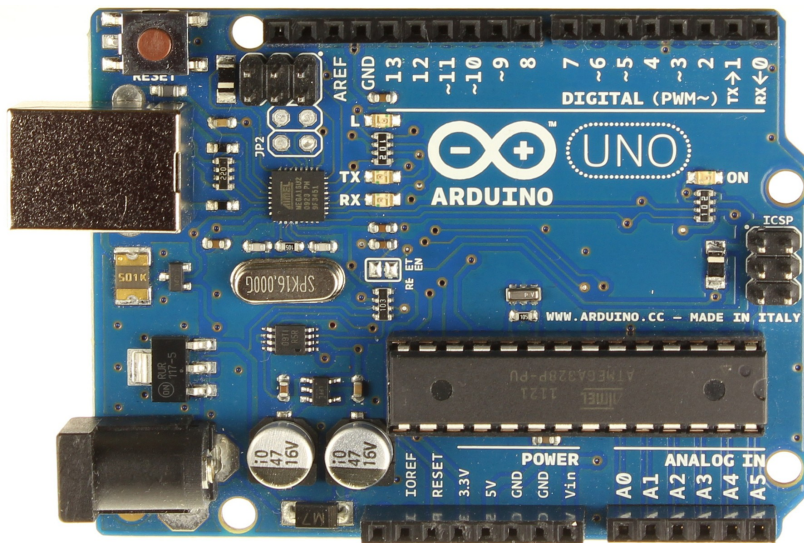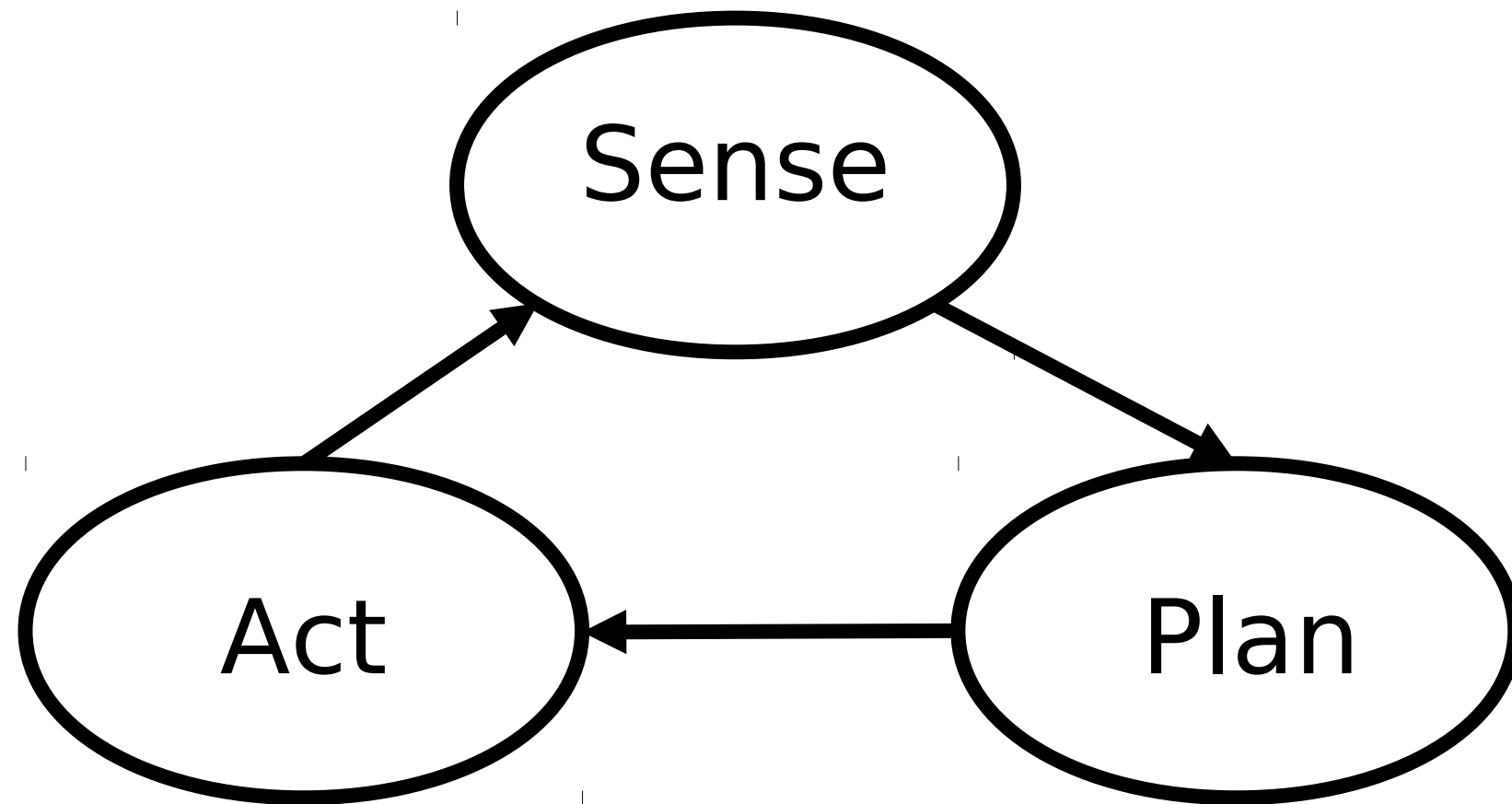