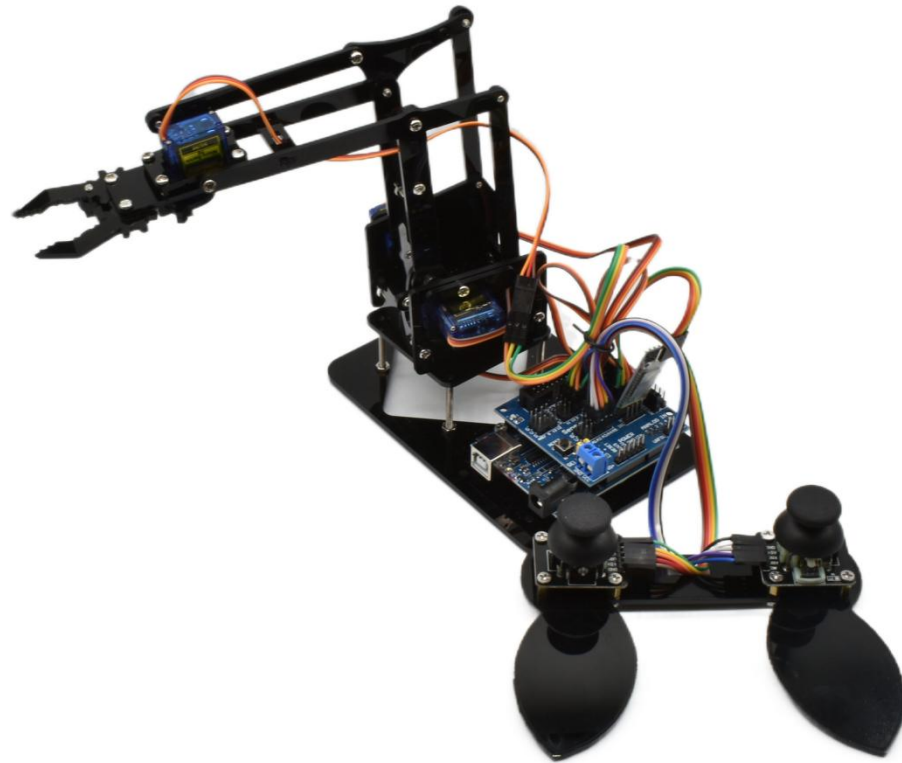


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**Smart Robot Arm Kit
V2.0**

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Preface

Company Profile

Founded in 2014, Shenzhen Lonten Technology Co., Ltd. focuses on the design, research production of Electronics Module for robotics related products. Consisting of professional researchers and skilled engineers, our R&D team constantly strives for creative function and excellent user experience. The company's R&D investments on arduino kits raspberry pi kits, as well as 3D printer and robots that back up STEAM education.

Customer Service

Our self-owned factory is certificated with BSCI and SO, covering an area of 5,000 square meters, and achieving an annual production capacity of over 10,000 units. Our products are all certified to CE, FCC, and ROHS standards, have exported to more than 100 countries including, but not limited to France, the United States of America, Australia, Russia, the United Kingdom, Germany, Singapore, Egypt, and India, bringing technological innovation to all walks of life.

Tutorial

This tutorial include codes, libraries and detailed user documentation.

