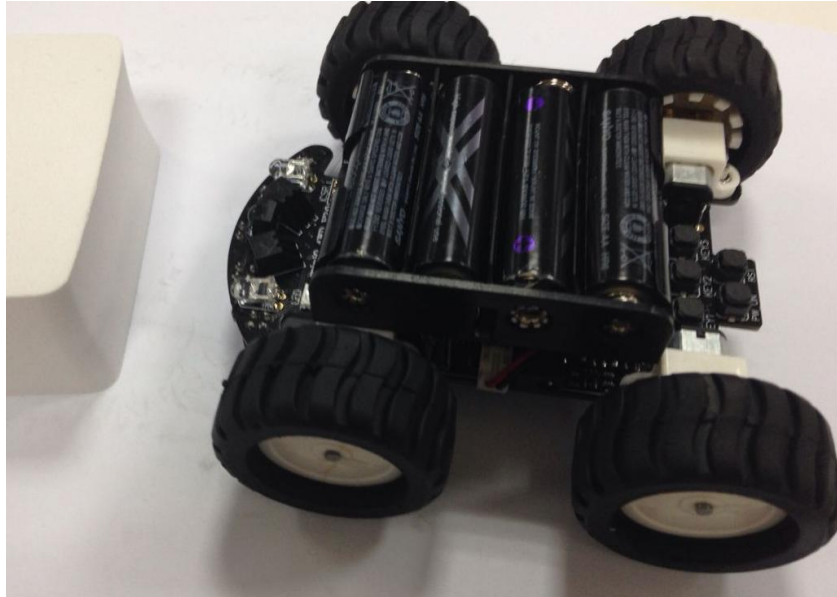


Lesson6.Avoid Obstacle



Key Points

Avoid obstacle, thus to avoid danger. We have learned how to make a robot follow the line, and now we try to make them avoid obstacle themselves.

1. Learn how to use infrared transmitter and receiver
2. Get to know how to avoid the obstacle
3. Program your robot
4. Equipment needed: Micro USB Cable, miniQ

Download the Code

- Open the folder and find “avoidance”,

Name	Date modified	Type	Size
avoidance	2014/6/3 17:10	File folder	
buzzer	2014/6/3 17:14	File folder	
control	2014/6/3 17:10	File folder	
Eat_Beans	2014/6/3 17:10	File folder	
hmc	2014/6/3 17:10	File folder	
key	2014/6/3 17:10	File folder	
lcd	2014/6/3 17:10	File folder	
light	2014/6/4 10:15	File folder	
line	2014/6/3 17:10	File folder	
line_hunt	2014/6/3 17:10	File folder	
miniQIII	2014/6/3 17:10	File folder	
ObstacleAvoidance	2014/6/3 17:10	File folder	
remote	2014/6/3 17:10	File folder	
rgb	2014/6/3 17:10	File folder	
song	2014/6/3 17:36	File folder	
speed	2014/6/3 17:10	File folder	

1) Find the code we use

- Download the code, and then put your car on the ground, you can use your hands as obstacle to test the robot.

```

avoidance | Arduino 1.5.6-r2
文件 编辑 Sketch 工具 帮助

avoidance

#define EN1 6//pin for run the right motor
#define IN1 7//pin for control right motor direction
#define EN2 5//pin for run the left motor
#define IN2 12//pin for control left motor direction

#define FORW 0//go forward
#define BACK 1//go back

#define IR_IN 17//IR receiver pin
#define L_IR 13//left ir transmitter pin
#define R_IR 8//right ir transmitter pin

上传成功。
Maximum is 28,672 bytes.
Global variables use 153 bytes (5%) of dynamic memory,
leaving 2,407 bytes for local variables. Maximum is
2,560 bytes.
94 - 101 Arduino Leonardo on COM5

```

2) The code

Code Analysis

- ✧ Define which pin to control the motor
 - #define EN1 6//pin for run the right motor
 - #define IN1 7//pin for control right motor direction
 - #define EN2 5//pin for run the left motor
 - #define IN2 12//pin for control left motor direction
- ✧ Define the pin which connect with the sensor

- #define IR_IN 17//IR receiver pin
- #define L_IR 13//left ir transmitter pin
- #define R_IR 8//right ir transmitter pin

✧ Function to send pulse of 40KHz

- void L_Send40KHZ(void)//left ir transmitter sends 40kHz pulse
- {
- int i;
- for(i=0;i<24;i++)
- {
- digitalWrite(L_IR,LOW);
- delayMicroseconds(8);
- digitalWrite(L_IR,HIGH);
- delayMicroseconds(8);
- }
- }

✧ Interrupt init:

- void pcint0_init(void)//init the interrupt
- {
- PCICR = 0X01;//
- PCMSK0 = 0X01;//
- }
-
- ISR(PCINT0_vect)//motor encoder interrupt
- {
- count++;
- }

✧ Transmit→Judge→Operate

- for(i=0;i<20;i++)//left transmitter sends 20 pulses
- {
- L_Send40KHZ();
- delayMicroseconds(600);
- }
- if(count>20)//if recieved a lot pulse , it means there's a obstacle
- {
- Motor_Control(BACK,100,BACK,100);
- delay(300);
- Motor_Control(BACK,100,FORW,100);
- delay(500);
- }

Principle Analysis

1. Infrared receiver

The receiver on the robot consist of receiver, amplification and demodulation.