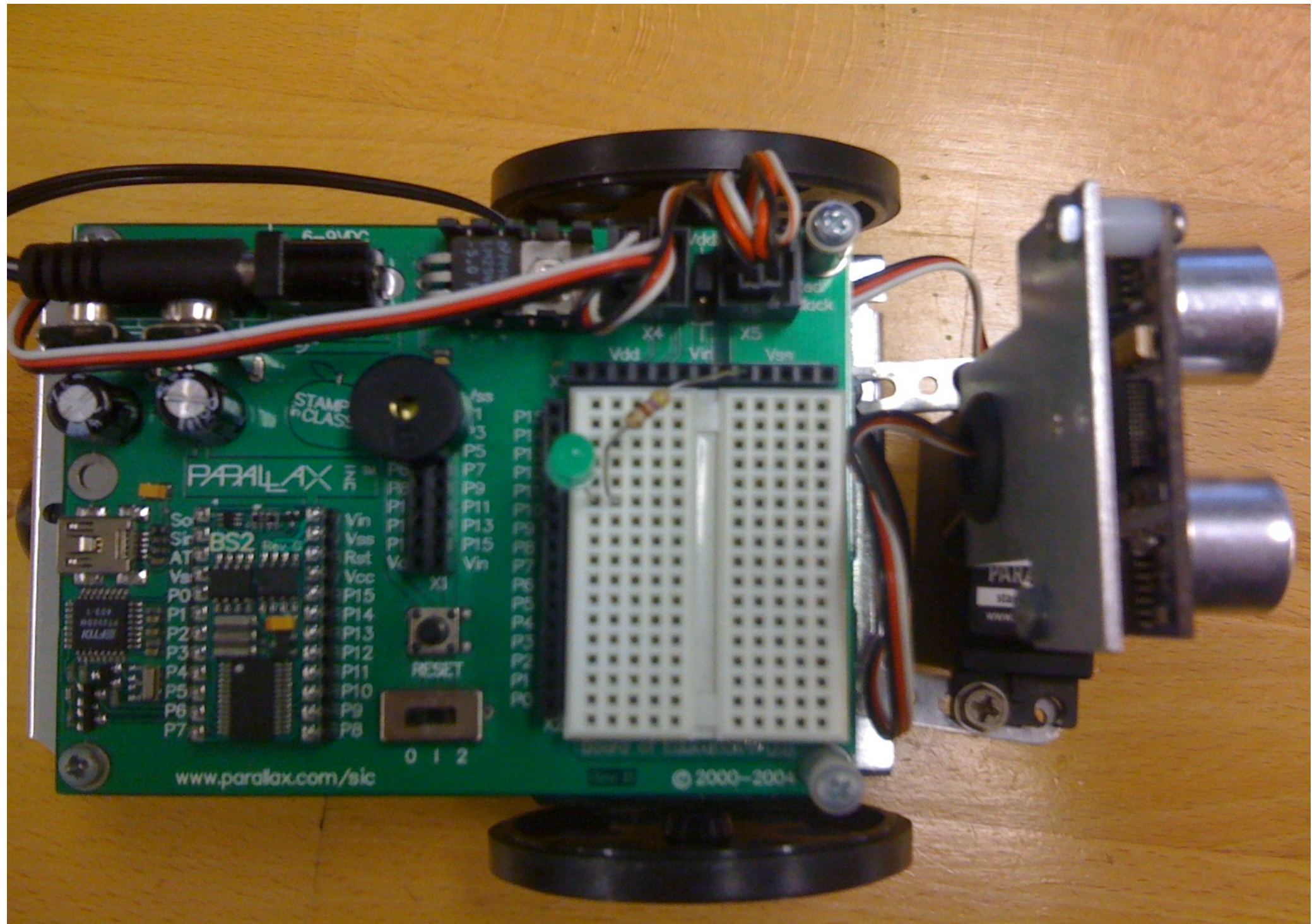# BoeBots
with
Arduinos