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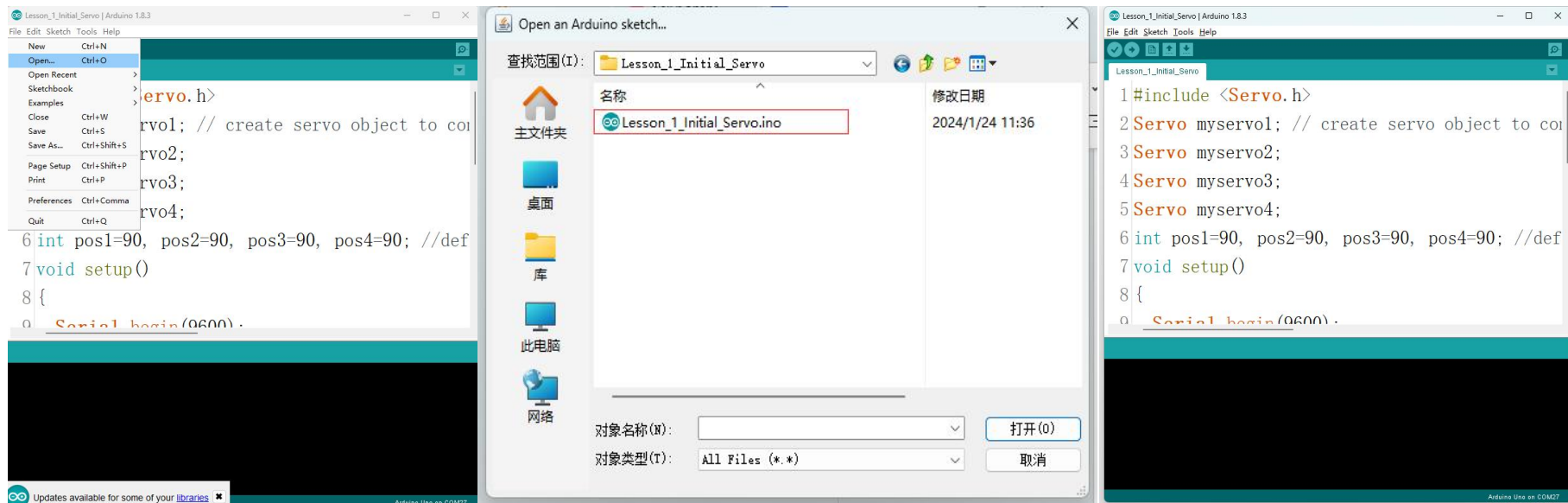
Lesson 1 Initial Servo

About this lesson

Firstly, it is necessary to initialize all servo angles to 90° so that errors will not occur during the later operation of the robotic arm.

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Upload the code



Result

After uploading the code successfully, you will see the servo motor initialized successfully. The all servos will turn to the initial angle of 90° .



Lesson 2 Single Servo

About this lesson

First, learn how to control a single servo motor.

Introduction

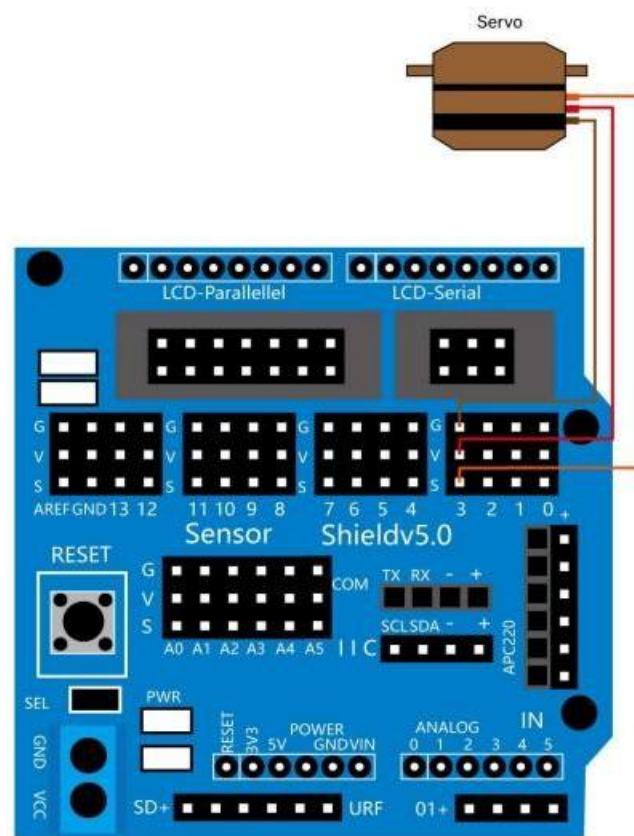
Servo motors are great devices that can turn to a specified position. Usually, they have a servo arm that can turn 180 degrees. Using the Arduino, we can tell a servo to go to a specified position and it will go there. As simple as that! Servo motors were first used in the Remote Control (RC) world, usually to control the steering of RC cars or the flaps on a RC plane. With time, they found their uses in robotics, automation, and of course, the Arduino world. There are two ways to control a servomotor with Arduino. One is to use a common digital sensor port of Arduino to produce square wave with different duty cycle to simulate PWM signal and use that signal to control the positioning of the motor. Another way is to directly use the Servo function of the Arduino to control the motor. In this way, the program will be easier. Next, we learn how to control the



servo. The servo motor has three leads. The color of the leads varies between servo motors, but the red lead is always 5V and GND will either be brown. The red one is the power wire and should be connected to the 5v port and signal control line is usually orange.