The infrared signal will be demodulated after being received, then the receiver will give a high level voltage or low level voltage. And for the users, we often connect the output pin to the interrupt pin of Arduino thus to get the data.

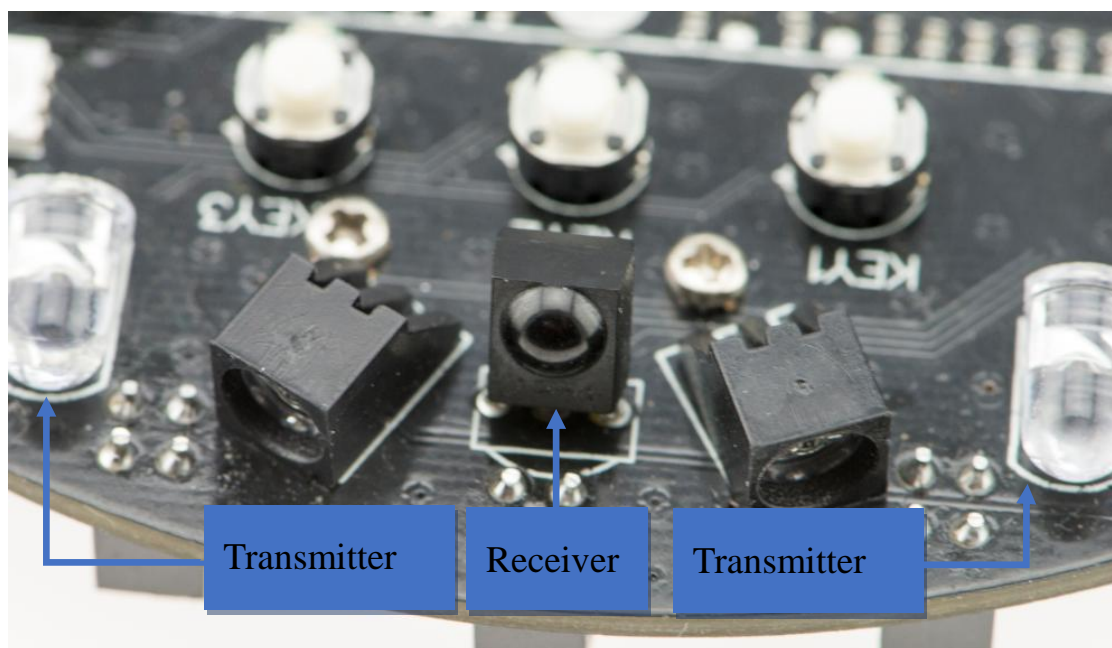
2. The concept of interrupt

Interrupt is the action the MCU will memorize where the code runs and jump to run a special function at the same time when it meets special situation or request, and it will jump back when the MCU finish the function for acting the request or the situation.

Take a simple example, if you were eating, and you hear it was raining, you would go and close the window, and then went back to eat your meal. The rain was the interrupt signal, you do the action of closing the window. Then continue eating.

3. Principle of avoiding obstacle

We use infrared sensor to help us finish the task of avoiding obstacle. The left transmitter will give 40KHz pulse and then the right one does the same work. If the robot can receive the pulse be reflected, the interrupt function will work to count how many times it receives the signal. When the time is more than 20, we can consider that there must be something in front, then we just need to change the route.

