Arduino Shield Manual

Version 1.5

www.DFRobot.com

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Arduino I/O Expansion Shield

(SKU: DFR0014)

Introduction

The Arduino I/O Expansion Shield provides an easy way to connect sensors, servos and RS485 device to Arduino board. It expands Arduino's Digital I/O and Analog Input Pins with Power and GND. It also provides separate PWM Pins which are compatible with standard servo connector. Another unique feature is that the I/O shield has a build-in RS485 converter which allows Arduino communicating with RS485 devices. The communication socket provides an extremely easy way to plug a wireless module such as APC220 RF module and DF-Bluetooth module. It has an individual power input for Servos. A servo power jumper allows user to select using external power or internal power to drive the Servos.

Diagram

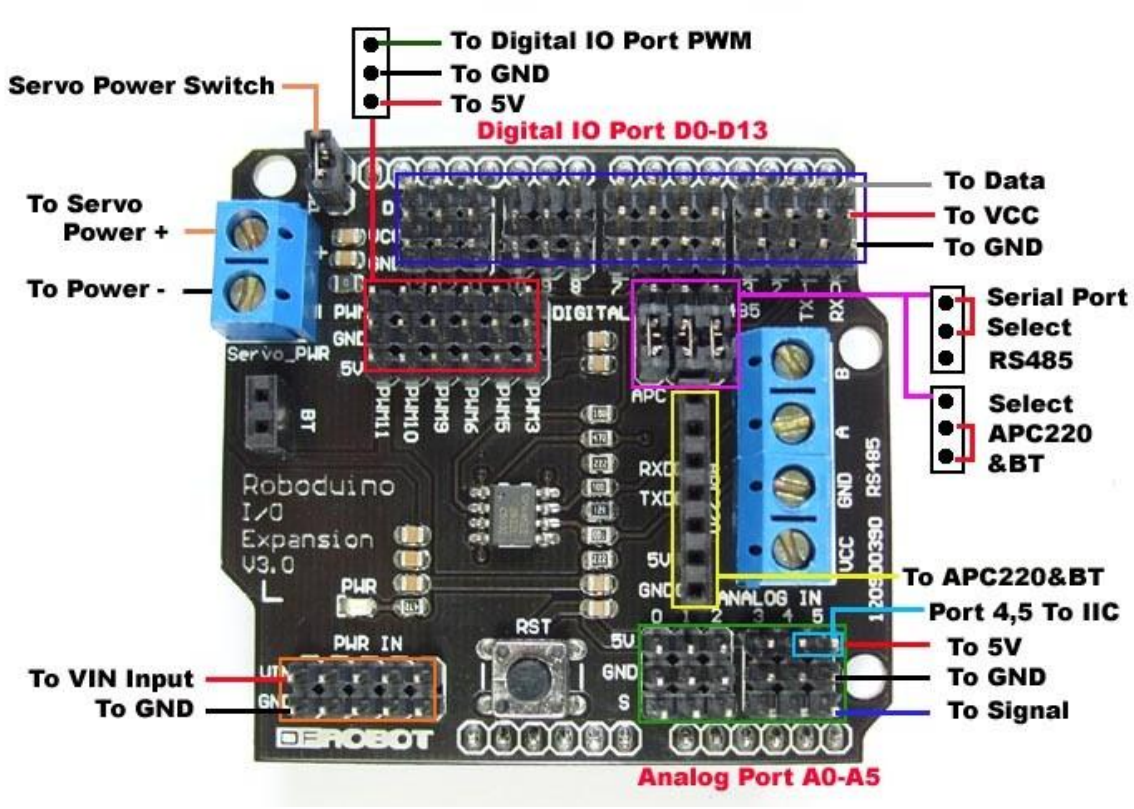


Figure 1 Arduino I/O Expansion Shield

Sample Code

Not available

Arduino Motor Shield (L293)

SKU: DRI0001

Introduction

This motor shield allows Arduino to drive two channel DC motors. It uses a L293B chip which deliveries output current up to 1A (2A for L298P version) each channel. The speed control is achieved through conventional PWM which can be obtained from Arduino's PWM output Pin 5 and 6. The enable/disable function of the motor control is signalled by Arduino Digital Pin 4 and 7.

