch       Tools       Help         New       Ctrl+N       Ctrl+N       Ctrl+N       Ctrl+N	

	New	Ctrl+N	
1	Open	Ctrl+O	
``	Open Recent	>	
	Sketchbook	>	
	Examples	>	
	Close	Ctrl+W	Technology Co., Ltd.
	Save	Ctrl+S	<u>c</u>
	Save As	Ctrl+Shift+S	
	Page Setup	Ctrl+Shift+P	
	Print	Ctrl+P	
	Preferences	Ctrl+Comma	nted, free of charge, to any person obtaining ociated documentation files (the "Software"),
	Quit	Ctrl+Q	restriction, including without limitation the

Figure 2. Arduino Board URL config

Preferences	×				
Settings Network					
Sketchbook location:					
D:\SMYM\Rr\Base\cards\sket	ch_card Browse				
Editor language:	English (English) v (requires restart of Arduino)				
Editor font size:	12				
Interface scale:	✓ Automatic 100 ≑ % (requires restart of Arduino)				
Show verbose output during:	compilation upload				
Compiler warnings:	None 🗸				
Display line numbers					
Enable Code Folding					
Verify code after upload					
Use external editor					
Aggressively cache comp	iled core				
Check for updates on sta	rtup				
Update sketch files to ne	w extension on save (.pde -> .ino)				
Save when verifying or uploading					
Additional Boards Manager URLs: https://raw.githubusercontent.com/Seeed-Studio/Seeed_Platform/master/package_seeeduino_boards.]					
More preferences can be edit	ed directly in the file				
C:\Users\seeed\AppData\Loc	al\Arduino15\preferences.txt				
(edit only when Arduino is no	t running)				

Figure 3. Arduino Board URL config

• Step 2. Add the Grove AI HAT board into Arduino IDE.

Click **Tools --> Board:"xxxx" -->Boards Manager**, tap **K210** into the search bar. Find the **Grove AI HAT for Edge Computing by Seeed Studio**, click Install button.

File	Edit	Sketch	Tools	Help				
	0	n j	1	Auto Format	Ctrl+T			
-		-/		Archive Sketch				
Т	B660	5_demo		Fix Encoding & Reload				
/*	TB6	605_de		Serial Monitor	Ctrl+Shift+M			
*				Serial Plotter	Ctrl+Shift+L		/	
*	Copy Webs	right ite		WiFi101 Firmware Updater				
*	Crea	te Tim		Board: "Arduino/Genuino Uno"		_	Δ	
*	Chan	ge Log	1	Port	2		Boards Manager	
*	The	MTT .i		Get Board Info			Arduino AVR Boards	
*							Arduino Yún	
ж	Perm	ission		Programmer: "AVRISP mkll"	2	•	Arduino/Genuino Uno	
*	of t	his so		Burn Bootloader			Arduino Duemilanove or Diecimila	
* *	in t	he Sof	tware	e Without restriction, in modify merge publish (	ncluding with Histribute s		Arduino Nano	

Figure 4. Open Board Manager



Figure 5. Install the Grove AI HAT Board

When the installation is complete, you can find the Seeed K210 Pi board in the Arduino board list.



Figure 6. Select Seeed K210 Pi

Also, to use the Grove AI HAT in the Arduino IDE, you need to select the **K-flash** Programmer at the Arduino Programmer list.

	Auto Format	Ctrl+T
	Archive Sketch	
nk	Fix Encoding & Reload	
	Serial Monitor	Ctrl+Shift+M
link	Serial Plotter	Ctrl+Shift+L
ırns an LE	WiFi101 Firmware Updater	
ost Arduin	Board: "Seeed K210 Pi"	,d ZERO
t is attac	Tool Install Location: "Default"	et to
ne correct	CPU Clock Erequency "400MHz CPU Clock Frequency	2" >
del chec	Pure Paud Pater "1 Mbec"	rduino
tps://www		
	Burn Tool Firmware: Derault	
odified 8	Port	3
Scott Fi	Get Board Info	
Arturo G	Programmer: "k-flash"	> AVR ISP
dified 8	Burn Bootloader	AVRISP mkll
Colby Newm	A11	USBtinyISP
iditalWrite(	FD BUILTIN HIGH . // turn the IFD on (H	Atmel-ICE (AVR)
elay(1000);	// wait for a second	• k-flash
igitalWrite(	LED_BUILTIN, LOW); // turn the LED off b	by making the v Atmel EDBG
elay(1000);	// wait for a second	Atmel-ICF

Figure 7. Select K-flash Programmer

### **Digital Demo**

### **Materials required**

- Grove AI HAT for Edge Computing x1
- Grove LED x1
- USB Type C cable x1

#### Hardware Connection

- 1 Connect the Grove LED to the Grove J2 port(D13 pin) of the Grove AI HAT
- 2 Connect the Grove AI HAT to the computer via USB Type C port.



