

#### About keyestudio

Keyestudio is a best-selling brand owned by KEYES Corporation. Our product lines range from controller boards, shields and sensor modules to smart car and complete starter kits for Arduino, Raspberry Pi and BBC micro:bit, which can help customers at any level learn electronics and programming knowledge. Likewise, all of our products comply with international quality standards and are greatly appreciated in a variety of different markets throughout the world.

You can obtain the details and the latest information through visiting the following web sites: http://www.keyestudio.com

#### \*References and After-sales Service

1. Download Profile: https://fs.keyestudio.com/KS0507

2. Feel free to contact us please, if there is missing part or you encounter some troubles. Welcome to send email to us: service@keyestudio.com. We will update projects and products continuously from your sincere advice.

#### \*Warning

1. This product contains tiny parts(screws, copper pillars), keep it out of reach of children under 7 years old please.

2. This product contains conductive parts (control board and electronic



module). Please operate according to the requirements of tutorial. Improper operation may cause parts to overheat damage. Do not touch and immediately disconnect the circuit power.

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# **Smart Motorhome Kit**





## 1. Description:

When it comes to programming, many think it difficult. However, KEYES group issues a smart motorhome kit to cope with this problem.

This is a low-cost, easy-to-build and open source programming kit.

In fact, it integrates a smart home and a robot car. You can absorb the

knowledge of programming like electronics, control logic, computing and science from practical installation.

In compliance with the tutorial, you can create your own robot by boards, slot connection and wiring.

It also has a temperature humidity sensor and an LCD display except LED, line tracking sensor, ultrasonic sensor, Bluetooth module and motor d riving modules. Furthermore, the detailed projects will guide you to learn the working principle of sensors and modules.

If interested in STEM and code programming, you can customize your smart motorhome by altering code and adding extra modules.

That sounds entertaining, right? Let' s get started!

## 2. Features:

- Multi-purpose function : obstacle avoidance, line tracking, Bluetooth control, ultrasonic follow, smart sensation and so on.
- > Easy to build: Slot connection and without soldering circuit
- > Novel style: Adopt strong wood board, acrylic board, RGB and lcd1602

modules.

- High extension: configure motor driving chip, preserve IIC, UART and SPI port and expand other sensor and module.
- > Basic programming learning: use C language and code

## 3. Specification:

- Working voltage: 5v
- Input voltage: 7-12V
- Maximum output current: 3A
- Maximum power dissipation: 15W
- Motor speed: 200 rpm (4.5V)
- Motor driving form: TB6612 chip drive
- Ultrasonic sensing angle: <15 degrees</li>
- Ultrasonic detection distance: 2cm-400cm
- Bluetooth remote control distance: 50 meters (measured)
- Bluetooth APP control: support Android and iOS system

## 4. Kit:

Remember to check if the components received are in line with the following product list when you getting this kit.

#	Picture	Model	QTY
1		Keyestudio MEGA 2560 Smart Development Board	1
2		9 Pcs Wooden Boards	1
3		Acrylic Board O	1
4	P	Acrylic Board P	1
5	ad b	Keyestudio 9G 180°Servo	3
6		6-Slot AA Battery Holder	1



7		4*4 Matrix Array Membrane Keypad	1
8	● ● ● ● 1 和在自然在在在中国在在10	Keyestudio l2C1602 LCD Display Module	1
9		HC-SR04 Ultrasonic Sensor	1
10		Keyestudio Quick Connectors Line Tracking Sensor	1
11	Keyestudio	Keyestudio TEMT6000 Ambient Light Sensor	1
12		Keyestudio Steam Sensor	1
13	A CONTRACT OF	Keyestudio DHT11 Temperature and Humidity Sensor	1



14		Keyestudio Analog Gas Sensor	1
15		Keyestudio Power Amplifier Module	1
16	Ser Pyte_IR Pute Ser Ser Ser Ser Ser Ser Ser Ser Ser Se	Keyestudio PIR Motion Sensor	1
17	LED RGB No.M No.M Keyestudio	Keyestudio Full Color LED	2
18		Keyestudio HM-10 Bluetooth Module	1
19	Arton Suitch Egy St Key GSTUCH D	Keyestudio Digital Push Button	1
20		4.5V 200r Motor	4
21		Car Wheels	4



