VG100 LAB SLIDE

VG100 FA2018 TA GROUP

September 18, 2018

Introduction to LAB

Q: What's lab time used for?
A: To give you tool, skill and knowledge necessary for the project.
Q: How to manage a good project?
A:

1. Start early
2. Time management
3. Self learning (Google, forum, OH...)
4. Group work

Tools

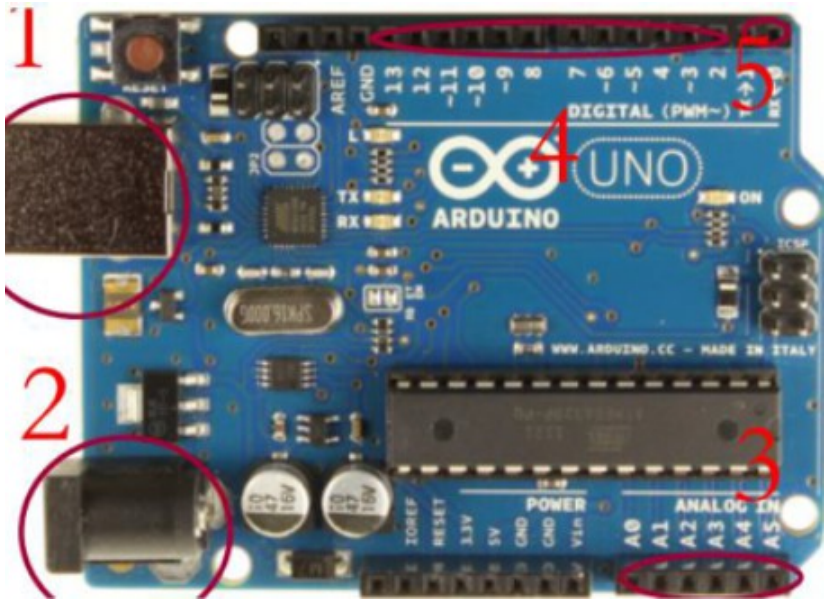
Here are some(not all) common tools you may need(Don't forget that project 1 forbids usage of all glue other than wood glue.) Most of them can be found in the lab.

Name	**Usage**
Tool box	Everything
502	Glue
Hot Melt	Glue
Ribbon	Connection
Electric iron	Heating
Bench vice	Fixation

Arduino

An open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world.
In short, it's a small computer which can be programmed to control other digital elements.

Arduino



1. USB port to take input from your PC
2. 9V DC source
3. Analog input that takes value ranging from 0 to 1024 (also output)
4. Digital input that takes 0 or 1 from simple devices (also output)
5. Serial port that used to connect it to another board

Arduino IDE

A cross-platform application (for Windows, macOS, Linux) used to write and upload programs to Arduino board.
Most of the knowledge needed for the Arduino programming can be found online. Most of the time you can find source code as reference.
Let's see a very simple example:

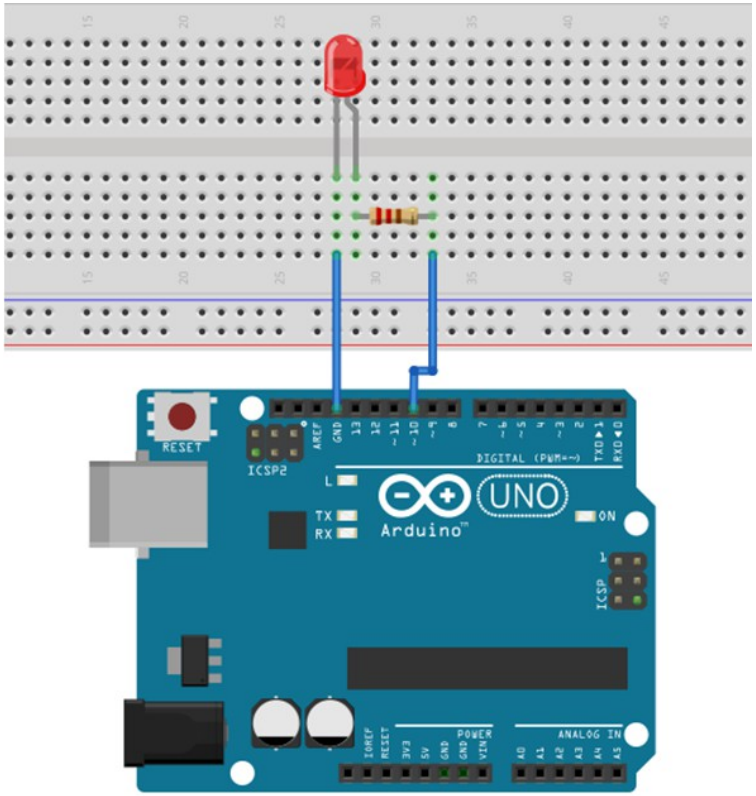
Sample 1 Hello World!

```
1  int val;
2  int ledpin=13;
3  void setup()
4
5  {
6     Serial.begin(9600);
7     //Baud rate should be the same as IDE.
8     pinMode(ledpin,OUTPUT);
9     //All I/O ports we use have to be defined.
10 }
```

Sample 1 Hello World!

```
1  void loop()
2  {
3    val=Serial.read();
4    if(val=='R')
5    {
6      digitalWrite(ledpin,HIGH);
7      delay(500);//delay is necessary. unit is ms
8      digitalWrite(ledpin,LOW);
9      delay(500);
10     Serial.println("Hello World!");
11   }
12 }
```

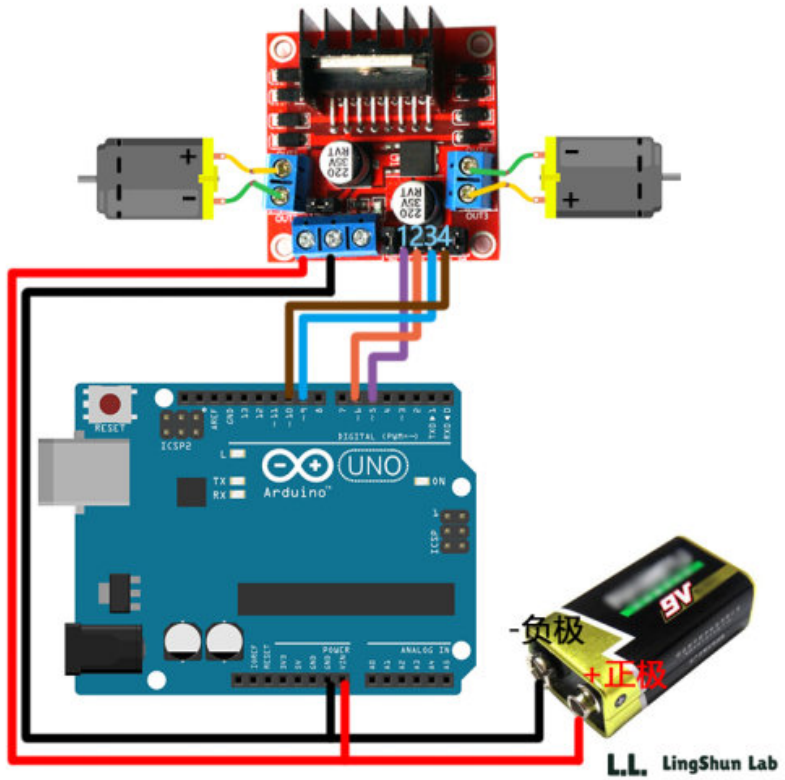
Sample 2 LED Control



Sample 2 LED Control

```
1  int ledPin = 10;
2  void setup()
3  {
4    pinMode(ledPin, OUTPUT);
5  }
6  void loop()
7  {
8    digitalWrite(ledPin, HIGH);
9    delay(1000);
10   digitalWrite(ledPin, LOW);
11   delay(1000);
12 }
```