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adapted from boebot tutorial by Yogesh Girdhar

Boebot Architecture

Boebot

Arduino Uno

Microcontroller   ATmega328

Operating Voltage 5V
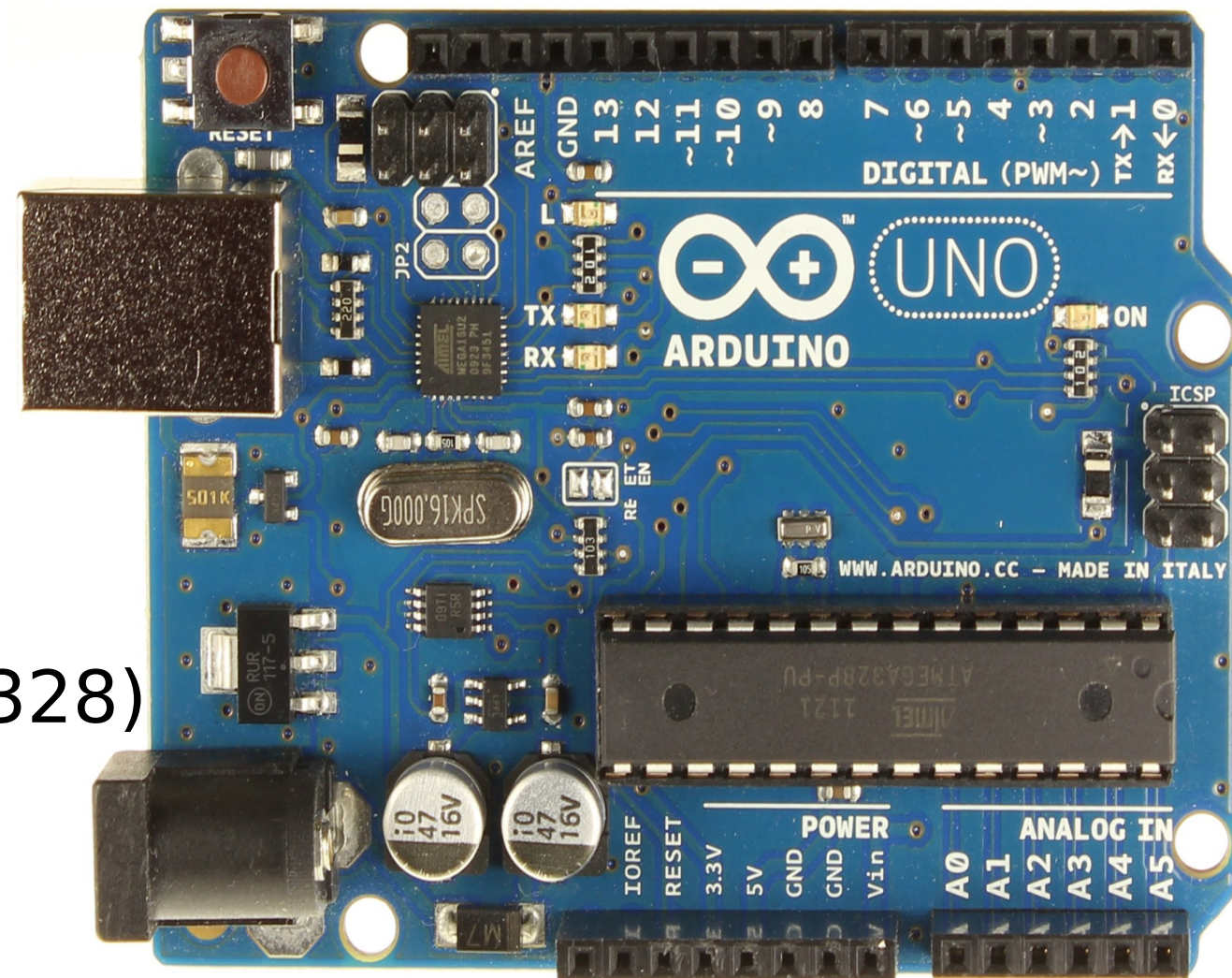
Input Voltage (limits)   6-20V