Roboduino Motor Shield uses PWM output Pin 6 and 9 and Digital Pin 7 and 8.

The Motor shield is powered directly from Arduino. It is strongly advised that use external power supply to power the Arduino instead of the USB power supply.

Diagram

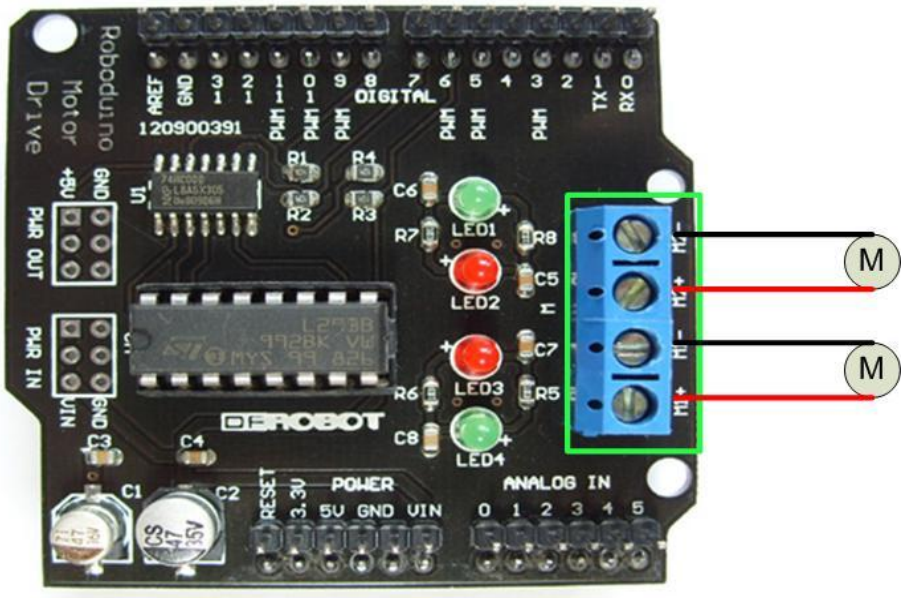


Figure 2 Motor Shield Diagram

Pin Allocation

Pin	Function
Digital 4	Motor 2 Direction control
Digital 5	Motor 2 PWM control
Digital 6	Motor 1 PWM control
Digital 7	Motor 1 Direction control

Sample Code

```
//This motor shield use Pin 6,5,7,4 to control the motor
// Simply connect your motors to M1+,M1-,M2+,M2-
// Upload the code to Arduino/Roboduino
// Through serial monitor, type 'a','s', 'w','d','x' to control the motor
// www.dfrobot.com
// Last modified on 24/12/2009

int EN1 = 6;
int EN2 = 5;  //Roboduino Motor shield uses Pin 9
int IN1 = 7;
int IN2 = 4; //Latest version use pin 4 instead of pin 8




void Motor1(int pwm, boolean reverse)
        {
          analogWrite(EN1,pwm); //set pwm control, 0 for stop, and 255 for
maximum speed
         if(reverse)
         {
          digitalWrite(IN1,HIGH);
         }
        else
        {
          digitalWrite(IN1,LOW);
         }
        }

void Motor2(int pwm, boolean reverse)
        {
          analogWrite(EN2,pwm);
         if(reverse)
         {
          digitalWrite(IN2,HIGH);
         }
        else
        {
          digitalWrite(IN2,LOW);
         }
```

```
        }


void setup()
{
    int i;
   // for(i=6;i<=9;i++) //For Roboduino Motor Shield
   // pinMode(i, OUTPUT);  //set pin 6,7,8,9 to output mode

    for(i=5;i<=8;i++)  //For Arduino Motor Shield
    pinMode(i, OUTPUT);  //set pin 4,5,6,7 to output mode

    Serial.begin(9600);
}


void loop()
{
  int x,delay_en;
  char val;
  while(1)
  {
    val = Serial.read();
    if(val!=-1)
       {
          switch(val)
           {
             case 'w'://Move ahead
                        Motor1(100,true);  //You can change the speed, such
as Motor(50,true)
                        Motor2(100,true);

                         break;
             case 'x'://move back
                        Motor1(100,false);
                        Motor2(100,false);
                         break;
             case 'a'://turn left
                        Motor1(100,false);
                        Motor2(100,true);
                         break;
             case 'd'://turn right
                        Motor1(100,true);
                        Motor2(100,false);
                        break;
               case 's'://stop
                        Motor1(0,false);
                        Motor2(0,false);
                         break;

           }

       }

  }
}
```