Sample 3 Motor Control



Sample 3 Motor Control

```
1  int input1 = 5;
2  int input2 = 6;
3  int input3 = 9;
4  int input4 = 10;
5
6  void setup() {
7  pinMode(input1,OUTPUT);
8  pinMode(input2,OUTPUT);
9  pinMode(input3,OUTPUT);
10 pinMode(input4,OUTPUT);
11 }
12
13 void loop() {
14   //forward
15   digitalWrite(input1,HIGH);
16   digitalWrite(input2,LOW);
17   digitalWrite(input3,HIGH);
```

Sample 3 Motor Control

```
1   digitalWrite(input4 ,LOW);
2   delay(1000);
3
4   //stop
5   digitalWrite(input1 ,LOW);
6   digitalWrite(input2 ,LOW);
7   digitalWrite(input3 ,LOW);
8   digitalWrite(input4 ,LOW);
9   delay(500);
10
11   //back
12   digitalWrite(input1 ,LOW);
13   digitalWrite(input2 ,HIGH);
14   digitalWrite(input3 ,LOW);
15   digitalWrite(input4 ,HIGH);
16   delay(1000);
17
```

Introduction to Ultrasonic Module

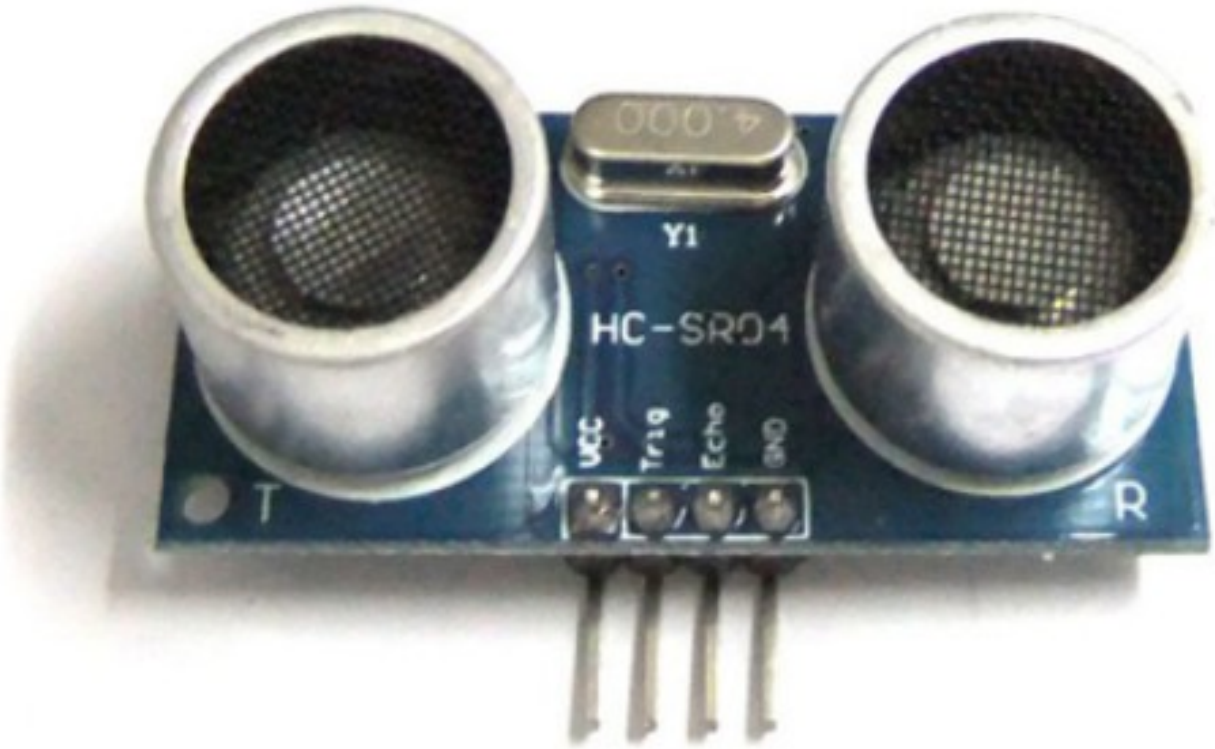
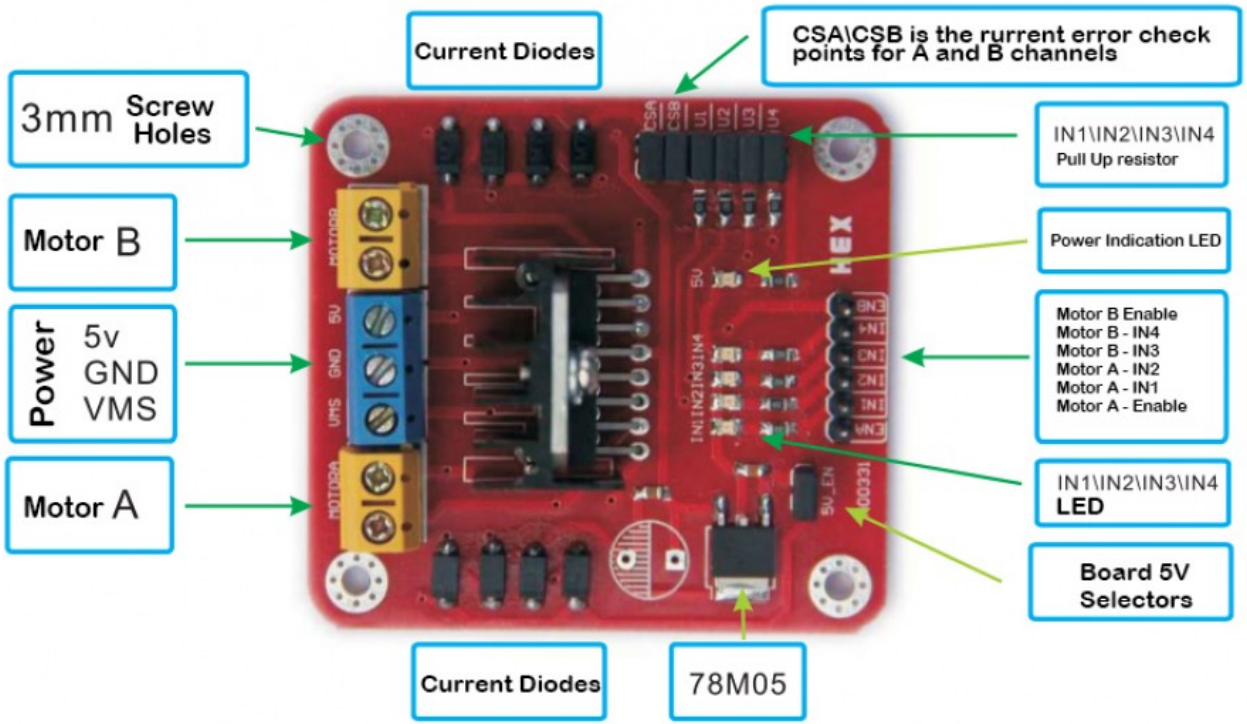