22	Contraction of the second seco	Keyestudio White LED Module	1
23		Keyestudio Analog Rotation Sensor	1
24		ABS White Insulation Column	14
25		Aluminum Mounts	4
26		M3*8MM Round Head Screws	32
27		M3*10MM Round Head Screws	6
28		M3*12MM Round Head Screws	5
29		M3*20MM Round Head Screws	2
30		M3*30MM Round Head Screws	10



31	80	M3 Nickel Plated Nuts	35
32		M3 Self-locking Nuts	6
33		M2*10MM Round Head Screws	3
34		M2*16MM Round Head Screws	5
35	80	M2 Nickel Plated Nuts	8
36		M1.4*8MM Round Head Screws	6
37		M1.4 Nickel Plated Nuts	6
38		M1.2*4MM Round Head Self-tapping Screws	14
39	A Contraction of the second se	M3*12MM Flat Head Screws	3
40		M3*10MM Copper Pillar	3



		1	
41		M3*20MM Copper Pillar	3
		3.0*40MM	
42	and a second a second s	Screwdriver	1
42		2.0*40MM	
43		Screwdriver	1
43		Cross Wrench	1
44	OF.	AM/BM USB Cable	1
45		Winding Pipe	1
46		3*100MM Black Ties	4
		Full Color WS2812B	
47	2 똜뼺똜뼺탒뼺븮탒뼺딶뼺탒뼺탒뼺탒뼺탒뼺탒	LED Light Strip with	2
		5V 5050 Light Beads	
48		15cm 3pin F-F	2
40		26AWG Dupont Line	۷
		20cm 3pin F-F	
49		26AWG	6
		Dupont Line	



	15cm 8pin M-F	
	26AWG	1
	Dupont Line	
	35cm 4pin F-F	
	26AWG	2
	Dupont Line	
	35cm 4pin F-F	
	26AWG	1
	Dupont Line	
	20cm 4pin F-F	
	26AWG	2
	Dupont Line	
	40cm 5pin XH2.54 to	
	PH2.0 26AWG	1
	Dupont Line	
	15cm 3pin F-F	
	26AWG	2
	Dupont Line	
	50*82*0.2MM	4 Г
Le contra de la co	Plastic Bag	15
	63*106*0.2MM	4
La company	Plastic Bag	1
		Second

58	4*6CM	17
50	Plastic Bag	17
59	6*9CM	С
59	Plastic Bag	2
60	10*15CM	2
60	Plastic Bag	2

### 5. Getting Started with Arduino

### (1) Installing Arduino IDE

When we get control board, we need to download Arduino IDE and driver firstly.

You could download Arduino IDE from the official website:

https://www.arduino.cc/, click the **SOFTWARE** on the browse bar, click

"DOWNLOADS" to enter download page, as shown below:





You can download either Windows win7 and newer or Windows ZIP file. The first one doesn't require

There are two versions of IDE for WINDOWS system, you can choose from the Installer (.exe) and the Zip packages. We suggest you use the first one that installs directly everything you need to use the Arduino Software (IDE), including the drivers.

With the Zip package you need to install the drivers manually. The Zip file is also useful if you want to create a portable installation.

# Downloads



## Arduino IDE 1.8.13

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the Getting Started page for Installation instructions.

SOURCE CODE

Active development of the Arduino software is hosted by GitHub. See the instructions for building the code. Latest release source code archives are available here. The archives are PGP-signed so they can be verified using this gpg key.

#### DOWNLOAD OPTIONS

Windows Win 7 and newer Windows ZIP file

Windows app Win 8.1 or 10 Get

Linux 32 bits Linux 64 bits Linux ARM 32 bits Linux ARM 64 bits

Mac OS X 10.10 or newer

Release Notes Checksums (sha512)



You just need to click JUST DOWNLOAD.

### (2) Keyestudio MEGA 2560 Smart Development Board



We need to know keyestudio MEGA 2560 development board, as a core of

this smart car.



The processor core of MEGA 2560 board is ATMEGA2560-16AU, with the cp2102 chip.

It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, 1 ICSP header, and a reset button.