Arduino Motor Shield (L298N)

SKU:DRI0009

Introduction

This motor shield allows Arduino to drive two channel DC motors. It uses a L298N chip which deliveries output current up to 2A each channel. The speed control is achieved through conventional PWM which can be obtained from Arduino's PWM output Pin 5 and 6. The enable/disable function of the motor control is signalled by Arduino Digital Pin 4 and 7.

The Motor shield can be powered directly from Arduino or from external power source. It is strongly encouraged to use external power supply to power the motor shield.

- Logic Control Voltage：5V (From Arduino)
- Motor Driven Voltage：4.8～35V (From Arduino or External Power Source)
- Logic supply current Iss：≤36mA
- Motor Driven current Io：≤2A
- Maximum power consumption：25W（T=75℃）
- PWM、PLL Speed control mode
- Control signal level:

  High：2.3V≤Vin≤5V Low：-0.3V≤Vin≤1.5V

Diagram

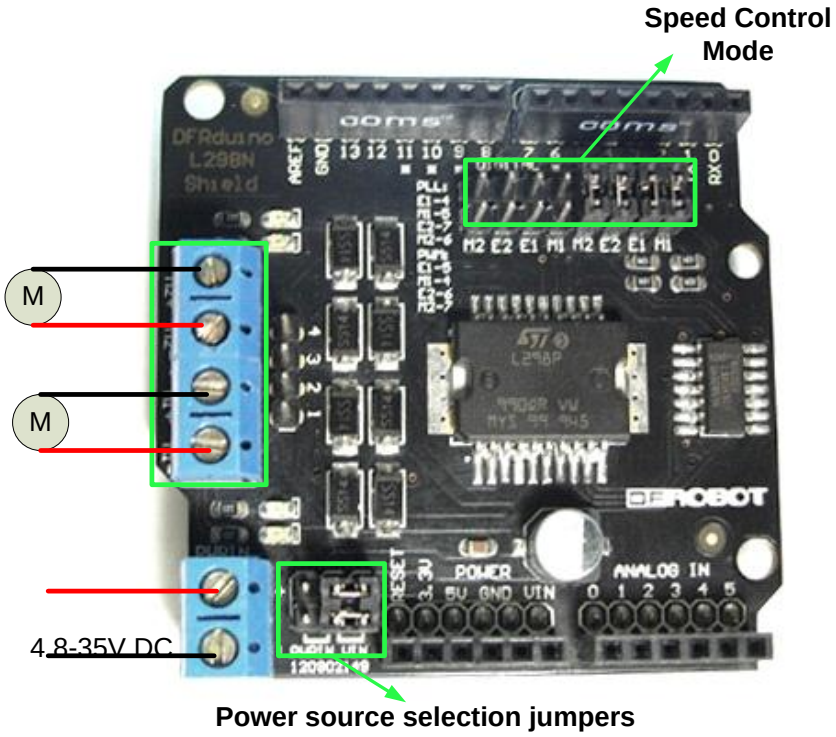


Figure 3 Motor Shield Diagram

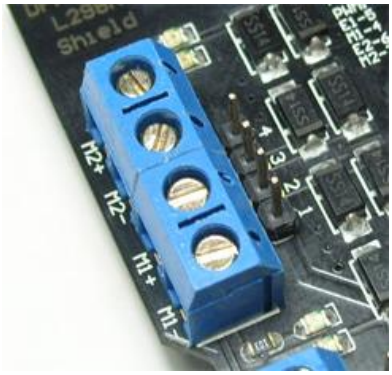
Control Mode Selection Jumpers:

The shield supports PWM and PLL(Phased Locked Loop) control Modes. The PWM mode uses E1 and E2 to generate PWM signal. The PLL mode uses M1 and M2 to generate phase control signal.

Control Mode Selection Jumpers

Motor Terminal:

Two DC motors are connected to blue motor terminals. The male header behide the terminals are the same as the motor terminals.

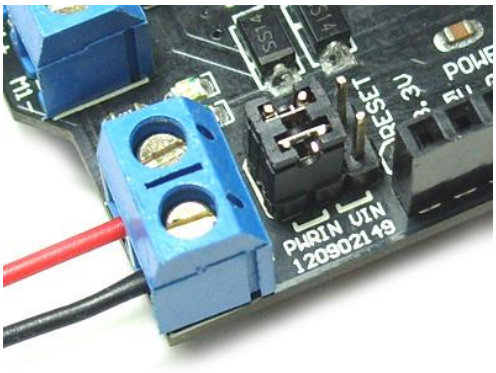


Motor terminal

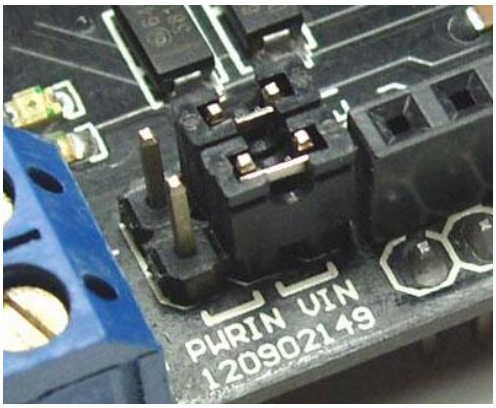
PWRIN:

The motors can be powered by external power supply when the motor current exceeds the limits provided from the Arduino. The swith between external and Arduino power is implemented by two jumpers.

- PWRIN: External Power
- VIN: Arduino Power



The motors are powered by external power supply



Power Source Selection Jumpers

NOTE: When the motor shield is powered by external power source, make sure the external power source and Arduino have the same GND.

Control Signal Truth Table：

E1	M1		E2	M2	
L	X	Motor 1 Disabled	L	X	Motor 2 Disabled
H	H	Motor 1 Backward	H	H	Motor 2 Backward
H	L	Motor 1 Forward	H	L	Motor 2 Forward
PWM	X	PWM Speed control	PWM	X	PWM Speed control

Note： H is High level ;L is Low level ;PWM is Pulse Width Modulation signal; X is any voltage level

Pin Allocation

Pin	Function
Digital 4	Motor 2 Direction control
Digital 5	Motor 2 PWM control
Digital 6	Motor 1 PWM control
Digital 7	Motor 1 Direction control

PWM Mode

Pin	Function
Digital 4	Motor 2 Enable control
Digital 5	Motor 2 Direction control
Digital 6	Motor 1 Direction control
Digital 7	Motor 1 Enable control