Figure: Ultrasonic Module HC-SR04

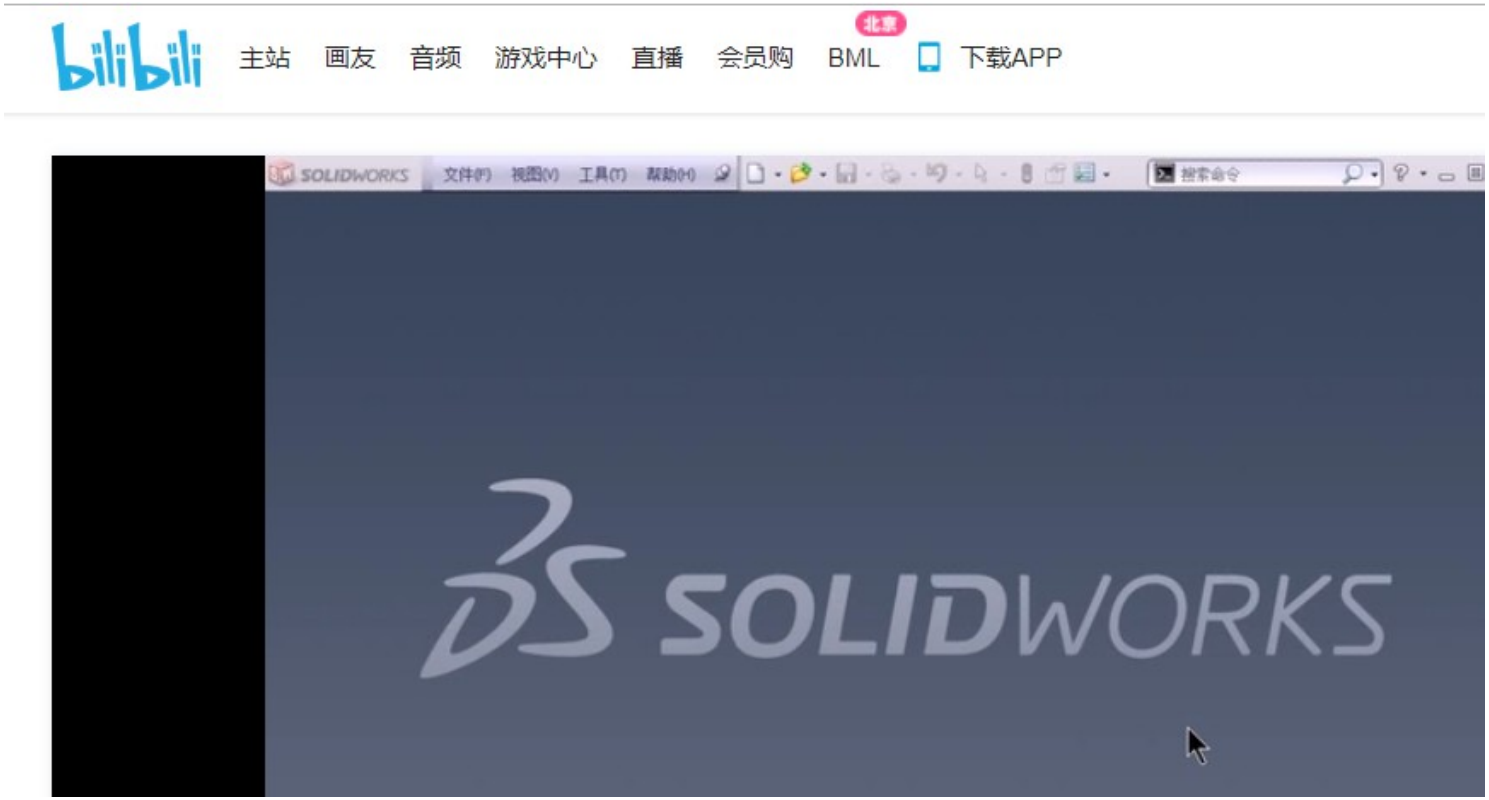
Motor Driving Board



Introduction to SolidWorks

A solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer program that runs on Microsoft Windows.

How to learn SolidWorks?



Introduction to SolidWorks

In this lab, I will teach you three ways to draw a column:

1. Stretch
2. Rotate
3. Scan

Let's have a try!