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Wiring diagram





Result

After connecting, please open the the program and load up the code **Lesson_2_Single_Servo** onto your Arduino board. Before you can run this, make sure that you have installed the < Servo> library or re-install it, if necessary. Otherwise, your code won't work.

Lesson 3 Multiple Servo

About this lesson

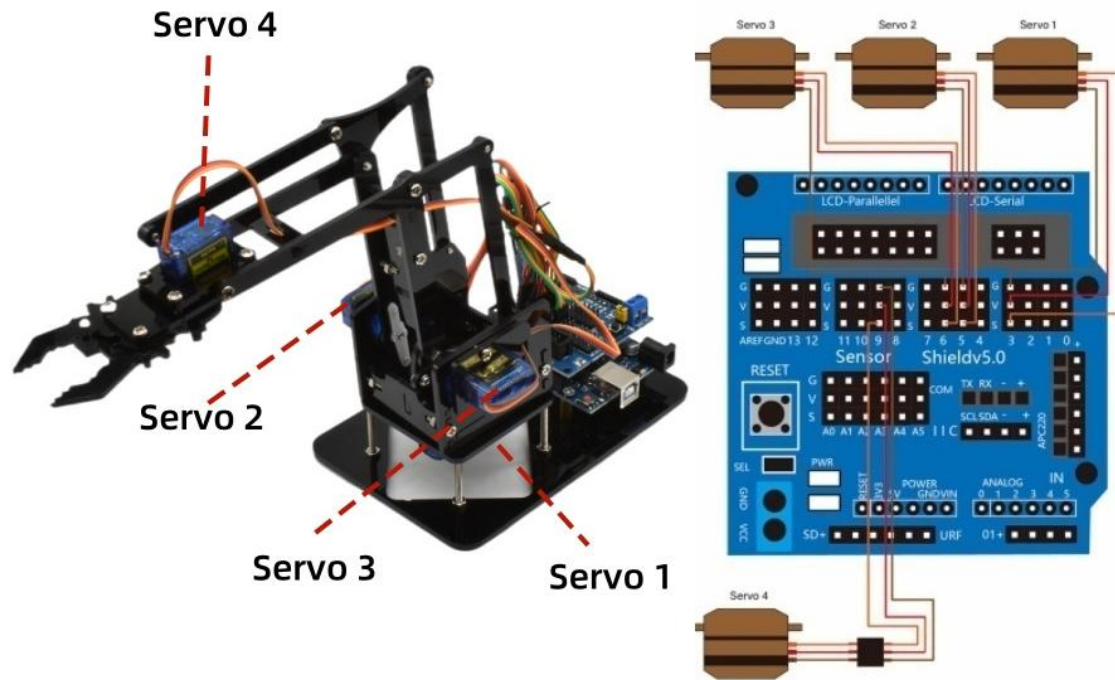
In this lesson, you will learn how to control four servo motors at the same time.

Introduction

On the basis of single servo motor control, we learn to control four servo motors at the same time. At this point, we need to be aware that the four servo motors are connected to different digital interfaces on the control board.

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Wiring diagram





Result

After connecting, please open the the program and load up the code **Lesson_3_Multiple_Servo** onto your Arduino board. upload well the code. Powered on, press the reset button, the robot arm will realize a cyclic motion. Grab the thing on the left to the right.

Lesson 4 Analog Joystick Module

About this lesson

Analog joysticks are a great way to add some control in your projects. In this tutorial we will learn how to use the analog joystick module.