Figure 8. Hardware connection

#### Software

• Step 1. Creat a new blank sketch in your Arduino IDE, copy the following code into that sketch.

```
void setup() {
   // initialize digital pin LED_BUILTIN as an output.
   pinMode(13, OUTPUT);
}
void loop() {
   digitalWrite(13, HIGH); //
   delay(1000); // wait for a second
   digitalWrite(13, LOW); //
   delay(1000); // wait for a second
}
```

• **Step 2.** Upload the demo. If you do not know how to upload the code, please check How to upload code.

After done uploading, the Grove - LED will flash.

#### **Analog Demo**

#### **Materials required**

- Grove AI HAT for Edge Computing x1
- Grove Round Force Sensor (FSR402) x1
- USB Type C cable x1

#### **Hardware Connection**

- 1 Conect the Grove Round Force Sensor (FSR402) to the Grove J11 port(A0 pin) of the Grove AI HAT
- 2 Conect the Grove AI HAT to the computer via USB Type C port.



Figure 9. Hardware connection

#### Software

- Step 1. Download the ADS1115 library
- Step 2. Open the demo at File --> Examples -->ADS-1115-master --> Example -->ADS1115\_ReadVoltage



Figure 10. ADC Demo Path

- **Step 3.** Upload the demo. If you do not know how to upload the code, please check How to upload code.
- Step 4. Open the Serial Monitor of Arduino IDE by click Tool-> Serial Monitor. Or tap the ++ctrl+shift+m++ key at the same time. Set the baud rate to 115200.

Then, press the Grove - Round Force Sensor, the A0 valuee will change.

A0:1586mV,	Al:571mV,	A2:561mV,	A3:567mV
A0:1586mV,	A1:570mV,	A2:561mV,	A3:566mV
A0:1586mV,	A1:570mV,	A2:559mV,	A3:566mV
A0:1676mV,	A1:570mV,	A2:561mV,	A3:565mV
A0:2693mV,	A1:570mV,	A2:558mV,	A3:564mV
A0:2618mV,	A1:570mV,	A2:555mV,	A3:562mV
A0:1586mV,	A1:567mV,	A2:553mV,	A3:562mV
A0:1586mV,	A1:567mV,	A2:552mV,	A3:564mV
A0:1586mV,	A1:568mV,	A2:551mV,	A3:564mV
A0:1586mV,	A1:568mV,	A2:550mV,	A3:566mV
A0:2686mV,	A1:570mV,	A2:551mV,	A3:566mV
A0:2482mV,	A1:571mV,	A2:552mV,	A3:567mV
A0:2202mV,	A1:570mV,	A2:553mV,	A3:566mV
A0:1645mV,	A1:569mV,	A2:555mV,	A3:567mV
A0:1603mV,	A1:570mV,	A2:557mV,	A3:568mV
A0:1587mV,	A1:572mV,	A2:560mV,	A3:568mV
A0:1586mV,	Al:571mV,	A2:561mV,	A3:568mV

Figure 11. Output

### kendryte k210 Standalone SDK

In order to use the kendryte k210 Standalone SDK with Grove AI HAT you should config the Arduino IDE as the previous chapter Play with Arduino.

Now let's assume that you have downloaded the K210 development board in the Arduino IDE, selected **Seeed K210 Pi** board and **k-flash**.

First of all download the kendryte-standalone-demo at github.

We will take the face\_detect for instance.

#### Face Detect Demo

#### **Materials required**

- Grove AI HAT for Edge Computing x1
- OV2640 Camera x1
- 2.4 inch TFT LCD x1
- USB Type C cable x1

#### Hardware Connection

- a. Connect the OV2640 camera into the Grove AI Hat 24 pin FPC camera connector
- b. Connect the 2.4 inch TFT LCD into the Grove AI Hat 24 pin FPC LCD connector
- c. Connect the Grove AI HAT to the computer via USB Type C port.