Digital I/O Pins   14

Analog Input Pins 6

Flash Memory 32 KB (ATmega328)

SRAM 2 KB (ATmega328)

EEPROM   1 KB (ATmega328)

Clock Speed   16 MHz

Boebot-Arduino Interface

Software
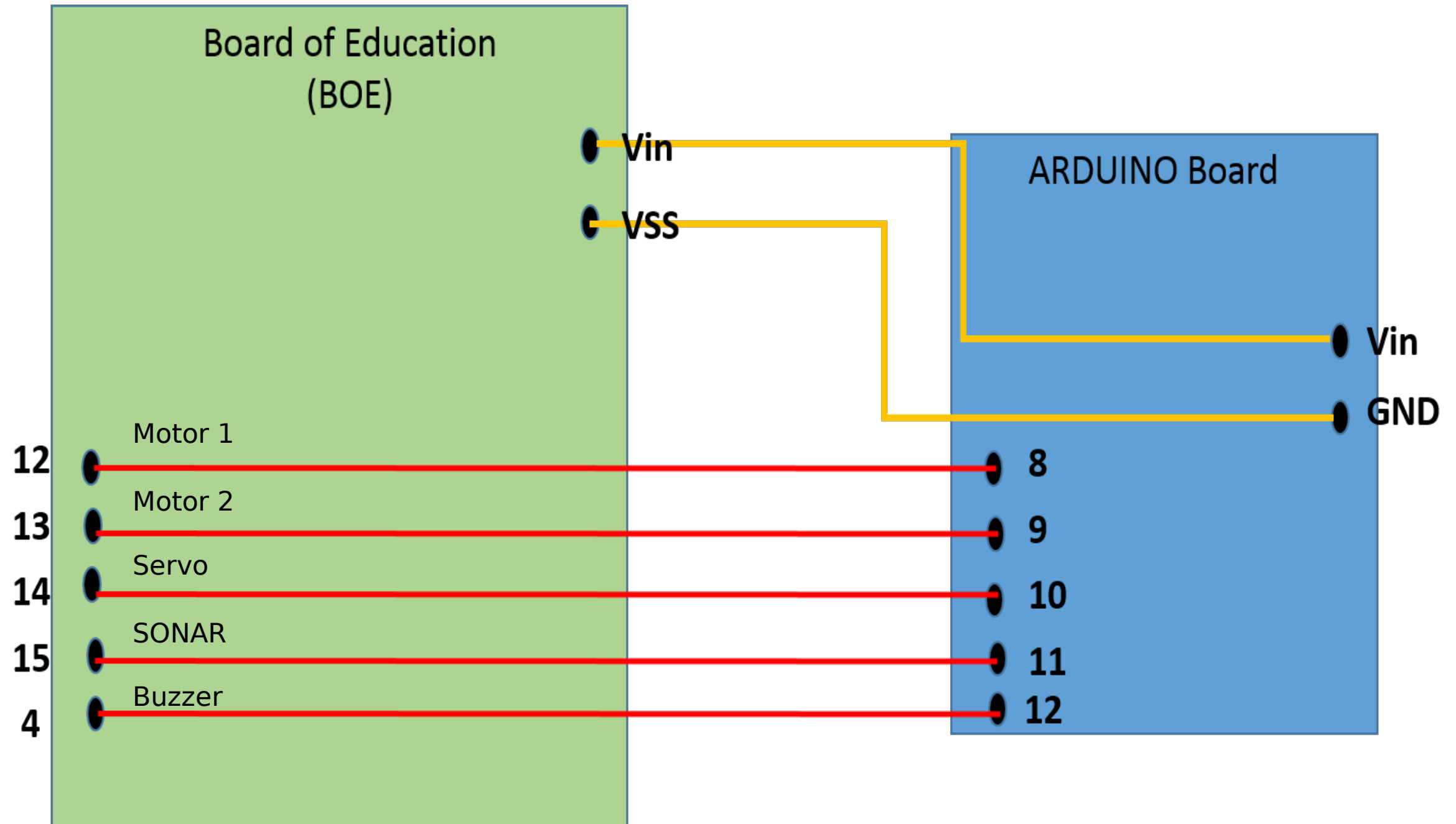
- http://arduino.cc/en/Main/Software