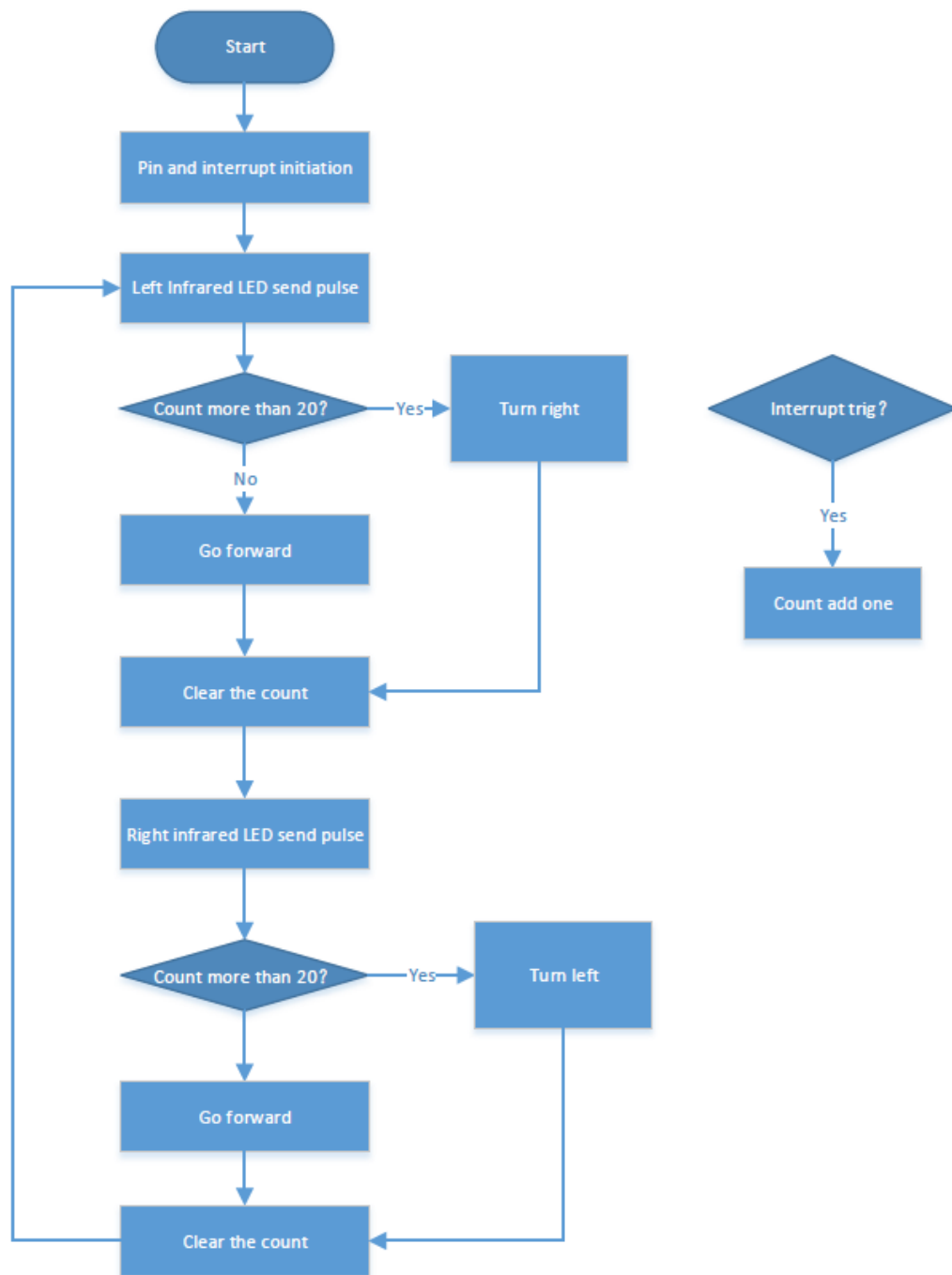


3) 小车避障模块

In the flow chart below, we can see that we just need to check that how many times the receiver can receive the signal when the transmitter is working. After finish the simple way to avoid the obstacle, it is very nice to make your own opinion to have fun with your robot like let your robot follow your hand or something else.

And you can also use line tracking sensors and obstacle avoiding sensor together to let your robot can stop when he have a line follow work. And we also put an electronic compass sensor, so you can let your robot runs more straightly.

o

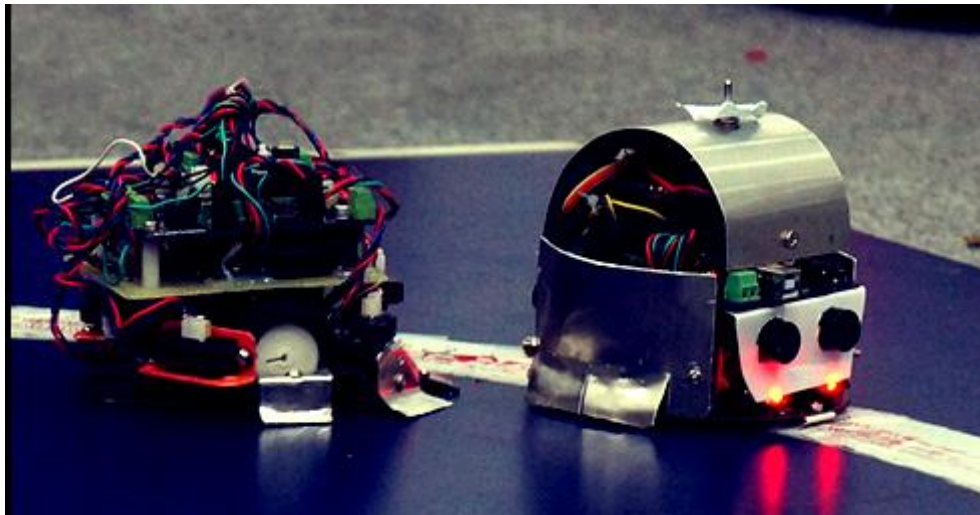


4) Flow chart about the code

🔧 Because if we just turn on the infrared LED, the distance we can detect will be very short, that is not enough for using, and now we use pulse about 38KHz, we can detect longer. This is an interesting point that we change the way of transmitting, and it gives different feedback.

Circuit Design

There is a kind of game named sumo robot, so would you have a try?



6) SumoRobot

1 This is the link:

[http://www.dfrobot.com/index.php?route=product/product&filter_name=sumo
&product_id=1037#.U4gAE43diHA](http://www.dfrobot.com/index.php?route=product/product&filter_name=sumo&product_id=1037#.U4gAE43diHA)