Figure 12. Hardware connection of face detect demo

#### Software

#### Download the AI module

• Step 1. Enter the folder, **D:XXXXXX\kendryte-standalone-demo\face\_detect\kfpkg**, **D:XXXXXX** is the path where you download the **kendryte-standalone-demo**. You will find four files as following:

> Th	s PC > DataBase (D:) > WorkWork >	2019_Product_Shelves $\rightarrow$ S2 $\rightarrow$	Al hat > kendryte-s	standalone-demo	> face_detect > kfpkg
	Name	Date modified	Туре	Size	
	detect.kmodel	5/16/2019 5:49 PM	KMODEL File	380 KB	
×	face_detect.bin	5/16/2019 5:49 PM	BIN File	94 KB	
A	face_detect.kfpkg	5/16/2019 5:49 PM	KFPKG File	382 KB	
A	🔊 flash-list.json	5/16/2019 5:49 PM	JSON Source File	1 KB	
$\mathcal{A}$					

Figure 13. This folder contains the AI module of face detect

• Step 2. Open the Arduino IDE, click **File** --> **Preferences**, click on the part marked in the red box to open the Arduino package folder.

File	Edit Sketch	Tools Help			
	New	Ctrl+N			
1	Open	Ctrl+O			
. '	Open Recent		>	font.h	ima
	Sketchbook		>		
	Examples		>		
	Close	Ctrl+W			
	Save	Ctrl+S			
	Save As	Ctrl+Shift+S			
	Page Setup	Ctrl+Shift+P			
	Print	Ctrl+P		-	
	Preferences	Ctrl+Comma			
	Quit	Ctrl+Q			

Figure 14. Open preferences windows

Settings Network	
Sketchbook location:	
D:\SMYM\Rr\Base\cards\sketc	h_card Browse
Editor language:	English (English) v (requires restart of Arduino)
Editor font size:	12
Interface scale:	Automatic 100 + % (requires restart of Arduino)
Show verbose output during:	compilation upload
Compiler warnings:	None 🗸
Display line numbers	
Enable Code Folding	
Verify code after upload	
Use external editor	
Aggressively cache compile	ed core
Check for updates on star	tup
Update sketch files to new	v extension on save (.pde -> .ino)
Save when verifying or up	loading
Additional Boards Manager URI	Ls: _githubusercontent.com/Seeed-Studio/Seeed_Platform/master/package_seeeduino_boards_index.json ]
More preferences can be edite	d directly in the file
C:\Users\seeed\AppData\Loca	il\Arduino 15\preferences.txt
(edit only when Arduino is not	running)
	OK Cancel

Figure 15. Click on the part marked in the red box

CII	hno	aiu	Organize	INCAN	0	pen	Select	
	>	This	PC > Core (C:) > Users > seeed > AppDa	ta > Local > Arduino	15		✓ Ö Se	arı
	*	^	Name	Date modified	Туре	Size		
its	A		packages	6/11/2018 10:46 AM	File folder			
s	A		staging	9/6/2018 2:34 PM	File folder			
	*		library_index.json	5/23/2019 9:15 AM	JSON Source File	8,002 KB		
	*		刘 package_index.json	5/23/2019 9:14 AM	JSON Source File	244 KB		
le-	Colc		package_index.json.sig	5/23/2019 9:14 AM	SIG File	1 KB		
,			🔰 package_seeeduino_boards_index.json	5/23/2019 9:15 AM	JSON Source File	99 KB		
<i>`</i>			package_seeeduino_boards_index.json.si	6/11/2018 10:43 AM	TMP File	0 KB		
			preferences.txt	5/22/2019 6:21 PM	Text Document	21 KB		

Figure 16. Click on the part marked in the red box

Step 3. Find the Kflash\_py.exe in the path XXXXX\packages\Seeeduino\tools\kflash\1.1.0, XXXX is the folder you just open by click the links in the Arduino references Windows. For instance mine is C:\Users\seeed\AppData\Local\Arduino15\packages\Seeeduino\tools\kflash\1.1.0, copy the whole path of your own, we need to use it in the next step.

C:\U	sers\seeed\AppData\Local\Arduino15\packages\Se	Undo		
* ^	Name	Date modified	Туре	Cut
*	🚰 kflash_py.exe	5/15/2019 4:12 PM	Appl	Сору
*				Paste
*				Delete

Figure 17. Copy the path of Kflash\_py.exe

Step 4. Back to the kfpkg folder, enter a command console, you can use any console you like. If you don't know how to open one, for win10 user, you can click File -->Open Windows Power Shell -->Open Windows Power Shell

🔄   🔄 📑 🗢   D:\WorkWork\2019_Produ		etect\kfpkg	- 0
File			
Open <u>n</u> ew window	Open Windows Powe <u>r</u> Shell	Copen →	Select all
Open Windows Powe <u>r</u> Shell	Open Windows PowerShell as <u>a</u> dministrator	Properties History Open	E Invert selection
Change older and search options			マ Ö Search kf
? Help →			
		×	
detect.ki	model face_detect.bin face_detect.kfpkg	flash-list.json	