- Sketchbook

- Sketches (console, verify, upload)

- Getting started – bare minimum

```
void setup() {

  // put your setup code here, to run once:

}

void loop() {

  // put your main code here, to run repeatedly:

}
```

Hello World

```
void setup() {

  Serial.begin(9600);  // initialize serial
    communication

}


void loop() {

  //Add code that repeats automatically here.

  Serial.println("Hello World!");

}
```
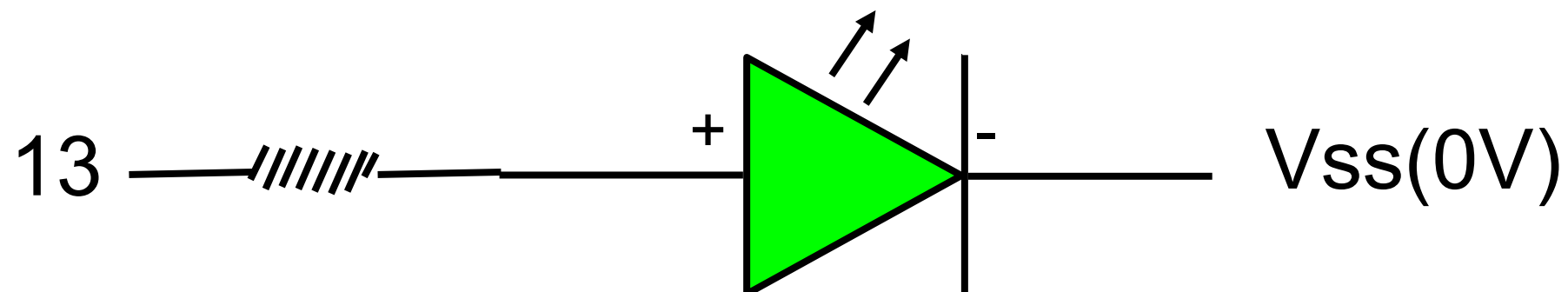
Setting Pins to HIGH/LOW

- *digitalWrite(13, HIGH)*

    PIN 13 now has +5V

- *digitalWrite*(13, LOW)

    PIN 13 now has 0V

13 ——/////——————— + [LED] - ———— Vss(0V)