It can be interfaced computer with external power with a USB cable.

Microcontroller	ATMEGA2560-16AU
Working Voltage	5V
Input Voltage	DC7-12V
	54个 (D0-D53)
	(pin D9,D10,D11 and D12
Digital I/O Pins	control speed of motor ,
	D28,D29,D30,D31,D32,D33,D
	34 and D35 control rotation
	direction of motor
PWM IO Pins	<b>15 (</b> D2-D13, D44-D46 <b>)</b>
Analog Input Pins	16 (A0-A15)
DC Current per I/O Pin	20 mA
DC Current per I/O Pin DC Current for 3.3V Pin	20 mA 50 mA
· · · · · · · · · · · · · · · · · · ·	
· · · · · · · · · · · · · · · · · · ·	50 mA
DC Current for 3.3V Pin	50 mA 256 KB (ATMEGA2560-16AU)
DC Current for 3.3V Pin	50 mA 256 KB (ATMEGA2560-16AU) of which 8 KB used by boot



**Clock Speed** 



16 MHz



#### (3) Install Driver on Windows System

Let's install the driver of keyestudio MEGA 2560 smart development board. The USB-TTL chip on this board adopts CP2102 serial chip. The driver program of this chip is included in Arduino 1.8 version and above, which is convenient. Plugged in USB port, the computer can recognize the hardware and automatically install the driver of CP2102. If install unsuccessfully, or you intend to install manually, open the device manager of computer. Right click Computer---- Properties----- Device Manager.



There is a yellow exclamation mark on the page, which implies installing unsuccessfully. Then we double click the hardware and update the driver.



File Action View Help <p< th=""><th>▲ 设备管理器</th><th></th><th></th><th>×</th></p<>	▲ 设备管理器			×
<ul> <li>XIAORONG</li> <li>Audio inputs and outpu</li> <li>Computer</li> <li>Disk drives</li> <li>Display adapters</li> <li>Muma Interface Device</li> <li>IDE ATA/ATAPI controller</li> <li>Monitors</li> <li>Monitors</li> <li>Metwork adapters</li> <li>Network adapters</li> <li>Network adapters</li> <li>CP2102 USB to UART Bridge Controller</li> <li>Device type: Other devices</li> <li>Manufacturer: Unknown</li> <li>Location: Port_#00111.Hub_#0001</li> <li>Device status</li> <li>Device status</li> <li>The drivers for this device.</li> <li>Ports (COM &amp; LPT)</li> <li>Processors</li> <li>Software devices</li> <li>Software devices</li> <li>Software devices</li> <li>Sotrage controllers</li> <li>System devices</li> <li>Universal Serial Bus con</li> </ul>	File Action View Help			
<ul> <li>Audio inputs and output</li> <li>Computer</li> <li>Disk drives</li> <li>Display adapters</li> <li>Mine and other pointing</li> <li>Monitors</li> <li>Monitors</li> <li>Monitors</li> <li>Monitors</li> <li>Monitors</li> <li>Ports (COM &amp; LPT)</li> <li>Processors</li> <li>Software devices</li> <li>Software devices</li> <li>Software devices</li> <li>Software devices</li> <li>System devices</li> <li>System devices</li> <li>Winversal Serial Bus con</li> </ul>		CP2102 USB to UART Bridge Controller Properties X		
	<ul> <li>XIAORONG</li> <li>Audio inputs and outpu</li> <li>Computer</li> <li>Disk drives</li> <li>Display adapters</li> <li>Human Interface Device</li> <li>IDE ATA/ATAPI controlle</li> <li>Keyboards</li> <li>Mice and other pointing</li> <li>Monitors</li> <li>Network adapters</li> <li>Other devices</li> <li>CP2102 USB to UART</li> <li>Ports (COM &amp; LPT)</li> <li>Print queues</li> <li>Print queues</li> <li>Software devices</li> <li>Software devices</li> <li>Sond, video and game</li> <li>System devices</li> <li>System devices</li> </ul>	General       Driver       Details       Events         Image: CP2102 USB to UART Bridge Controller       Device type:       Other devices         Manufacturer:       Unknown       Location:       Port_#0011.Hub_#0001         Device status       Image: Controller of this device are not installed. (Code 28)       Image: Controller of this device.         There are no compatible drivers for this device.       Image: Controller of this device.       Image: Controller of this device.         Update Driver.       Update Driver       Image: Controller of the control of the controller of the controle of the control of the		

Click "OK" to enter the following page, click "browse my computer for updated driver software", find out the installed or downloaded ARDUINO software. As shown below:



Update Drivers - CP2102 USB to UART Bridge Controller

How do you want to search for drivers?

→ Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

→ Browse my computer for driver software Locate and install driver software manually.

There is a DRIVERS folder in Arduino software installed package. Just open driver folder and you can see the driver of CP210X series chips.

We click "Browse", then find out the driver folder, or you could enter "driver" to search in rectangular box, then click "next", the driver will be installed successfully. (I place Arduino software folder on the desktop, you can follow my way)

Х

Cancel



← ■ Update Drivers - CP2102 USB to UART Bridge Controller



→ Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device.





Update Drivers - Silicon Labs CP210x USB to UART Bridge (COM4)

Windows has successfully updated your drivers

Windows has finished installing the drivers for this device:



Silicon Labs CP210x USB to UART Bridge

Close

×

Open device manager, we will find the yellow exclamation mark disappear.

The driver of CP2102 is installed successfully.



🗄 Device Manager	_		×			
File Action View Help						
V 🚦 DESKTOP-eng			[			
> 👖 Audio inputs and outputs						
> 🗃 Batteries						
> 💻 Computer						
> Disk drives						
> 🕞 Display adapters						
> PVD/CD-ROM drives						
> 🖓 Human Interface Devices						
>  IDE ATA/ATAPI controllers						
> Explored states and the second states of the seco						
Mice and other pointing devices     Monitors						
> 💭 Monitors > 💭 Network adapters						
✓ ■ Ports (COM & LPT)						
Silicon Labs CP210x USB to UART Bridge (COM3)						
>  Print queues						
> Processors						
> Software devices						
> 🖾 Storage controllers						
> E System devices						
> 🖗 Universal Serial Bus controllers						

### (4) Install Driver on MAC System

The USB to serial chip of control board is CP2102. We install driver on MAC

as follows:

https://wiki.keyestudio.com/How\_to\_Install\_the\_Driver\_of\_CP2102\_on\_MA

C\_System

### (5) Arduino IDE Setting







To avoid the errors when uploading the program to the board, you need to select the correct Arduino board that matches the board connected to your computer.

Then come back to the Arduino software, you should click Tools $\rightarrow$ Board, select the board. (as shown below)



ile <u>E</u> dit <u>S</u> ketch <u>T</u> o						
	Auto Format	Ctrl+T				
	Archive Sketch					
sketch_dec10a	Fix Encoding & Reload					
void setup()	Manage Libraries	Ctrl+Shift+I	-			
// put you	Serial Monitor	Ctrl+Shift+M	r III	Reards Managar		
	Serial Plotter	Ctrl+Shift+L		Boards Manager Arduino Vún		
}	WiFi101 / WiFiNINA Firmware Updater			Arduino Uno		
void loop() // put you	Board: "Arduino Mega or Mega 2560"		•	Arduino Duemilanove or Diecimila		
// puc you	Processor: "ATmega2560 (Mega 2560)"			Arduino Nano		
3	Port: "COM3"	13"	•	Arduino Mega or Mega 2560		
	Get Board Info			Arduino Mega ADK Arduino Leonardo		
	Programmer: "AVRISP mkII"			Arduino Leonardo ETH		
	Burn Bootloader			Arduino Micro		
				Arduino Esplora		
				Arduino Mini		
				Arduino Ethernet		
				Arduino Fio		
				Arduino BT		

Then select the correct COM port (you can see the corresponding COM

port after the driver is successfully installed)