Figure 18. Open power shell



Figure 19. Open power shell

• Step 5. Download the AI module into your Grove AI Hat Remember the path we copied in the **step3**? Mine is:

C:\Users\seeed\AppData\Local\Arduino15\packages\Seeeduino\tools\kflash\1.1.0

For windows user, you should change all the  $\$  in the path into /, then we get:

C:/Users/seeed/AppData/Local/Arduino15/packages/Seeeduino/tools/kflash/1.1.0

Replace the following command with you own Path

C:/Users/seeed/AppData/Local/Arduino15/packages/Seeeduino/tools/kflash/1.1.0/kflas h\_py -n -p COM31 -b 2000000 -B dan face\_detect.kfpkg

Check your COM number in the Computer Device Manager



Figure 20. Check the COM number

Replace the COM number with your own COM number, as you can see, mine is COM21, then enter the following command and run:

2 > DataBase (D:) > WorkWork	> 2019_Product_Shelves > S2 >	Al hat → face_dete	t → kfpkg		
vame ^	Date modified	Туре	Size		
detect.kmodel	5/16/2019 5:49 PM	KMODEL File	380 KB		
face_detect.bin	5/16/2019 5:49 PM	BIN File	94 KB		
face_detect.kfpkg	5/16/2019 5:49 PM	KFPKG File	382 KB		
d flash-list.json	5/16/2019 5:49 PM	JSON Source File	1 KB		

Figure 21. Replace the Path of kflash\_py and the COM port number with your own path and COM

port

When the download is finish, you will see:

→ Windows PowerShell	-	
PS D:\WorkWork\2019_Product_Shelves\S2\AI hat\face_detect\kfpkg> C:/Users/seeed/Ap o15/packages/Seeeduino/tools/kflash/1.1.0/kflash_py -n -p COM21 -b 2000000 -B dan [INFO] ANSI colors not used [INFO] COM Port Selected Manually: COM21 [INFO] Default baudrate is 115200 , later it may be changed to the value you set. [INFO] Trying to Enter the ISP Mode	pData/Local, face_detect	/Arduin .kfpkg
<pre>[INF0] Greeting Message Detected, Start Downloading ISP [INF0] CH340 mode Downloading ISP:  ====================================</pre>	=  100.0% 10	OkiB/s
[INFO] Writing face_detect.bin into 0x000000000 Programming BIN:  ====================================	=  100.0% 68 =  100.0% 67	3kiB/s 7kiB/s

#### Figure 22. Download Success

Now you will see the LCD screen light on with full white. Let's move to next step.

Download Demo code

• Step 1. Creat a new folder, creat a new blank xxx.ino file. xxx must be the same as the folder name. For instance both of mine is Face\_Detect\_Demo

IllAttention Please make sure the .ino file is blank and the .ino name is the same as your folder.



#### Figure 23. Great blank ino

• Step 2. Copy all the files in the folder XXXXX\kendryte-standalone-demo\face\_detect into the new folder you've just created.

Name	Date modified	Туре	Size	10:1	📙 kfpkg
	5/16/2019 5:49 PM	File folder		Cuick access	🔊 board_config.h
board_config.h	5/16/2019 5:49 PM	C Header	1 KB	📃 Desktop 📌	detect.kmodel
detect.kmodel	5/16/2019 5:49 PM	KMODEL F	380 KB	🔮 Documents 🖈	💿 Face_Detect_Demo.ino
🚽 font.h	5/16/2019 5:49 PM	C Header	26 KB	👆 Downloads 🖈	🚽 font.h
🛃 image_process.c	5/16/2019 5:49 PM	C Source F	1 KB	📰 Pictures 🛛 🖈	🕎 image_process.c
image_process.h	5/16/2019 5:49 PM	C Header	1 KB	of This PC 🖈	刘 image_process.h
incbin.h	5/16/2019 5:49 PM	C Header	11 KB	- dage	🚽 incbin.h
🛃 lcd.c	5/16/2019 5:49 PM	C Source F	6 KB	Erec Detect Der	📴 lcd.c
刘 lcd.h	5/16/2019 5:49 PM	C Header	2 KB		🚽 lcd.h
🛃 main.c	5/16/2019 5:49 PM	C Source F	9 KB	img	🕎 main.c
a nt35310.c	5/16/2019 5:49 PM	C Source F	4 KB	ThoneFlow	🕎 nt35310.c
刘 nt35310.h	5/16/2019 5:49 PM	C Header	4 KB	Creative Cloud Fil	🐋 nt35310.h
🛃 ov2640.c	5/16/2019 5:49 PM	C Source F	5 KB		🕎 ov2640.c
刘 ov2640.h	5/16/2019 5:49 PM	C Header	1 KB	of This PC	🔊 ov2640.h
ov5640.c	5/16/2019 5:49 PM	C Source F	7 KB	🗊 3D Objects	🕎 ov5640.c
刘 ov5640.h	5/16/2019 5:49 PM	C Header	1 KB	C Desktop	🔊 ov5640.h
README.md	5/16/2019 5:49 PM	Markdown	1 KB	Documents	README.md
region_layer.c	5/16/2019 5:49 PM	C Source F	11 KB	- Downloads	🕎 region_layer.c
region_layer.h	5/16/2019 5:49 PM	C Header	2 KB	Musia	🖈 region_layer.h
w25qxx.c	5/16/2019 5:49 PM	C Source F	14 KB	J Music	🕎 w25qxx.c
w25qxx.h	5/16/2019 5:49 PM	C Header	5 KB	Pictures	🔊 w25qxx.h