PLL Mode

Sample Code

```
Arduino PWM Speed Control:

int E1 = 6;
int M1 = 7;
int E2 = 5;
int M2 = 4;

void setup()
{
    pinMode(M1, OUTPUT);
    pinMode(M2, OUTPUT);
}

void loop()
{
  int value;
  for(value = 0 ; value <= 255; value+=5)
  {
    digitalWrite(M1,HIGH);
    digitalWrite(M2, HIGH);
    analogWrite(E1, value);   //PWM Speed Control
    analogWrite(E2, value);   //PWM Speed Control
    delay(30);
  }
}
```

```
Arduino PLL Speed Control:

int E1 = 7;
int M1 = 6;
int E2 = 4;
int M2 = 5;

void setup()
{
    pinMode(M1, OUTPUT);
    pinMode(M2, OUTPUT);
}

void loop()
{
  int value;
  for(value = 0 ; value <= 255; value+=5)
  {
    digitalWrite(M1,HIGH);
    digitalWrite(M2, HIGH);
    analogWrite(E1, value);   //PLL Speed Control
    analogWrite(E2, value);   //PLL Speed Control
    delay(30);
  }
}
```

Arduino LCD&KeyPad Shield

(SKU: DFR0009)

Introduction

The LCD Keypad shield is developed for Arduino compatible boards, to provide a user-friendly interface that allows users to go through the menu, make selections etc. It consists of a 1602 white character blue backlight LCD. The keypad consists of 5 keys — select, up, right, down and left. To save the digital IO pins, the keypad interface uses only one ADC channel. The key value is read through a 5 stage voltage divider.