Blinking LED

Refer: ~/arduino-1.0.5/examples/01.Basics/Blink/Blink.ino

```
int led = 13;   // Pin 13 has an LED connected on most Arduino boards

// the setup routine runs once when you press reset:

void setup() {

  pinMode(led, OUTPUT);     // initialize the digital pin as an output.

}

// the loop routine runs over and over again forever:

void loop() {

  digitalWrite(led, HIGH);  // turn the LED on (HIGH is the voltage level)

  delay(1000);               // wait for a second

  digitalWrite(led, LOW);   // turn the LED off by making the voltage LOW

  delay(1000);               // wait for a second

}
```
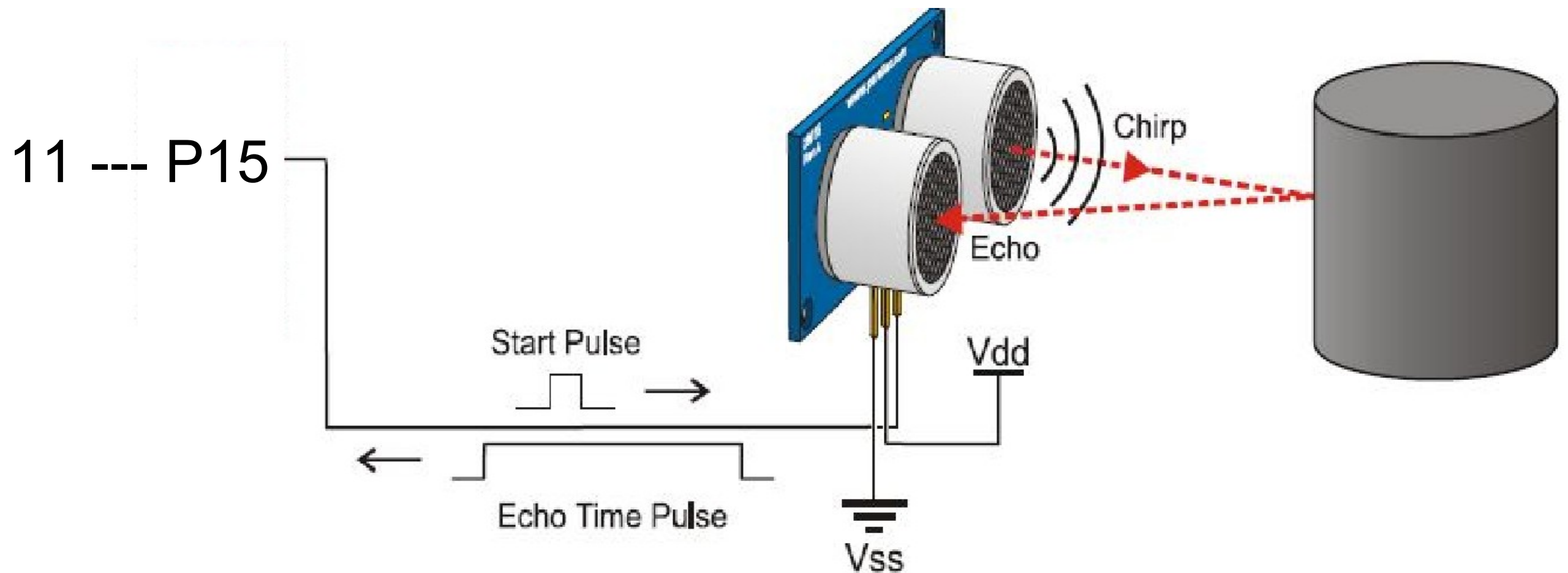
Ultrasonic Distance Sensor (SONAR)

11 --- P15

Start Pulse

Echo Time Pulse

Chirp

Echo

Vdd

Vss

Detecting Distance

Refer: ~/arduino-1.0.5/examples/06.Sensors/Ping/Ping.ino

```
const int pingPin = 11;        // Pin 11 is connected to the SONAR of the
    boebot

void setup() {

  Serial.begin(9600);          // initialize serial communication

}

void loop() {

 pinMode(pingPin, OUTPUT);   // make the pingPin as output to send a pulse

 digitalWrite(pingPin, LOW);

 delayMicroseconds(2);

 digitalWrite(pingPin, HIGH);  // send a HIGH pulse for 2 microseconds

 delayMicroseconds(5);

 digitalWrite(pingPin, LOW);  ......
```