Figure 24. Copy file into the ino folder

• Step 3. Open the .ino file with your Arduino IDE. The whole project will opened in the Arduino IDE.



Figure 25. Open the .ino file with Arduino IDE

• Step 4. Board Config. Before building, we need to config the camera and LED. In this demo, we use OV2604 and Grove AI Hat.

The code for Grove AI Hat is **BOARD\_LICHEEDAN**, so we need to config as below:



Figure 26. Board Config

• Step 5. Build the main.c, please make sure you have selected the right board and flasher. K-flash/Seeed k210 Pi/

Ð			Auto Format	Ctrl+T		
	-		Archive Sketch			
ce_pe	tect_C		Fix Encoding & Reload		ss.h	incbin.h
clude	<std< td=""><td></td><td>Serial Monitor</td><td>Ctrl+Shift+M</td><td></td><td></td></std<>		Serial Monitor	Ctrl+Shift+M		
clude	<str< td=""><td></td><td>Serial Plotter</td><td>Ctrl+Shift+I</td><td></td><td></td></str<>		Serial Plotter	Ctrl+Shift+I		
clude	<uni< td=""><td></td><td>Scharriotter</td><td>Cert Shire E</td><td></td><td></td></uni<>		Scharriotter	Cert Shire E		
clude	<std< td=""><td></td><td>WiFi101 Firmware Updater</td><td></td><td></td><td></td></std<>		WiFi101 Firmware Updater			
clude	<mat< td=""><td></td><td></td><td></td><td></td><td></td></mat<>					
clude	"bsp		Board: "Seeed K210 Pi"	>		
clude	"sys		Tool Install Location: "Default"	>		
clude	"pli		Toor mistail Eocation. Default			
clude	"uti		CPU Clock Frequency: "400MHz CPU Clock Frequency"	· >		
clude	"gpi		Burn Baud Rate: "2 Mbps"	>		
clude	"fpi		Burn Tool Firmware: "Default"	>		
clude	"lcd				-	
clude	"nt3	L	Port: "COM21"	,		Serial ports
clude	"dvp		Get Board Info		$\checkmark$	COM21
clude	"ov5			L		
clude	"ov2	L ـ	Programmer: "k-flash"	>		
clude	"uar		Burn Bootloader			
-1	11 1					

Figure 27. Board Select

💿 Face_Detect_Demo - main.c   Arduino 1.8.5				-		×
File Edit Sketch Tools Help						
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Face_Detect_Demo board_config.h § font.h	image_process.c image_p	process.h incbin.h I	led.c led.h main.c	nt35310.c	nt35310.h	ov
<pre>#include <stdio.h> #include <stdio.h> #include <unistd.h> #include <stdlib.h> #include <stdlib.h> #include "bsp.h" #include "bsp.h" #include "plic.h" #include "plic.h" #include "gpiohs.h" #include "fpioa.h" #include "iso h"</stdlib.h></stdlib.h></unistd.h></stdio.h></stdio.h></pre>				J		~
<b>#include</b> "nt35310.h"						~
8		Seeed K210 Pi, D	Default, 400MHz CPU Clock Fre	quency, 2 Mbps, D	Default on CON	121

Figure 28. Build the main.c

• Step 6. Download the face\_detect\_demo into your Grove AI Hat. When the downloading is success, you can see as below:



Figure 29. Success

Now you can use the camera to shoot faces, rotate the focus ring on the camera or adjust the distance from the camera to the face to make the face clear. A red box appears when it recognizes a face.

### Resources

- [PDF] Grove AI HAT for Edge Computing Schematic file
- [PDF] Accelerometers\_Sensor\_datasheet Datasheet
- [PDF] ADS1115 Datasheet