Introduction

Joystick

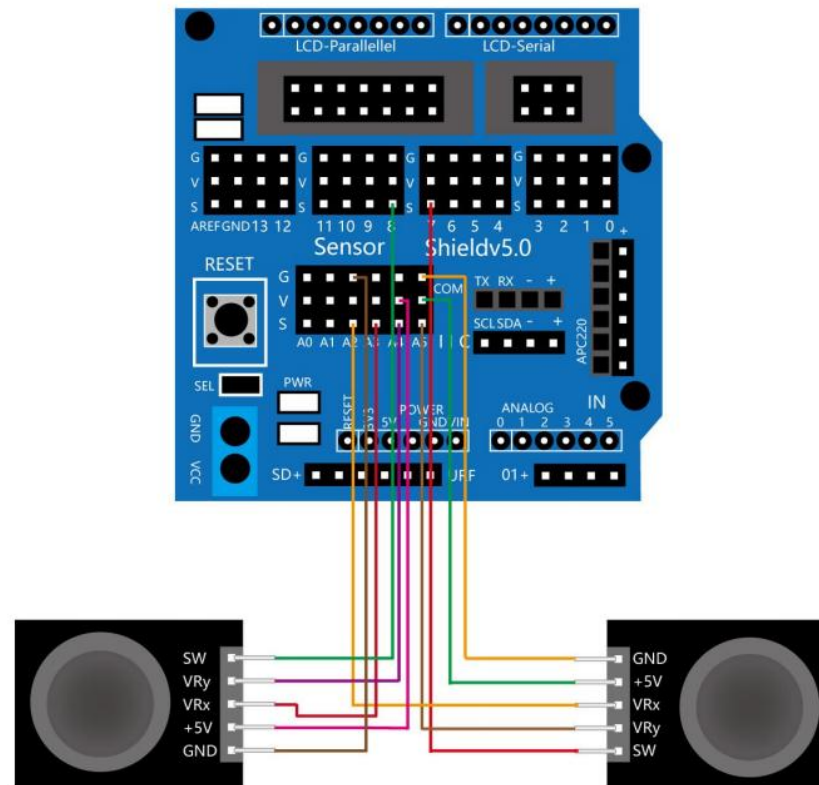
The module has 5 pins: VCC, Ground, X, Y, Key. Note that the labels on yours may be slightly different, depending on where you got the module from. The thumb stick is analog and should provide more accurate readings than simple 'directional' joysticks tact use some forms of buttons, or mechanical switches. Additionally, you can press the joystick



down (rather hard on mine) to activate a ‘press to select’ push-button. We have to use analog Arduino pins to read the data from the X/Y pins, and a digital pin to read the button. The Key pin is connected to ground, when the joystick is pressed down, and is floating otherwise. To get stable readings from the Key /Select pin, it needs to be connected to VCC via a pull-up resistor. The built in resistors on the Arduino digital pins can be used. For a tutorial on how to activate the pull-up resistors for Arduino pins, configured as inputs.

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Wiring diagram





Result

After wiring, please open the program in the code folder- **Lesson_4_Analog_Joystick_Module** and click UPLOAD to upload the program. Connect the UNO R3 to computer using a USB cable, then open the serial monitor and set the baud rate to 9600, you should see the analog value of the right Joystick pin X,Y.

A screenshot of a serial monitor window titled 'COM27'. The window displays the following text:

```
right_X = 536
right_Y = 1023
#####
####left_joystick#####
left_X = 0
left_Y = 511
#####
####right_joystick#####
right_X = 480
right_Y = 1023
#####
####left_joystick#####
left_X = 1014
left_Y = 1023
#####
```

 At the bottom of the window, there are controls: a checkbox for '自动换行' (Auto Line Feed) which is checked, a dropdown menu for '没有结束符' (No End Character), a dropdown menu for '9600 波特率' (9600 Baud Rate), and a 'Clear output' button.

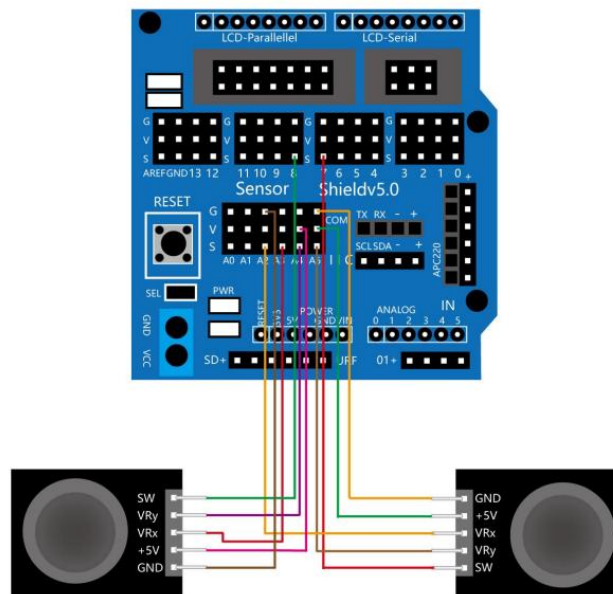
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Lesson 5 Dual Joystick Controlled Robot Arm

About this lesson

In this lesson, we have introduced how to use 4 Servo to control the robot arm. Next, combine those two experiments. Use two Joystick modules to control 4DOF robot arm realize different motions.