Detecting Distance

```
 .....

pinMode(pingPin, INPUT);                    // use same pin to read signal

duration = pulseIn(pingPin, HIGH);

inches = microsecondsToInches(duration);

cm = microsecondsToCentimeters(duration);

Serial.print(inches);

Serial.print("in, ");

Serial.print(cm);

Serial.print("cm");

Serial.println();

delay(100);
}
```
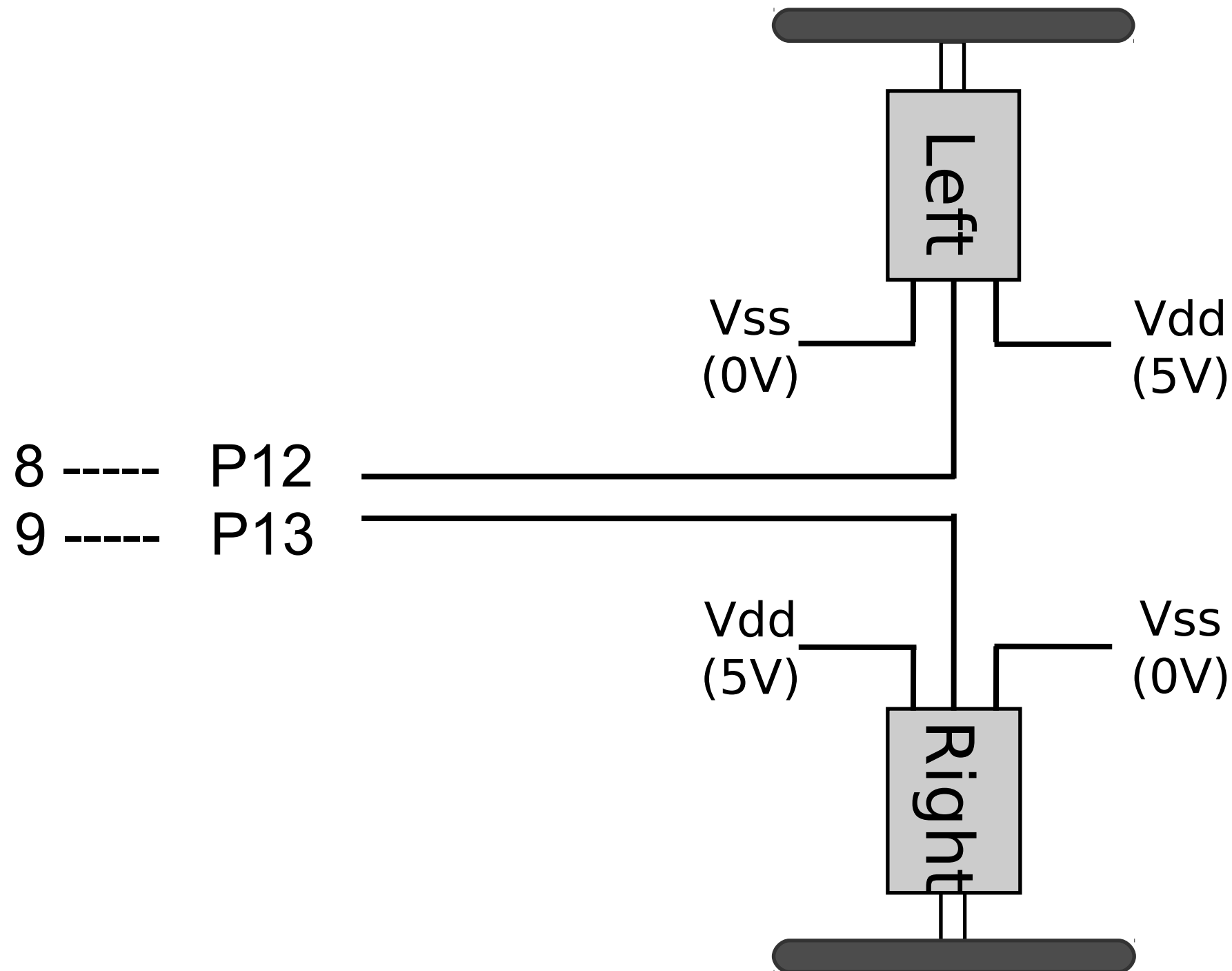
Servo Motors

Left

Vss
(0V)

Vdd
(5V)

8 ----- P12

9 ----- P13

Vdd
(5V)

Vss
(0V)

Right

Motor Command

```
include <Servo.h>

Servo myservo_left;          // create servo object to control left servo

Servo myservo_right;         // create servo object to control right servo

void setup() {

  myservo_left.attach(9);      // attach the servo on pin 9 to the left servo

  myservo_right.attach(8);     // attach the servo on pin 9 to the right servo

}

void loop() {

  myservo_left.write(1000);     // move left motor clockwise

  delay(1000);

  myservo_left.write(1500);     // stop left motor

  delay(1000);

  myservo_left.write(2000);     // move right motor anticlockwise

  delay(1000);

}
```

Moving Around

	Left	Right
Forward	CCW	CW
Backward	CW	CCW
Left	CW	CW
Right	CCW	CCW