Diagram

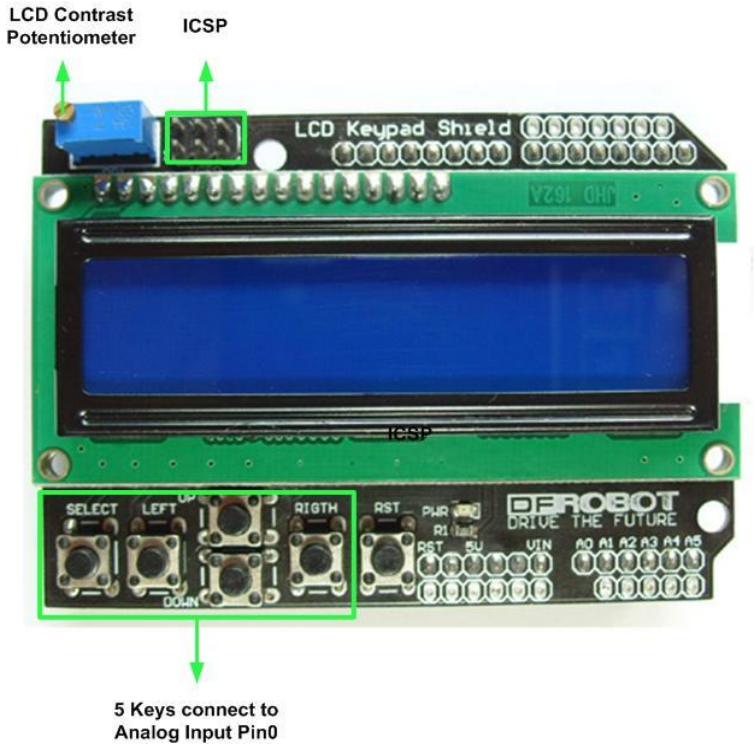


Figure 4 LCD&Keypad Shield Diagram

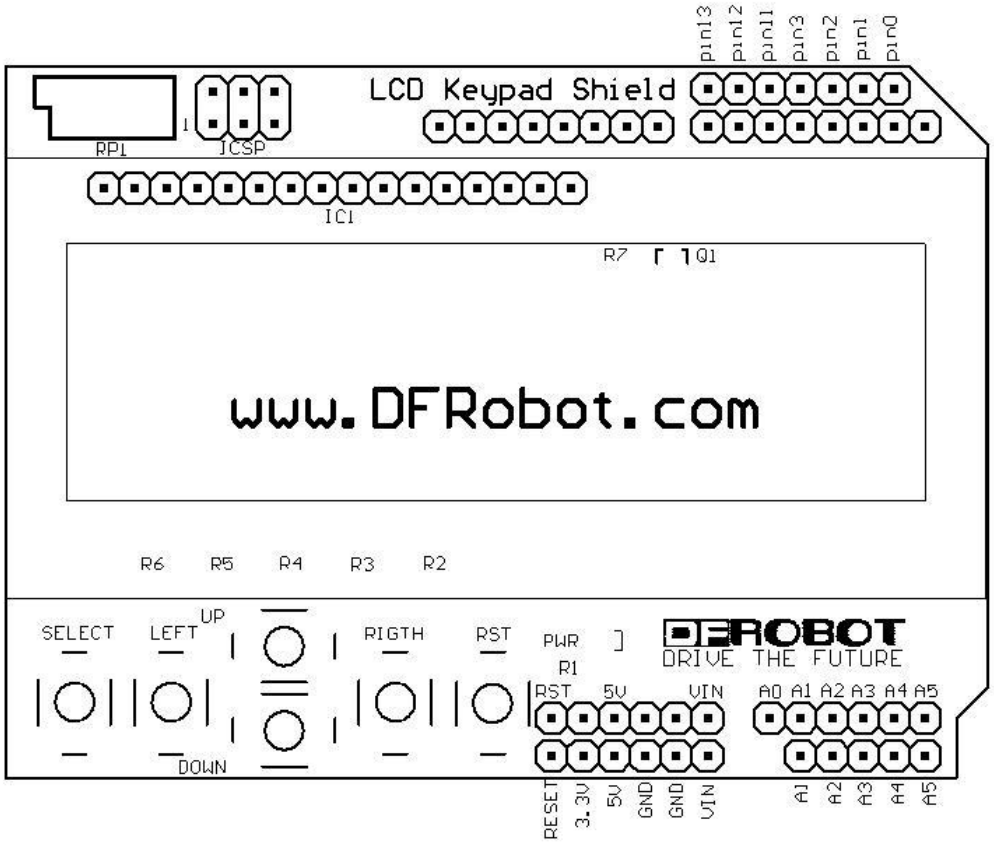


Figure 5 Pin Out Diagram

Pin Allocation

Pin	Function
Analog 0	Button (select, up, right, down and left)
Digital 4	DB4
Digital 5	DB5
Digital 6	DB6
Digital 7	DB7
Digital 8	RS (Data or Signal Display Selection)
Digital 9	Enable
Digital 10	Backlit Control

Sample Code

```
//example use of LCD4Bit_mod library

#include <LCD4Bit_mod.h>

//create object to control an LCD.

//number of lines in display=1

LCD4Bit_mod lcd = LCD4Bit_mod(2);

//Key message

char msgs[5][15] = {"Right Key OK ",

                    "Up Key OK    ",

                    "Down Key OK  ",

                    "Left Key OK  ",

                    "Select Key OK" };

int  adc_key_val[5] ={30, 150, 360, 535, 760 };

int NUM_KEYS = 5;

int adc_key_in;

int key=-1;

int oldkey=-1;

void setup() {

  pinMode(13, OUTPUT);  //we'll use the debug LED to output a heartbeat



  lcd.init();

  //optionally, now set up our application-specific display settings,
overriding whatever the lcd did in lcd.init()

  //lcd.commandWrite(0x0F);//cursor on, display on, blink on.  (nasty!)

   lcd.clear();

  lcd.printIn("KEYPAD testing... pressing");
```

```
}

void loop()

{

adc_key_in = analogRead(0);    // read the value from the sensor

digitalWrite(13, HIGH);

key = get_key(adc_key_in);    // convert into key press

      if (key != oldkey)      // if keypress is detected

      {

    delay(50);          // wait for debounce time

    adc_key_in = analogRead(0);    // read the value from the sensor

    key = get_key(adc_key_in);    // convert into key press

    if (key != oldkey)

    {

      oldkey = key;

      if (key >=0){

      lcd.cursorTo(2, 0);  //line=2, x=0

      lcd.printIn(msgs[key]);

      }

    }

  }

  digitalWrite(13, LOW);

}

// Convert ADC value to key number

int get_key(unsigned int input)

{     int k;

      for (k = 0; k < NUM_KEYS; k++)

      {
```

```
            if (input < adc_key_val[k])

            {  return k;  }

      }

    if (k >= NUM_KEYS)

        k = -1;     // No valid key pressed

    return k;

}
```