Wiring diagram



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Left Joystick	arm	Right Joystick	arm
X1<50	push the left joystick to the right, the claw opens	X2<50	push the right joystick to the left, the servo that controls the arm rotation turns left
X1>1000	push the left joystick to the left, the claw closed	X2>1000	push the right joystick to the right, the servo that controls the arm rotation turns right
Y1<50	push the left joystick to the down , lower the robot upper arm	Y2>1000	push the right joystick to the down,draw back the robot lower arm
Y1>1000	push the left joystick to the up,lift up the robot upper arm	Y2<50	push the right joystick to the up,stretch out the robot lower arm

Lesson 6 Bluetooth Test

About this lesson

In this lesson,we will learn how to use the Bluetooth Module.

Introduction

The HC05 is a Serial port Bluetooth module which having fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate)



3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

We use the serial port communication function of the Bluetooth module, use the app to control the Bluetooth connection of the mobile phone and the HC-05 Bluetooth module, and then the mobile phone app sends data, and the HC-05 Bluetooth module transmits the received data to the arduino uno through the serial port. The default communication baud rate of the HC-05 Bluetooth module is 9600.

VCC>>>> +

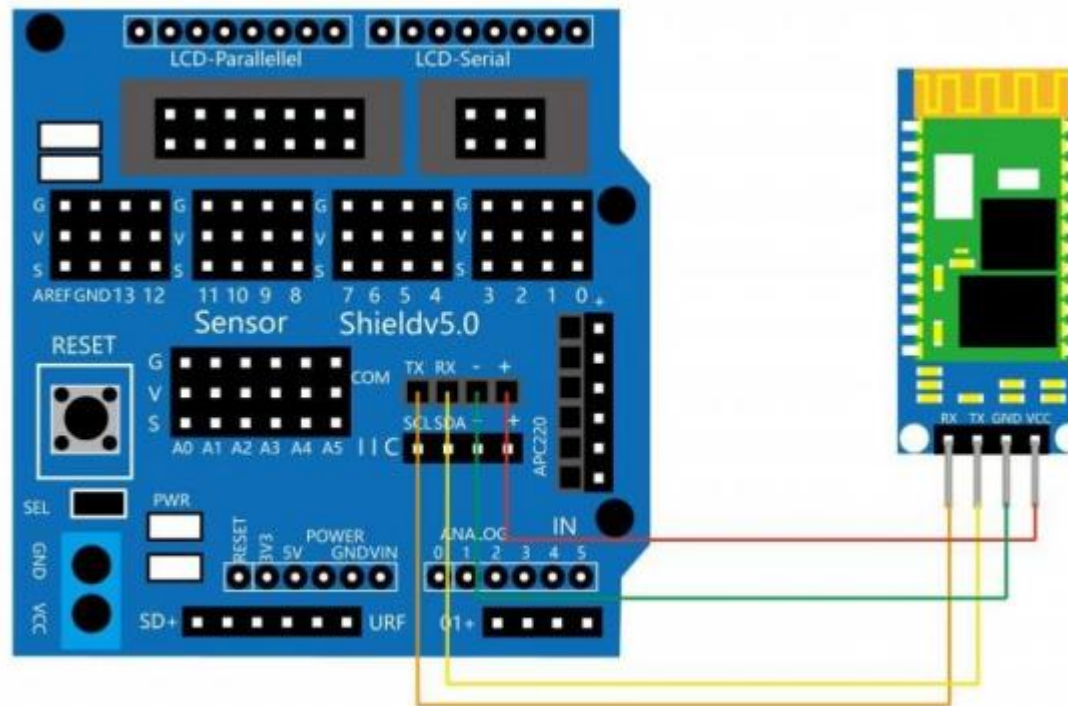
GND>>>> -

TXD>>>>RX

RXD>>>>TX

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Wiring diagram





Attention

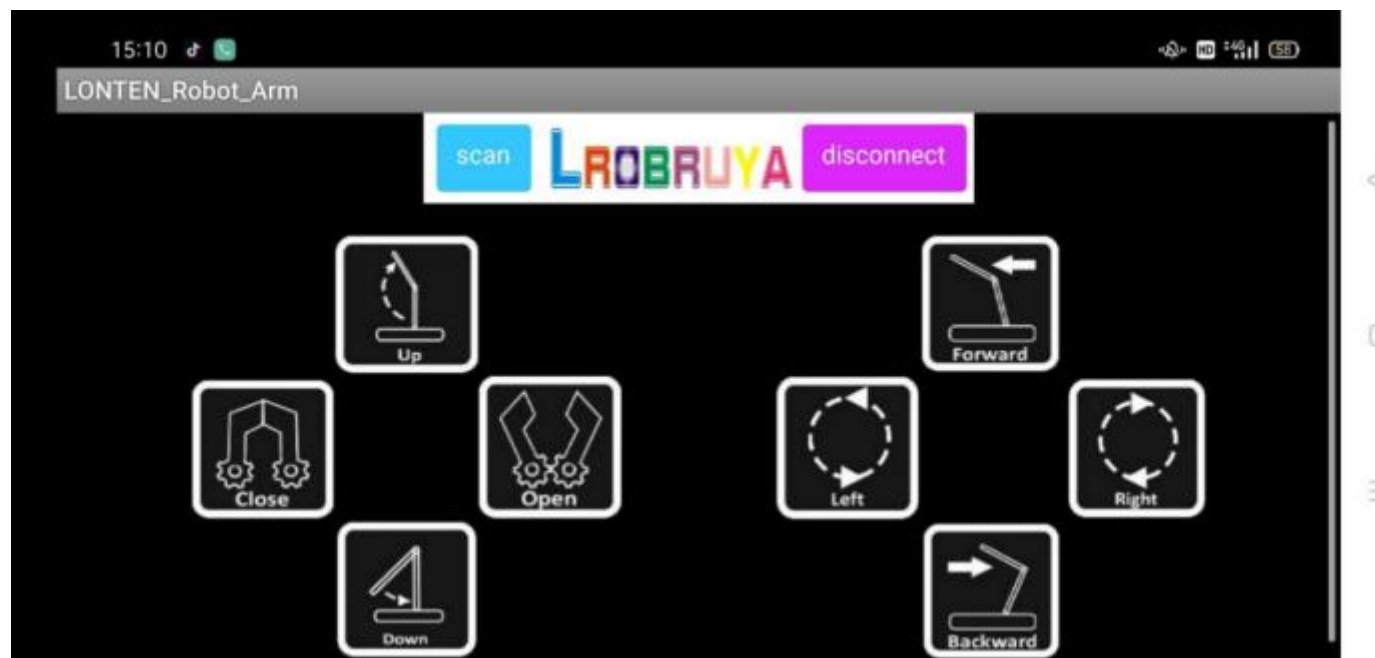
The bluetooth module should be pulled out before you upload the program every time, or it will be failed to upload the program. When uploading the code, CANNOT connect the Bluetooth module first; otherwise uploading fails! You are supposed to upload the code to control board, then connect the Bluetooth module.



Lesson 7 Bluetooth Controlling Arm

Instructions for the use of app

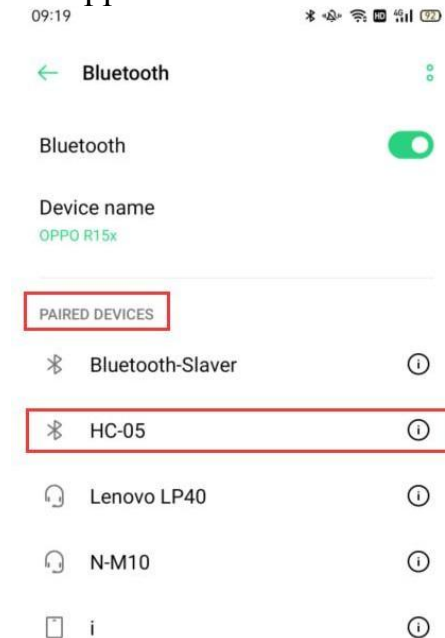
Firstly, download the “**LONTEN_Robot_Arm.apk**” file from the folder to your mobile phone and install it into an application software.



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Then make sure the Bluetooth module is connected. Pair your phone with HC-05. for doing this go to **Settings->Bluetooth->Scan device->select HC-05** and pair it. Pass code to pair is '1234'.