#### 🛔 Device Manager

File Action View Help ♦ ♦ ✓ ♣ DESKTOP-eng > 🛯 Audio inputs and outputs > 🍃 Batteries > 💻 Computer > 👝 Disk drives > 🔙 Display adapters > @ DVD/CD-ROM drives > 🐺 Human Interface Devices > 🖷 IDE ATA/ATAPI controllers > 🔤 Keyboards > I Mice and other pointing devices > 🛄 Monitors > 💭 Network adapters ✓ ₽ Ports (COM & LPT) 📮 Silicon Labs CP210x USB to UART Bridge (COM3) > 🖹 Print queues > 
Processors > Software devices > 🍇 Storage controllers > 🛅 System devices > 🏺 Universal Serial Bus controllers

🔊 sketch_dec10a   A	Arduino 1.8.13		
File Edit Sketch To	ools) Help		
sketch_dec10a	Auto Format Archive Sketch Fix Encoding & Reload	Ctrl+T	
void setup() // put you	Manage Libraries Serial Monitor	Ctrl+Shift+I Ctrl+Shift+M	<b>^</b>
}	Serial Plotter WiFi101 / WiFiNINA Firmware	Ctrl+Shift+L Updater	
void loop() // put you	Board: "Arduino Mega or Me Processor: "ATmega2560 (Me	-	
}	Port: "COM3"		Serial ports
	Get Board Info Programmer: "AVRISP mkII" Burn Bootloader		

Before uploading the program to the board, let's demonstrate the

×



function of each symbol in the Arduino IDE toolbar.



- A- Used to verify whether there is any compiling mistakes or not.
- B- Used to upload the sketch to your Arduino board.
- C- Used to create shortcut window of a new sketch.
- D- Used to directly open an example sketch.
- E- Used to save the sketch.
- F- Used to send the serial data received from board to the serial monitor.

Note: the setting method on Mac system is same as on Windows system except different COM port, as shown below:



### (6) Start First Program

We' ve known how to download and install the driver of development board , next, we will burn a code to show "Hello World!" in the monitor.

#### **Test Code**

void setup() {

// initialize serial communication at 9600 bits per second:

```
Serial.begin(9600);
```

}

```
void loop() {
```

```
// print out "Hello world!"
```

```
Serial.println("Hello world!");
```

```
delay(1000);// delay 1 second
```

}

## Open Arduino IDE, and set board as follows:

ile <u>E</u> dit <u>S</u> ketch <u>T</u> o	ols <u>H</u> elp			
	Auto Format	Ctrl+T		
	Archive Sketch			
sketch_jan27b	Fix Encoding & Reload			
void setup()	Manage Libraries	Ctrl+Shift+I	-	
// put you	Serial Monitor	Ctrl+Shift+M		
}	Serial Plotter	Ctrl+Shift+L		Boards Manager
	WiFi101 / WiFiNINA Firmware Updater			Arduino Yún
void loop()				Arduino Uno
// put you	Board: "Arduino Mega or Mega 2560"	-		Arduino Duemilanove or Diecimila
	Processor: "ATmega2560 (Mega 2560)"		<u> </u>	Arduino Nano
	Port		•	Arduino Mega or Mega 2560
	Get Board Info			Arduino Mega ADK
	Programmer: "AVRISP mkII"			Arduino Leonardo
	Burn Bootloader			Arduino Leonardo ETH
				Arduino Micro
				Arduino Esplora
				Arduino Mini
				Arduino Ethernet
				Arduino Fio
				Arduino BT
				LilyPad Arduino USB
				LilyPad Arduino
				Arduino Pro or Pro Mini

### Set COM port, as shown below:



Click to start compiling the program, and check errors.

Click to upload the program, upload successfully.





Upload the program successfully, open serial monitor and set baud rate to 9600. Monitor will print "Hello World!" each 1s.

Congratulation, you finish the first program.



© COM3		-	
1			Send
Hello world!			<u>^</u>
Hello world!			
Hello world!			
🕼 Autoscroll 🔲 Show timestamp	Newline 🔻	9600 baud 🔻	Clear output

#### 7. Projects

The whole project begins with basic program. Starting from simple to complex, the lessons will guide you to assemble smart motorhome and absorb the knowledge of electronic and machinery step by step. I reckon that you might hardly sit still and itch to have a go, let's get started.

Note: (G), marked on each sensor and module, is negative pole and connected to "G", "-" or "GND" on the sensor shield or control board; (V) is positive pole and interfaced with "V", "VCC", "+" or "5V" on the sensor shield or control board.