Arduino Input Shield

(SKU: DRR0008)

Introduction

The Arduino Input Shield includes a two axis mini joystick (with moment switch) as well as two colored push buttons. The reserved APC220 module interface is to facilitate the realization of wireless rocker button controller. The shield can be easily stacked on top of your Arduino.

Diagram

Pin Allocation

Pin	Function
Digital 3	Button B
Digital 4	Button C
Digital 5	Button A
Analog 0	Y axis
Analog 1	X axis

Sample Code

```
//This input shield use Digital Pin 3,4,5 (3 buttons) and Analog Pin 0,1
(JS)
// // Upload the code to Arduino
// www.dfrobot.com
// Last modified on 24/12/2009

int x=1;

int y=0;

int button_A= 5;

int button_B= 3;

int button_C= 4;



void setup()

{

  int i;

  for(i=3;i<=5;i++)

  pinMode(i, INPUT);

  pinMode(LED,OUTPUT);

}



void loop()

{

  int val;

  while(1)

  {

    val=analogRead(x); //Read Analog input

    if(val>1000||val<20) digitalWrite(LED, HIGH);

    else digitalWrite(LED,LOW);
```

```
    val=analogRead(y);
    if(val>1000||val<20) digitalWrite(LED, HIGH);
    else digitalWrite(LED,LOW);

    if(digitalRead(button_A)==0)    //Check Button A
     {
         digitalWrite(LED, HIGH);   // Set LED on
     }
    else digitalWrite(LED,LOW);
    if(digitalRead(button_B)==0)   //Check Button B
     {
         digitalWrite(LED, HIGH);    // Set LED Off
     }
    else digitalWrite(LED,LOW);
    if(digitalRead(button_C)==0)   //Check Button C
     {
         digitalWrite(LED, HIGH);    // Set LED off
     }
    else digitalWrite(LED,LOW);
  }
}
```