Open Bluetooth Terminal software, go to options and select 'connect a device - secure' option. If it ask for pass code enter 1234.If your phone is connected to the Bluetooth module, you will see a usable device called HC-05 on the PAIRED DEVICES(As shown below).If the HC-05 does not appear on the PAIRED DEVICES, reoperate the above steps.



After the above steps are complete, we open the **LONTEN_Robot_Arm app**.

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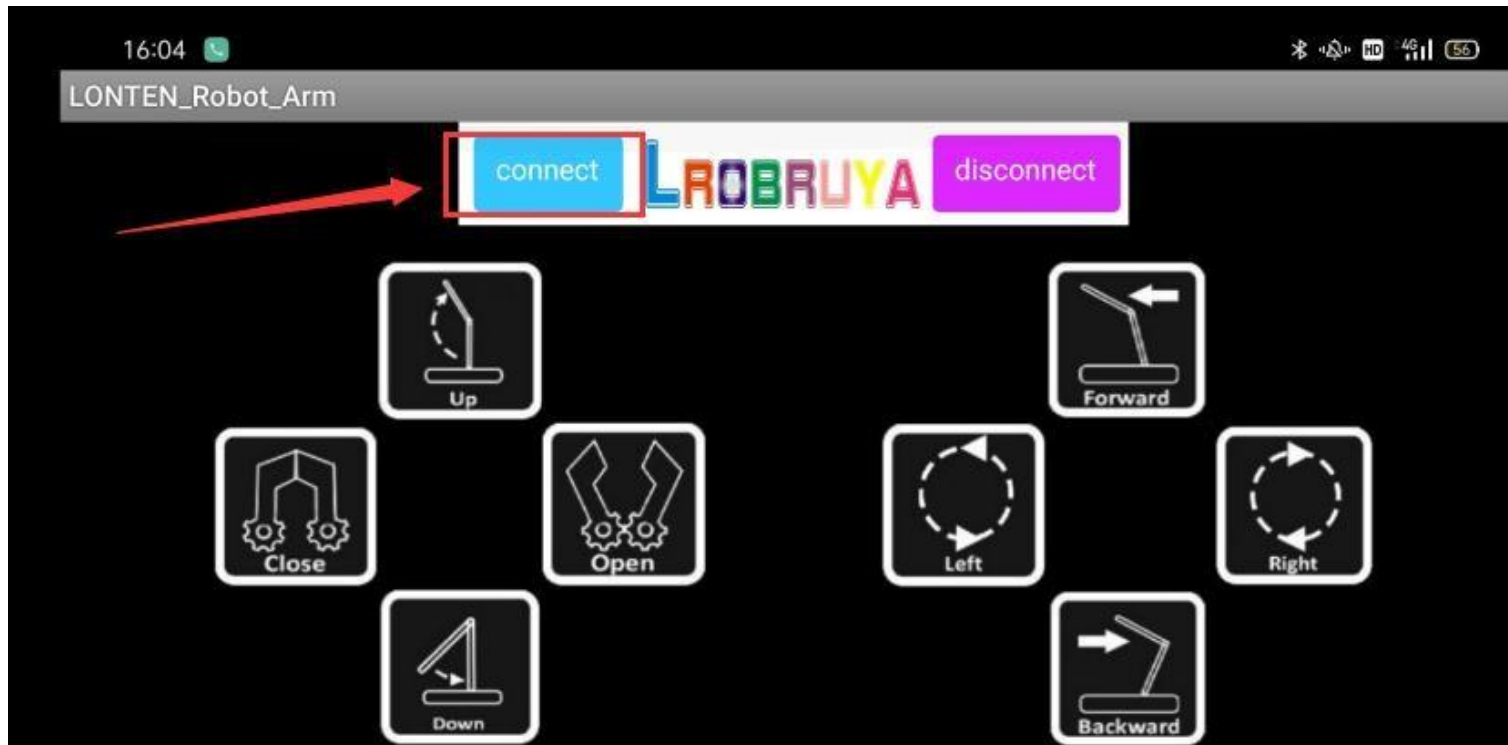
Click the button "scan". the HC-05 will appear in our scan results. Select HC-05.

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After selecting the HC-05 device, click button will to connect .“scan” will be “connect”.

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(Note: When the Bluetooth module is not successfully connected, the red LED light will continue to flash. When the connection is successful, the red LED light will be remain on.).






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Result

After wiring, please open the program in the code folder--**Lesson_7_Bluetooth_Controlling_Arm** and click UPLOAD to upload the program. After the code has been successfully uploaded to the UNO board, reconnect the Bluetooth. Repeat the steps above regarding the app connection to the Bluetooth module. Now that the app has successfully connected to Bluetooth, we can begin to control the robotic arm through the app.

APP KEY	Value
	Upper the robot lower arm
	The claw closed
	The claw opens

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	Lower the robot upper arm
	Stretch out the robot lower arm
	Turns left
	Turns right
	Draw back the robot lower arm



Lesson 8 PS2 Module

About this lesson

In this lesson, we will learn how to send messages through the PS2 controller buttons and display them on the serial port. **But you need to purchase it by yourself because the PS2 Joypad is not included in the kit.**

Introduction

PS2 consists of a handle and a receiver, with the handle mainly responsible for sending button information. When the power is turned on and the handle switch is turned on, the handle and receiver automatically pair and connect. In the state of unsuccessful pairing, the receiver's green light will flash, and the light on the handle will also flash. After successful pairing, the receiver's green light will remain on, and the handle's light will also remain on. At this time, you can press the "MODE" button to select the handle sending mode.

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9	8	7	6	5	4	3	2	1
ACK	NC	CLK	CS/SEL	VDD	GND	NC	DQ/CMD	D/DAT

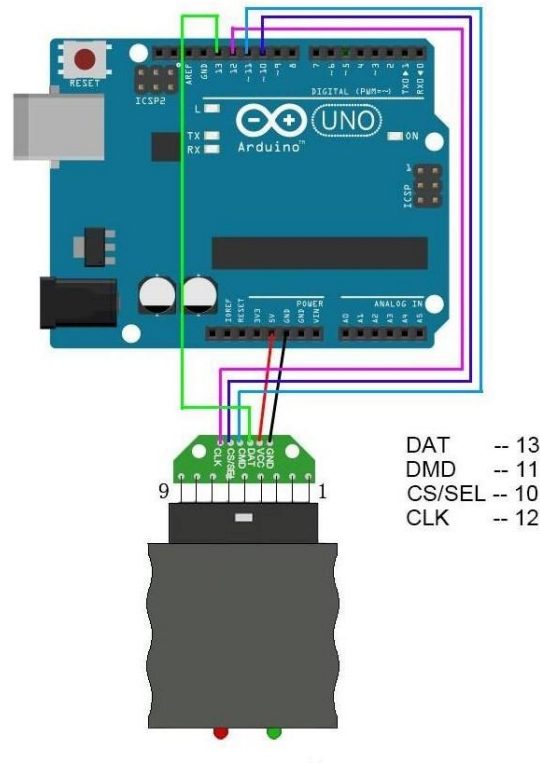
9	8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---	---



Pay attention to
the sequins
facing upwards

Wiring diagram

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Result

After wiring, please open the program in the code folder--**Lesson_8_PS2_Module** and click UPLOAD to upload the program. You can press the PS2 controller button, and there will be corresponding output reminders on the serial port.



Lesson 9 PS2 Control Arm

About this lesson

Learn the PS2 Joypad to control the movement of the robot arm. **But you need to purchase it by yourself because the PS2 Joypad is not included in the kit.**

Result

After wiring, please open the program in the code folder--**Lesson_9_PS2_Control_Arm** and click UPLOAD to upload the program. But before upload the program, should place the PS2X_lib folder inside the libraries folder of Arduino IDE directory. We provide PS2X_lib library files in the library on the tutorial. After successfully uploading the program, turn on the PS2 handle power switch. The signal light will flash. When the signal stop flashing, the controller and the receiver will be connected successfully. The control relationship between joystick and manipulator on handle is as follows.

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Right Joystick	arm	Left Joystick	arm
X1<50	Push the left joystick to the right,the claw closed	X2<50	Push the right joystick to the left,the servo that controls the arm rotation turns left
X1>200	Push the left joystick to the left,the claw opens	X2>200	Push the right joystick to the right,the servo that controls the arm rotation turns right
Y1<50	Push the left joystick to the down,lower the robot upper arm	Y2<50	Push the right joystick to the up,stretch out the robot lower arm
Y1>200	Push the left joystick to the up,lift up the robot upper arm	Y2>200	Push the right joystick to the down,draw back the robot lower arm