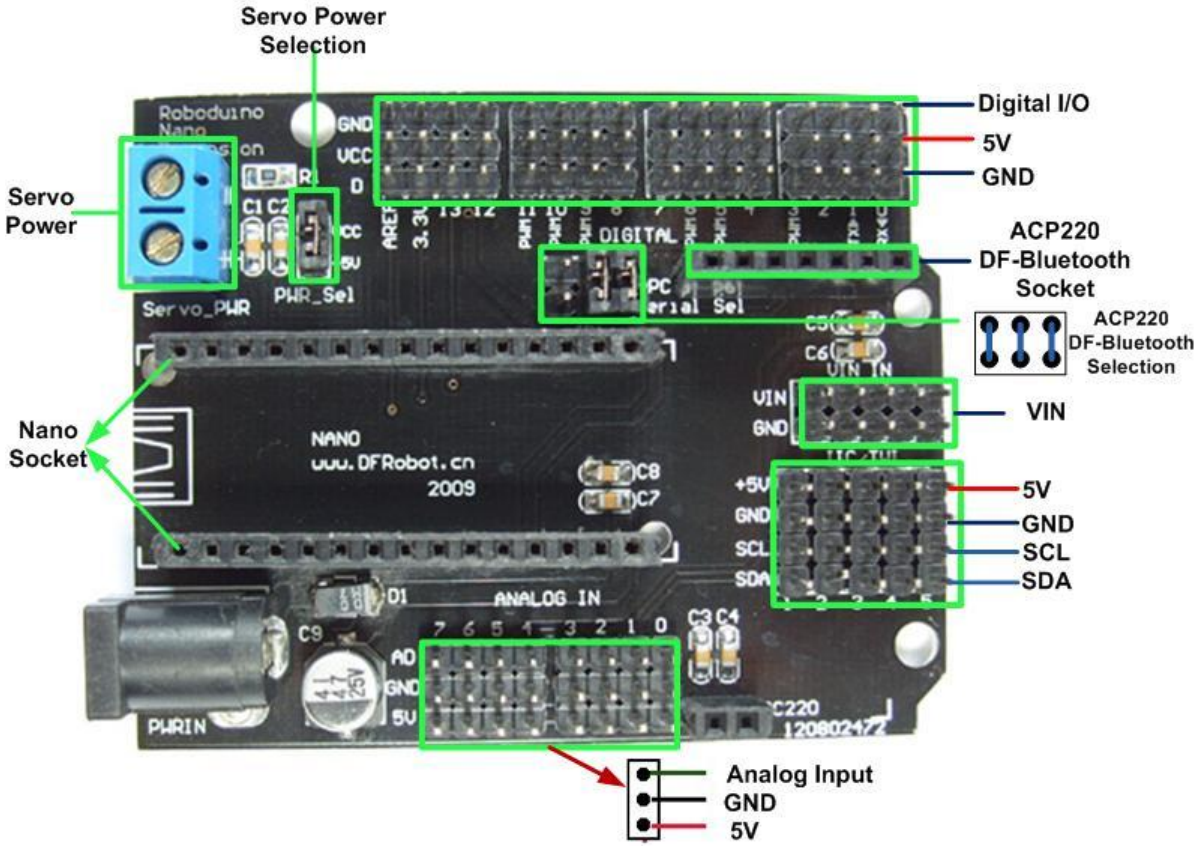
Arduino Nano IO Shield

(SKU: DRR0012)

Introduction

The Nano IO Shield extends the Digital I/O with Power and GND Pins. A communication module socket provides an easy way to integrate APC220 RF module and DF-Bluetooth module which brings a wireless solution. A separate set of I2C pins make the I2C device connection

Diagram



Sample Code

Not available

Compatible Table

	Diecimila	Duemilanove	Mega	Nano	Romeo
IO Shield	Yes	Yes	Yes	No	No
Motor Shield	Yes	Yes	Yes	No	No
Ethernet Shield	No	Yes	No	No	Yes
LCD&Keypad Shield	Yes	Yes	Yes	No	No
Input Shield	Yes	Yes	Yes	No	Yes
XBee Shield	Yes	Yes	Yes	No	Yes
Nano IO Shield	No	No	No	Yes	No

Stackable Table

Shield Name	Stackable
IO Shield	Yes
Motor Shield	Yes
Ethernet Shield	Yes
LCD&Keypad Shield	No
Input Shield	No
XBee Shield	No
Nano IO Shield	No

Control Pin Table

Shield Name	Control Pin
IO Shield	None
Motor Shield	6,7,8(5),9(4)
Ethernet Shield	10,11,12,13
LCD&Keypad Shield	Digital Pin: 4,5,6,7,8,9,10 Analog Pin: 0
Input Shield	Digital Pin:3,4,5 Analog Pin: 0,1
XBee Shield	0,1
Nano IO Shield	None

Where to buy ?

Region	Shop
USA/Canada	http://www.robotshop.ca
UK	http://www.yerobot.com
China	http://www.dfrobot.com
Taiwan	http://www.aroboto.com/
Thailand	http://www.micro4you.com/
Australia	http://www.littlebirdelectronics.com/

If you cannot find local shop? Please contact us at service@dfrobot.com

if you are interesting in to be one of our distributors, please contact us at distributor@dfrobot.com

Revision	Date	Comments
1.0	20 August 2009	First Release
1.1	2nd September 2009	Add LCD pin out Diagram
1.2	14th November 2009	Modify Motor shield Pin allocation
1.3	24th December 2009	Modify Motor shield code
1.4	28th December 2009	Add Input Shield Code
1.41	7th April 2010	Add motor power supply information
1.5	25th May 2010	Add motor shield L298N