Development of intelligent car based on STM32

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Abstract:With the development of industrial automation, smart car has been widely used in industrial production. Smart car with automatic tracking, automatic obstacle avoidance, color recognition, wireless remote control and other functions. Able to work in humid, dusty, greasy spots and other harsh environments. This paper studies how to realize the automatic tracking and obstacle avoidance, color recognition, and can realize remote wireless remote control. Realize the intelligent work of the car, can replace people to harsh environment work. The hardware circuit diagram and software program are given in this paper, and the intelligent control of the car is realized.

Introduction

In the electronic design competition and the innovation and training of college students, many kinds of smart cars often appear. With automatic tracking, automatic obstacle avoidance, color recognition and wireless remote control function. The automatic tracking and obstacle avoidance is the basic function. The photoelectric sensor tracking or graphic image recognition technology. Obstacle avoidance can also be done by photoelectric sensors or ultrasonic sensors. Color recognition is also used in graphics, image recognition, or photoelectric sensors. Wireless remote control can realize the remote control of the car.

Hardware circuit design。

Drive circuit design of DC motor

The pin diagram of the TB6612 is shown in figure 1. In figure PWMA, AIN2, AIN1 control the whole motor, PWMB, BIN2 and BIN1 control the other way motor. PWMA and PWMB output PWM wave to control the speed of the motor. AIN2=1, AIN1=0 control motor clockwise rotation, AIN2=0, AIN1=1 control motor counter clockwise rotation, BIN2 and BIN1 control logic with AIN2, AIN1.
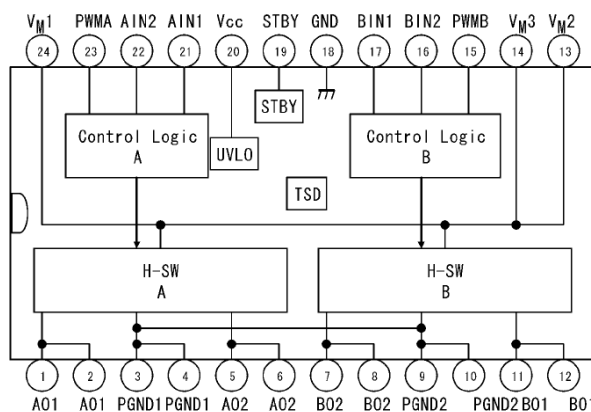

Figure 1 TB6612 pin diagram

Motor control circuit diagram

The motor control circuit is shown in figure 2. You can see from Figure 2, BIN2, BIN1, AIN2, AIN1, PWMA, PWMB is connected with the microprocessor, the microprocessor sends out the control logic and PWM wave, A01, A02 drive DC motor rotation, B01, B02 and DC motor driven rotary road.
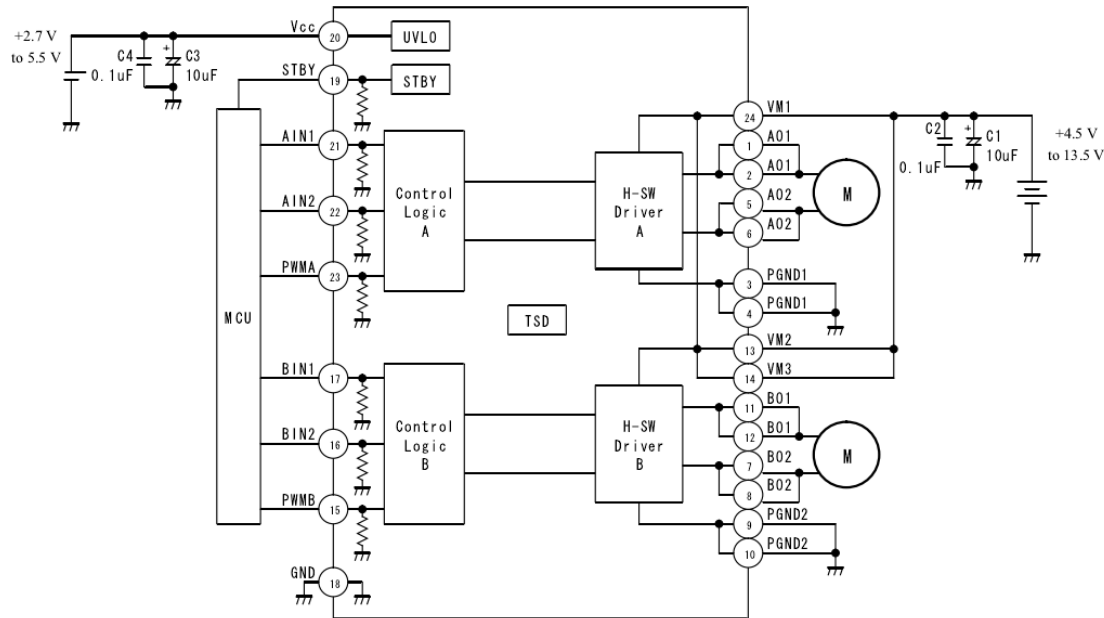

Fig. 2 Diagram of motor control circuit

Due to the limited space, the article only gives some hardware circuit diagram。

Software programming

In this design, under KEIL 5, programming with C language. Complete the initialization of the TB6612 and the motor speed measurement and tracking, obstacle avoidance, color detection, wireless remote control software programming. Some code is given below:

```
void TIM3_PWM_Set(u16 T_pwm,u16 psc_pwm,u8 re_map,u8 channel,u16 pwm_duty)
{
RCC->APB2ENR|=1;
switch (re_map)
{
        case 0:
                AFIO->MAPR&=0XF8FFFFFF;
                AFIO->MAPR|=0X04000000;
                AFIO->MAPR&=0XFFFFF3FF;
                AFIO->MAPR|=0<<10;
        RCC->APB2ENR|=1<<2;
        RCC->APB2ENR|=1<<3;
            GPIOA->CRL&=0X00FFFFFF;
        GPIOA->CRL|=0XBB000000;
            GPIOB->CRL&=0XFFFFFF00;
        GPIOB->CRL|=0X000000BB;
        break;
```

```
        case 2:
            AFIO->MAPR&=0XF8FFFFFF;
            AFIO->MAPR|=0X04000000;
            AFIO->MAPR&=0XFFFFF3FF;
            AFIO->MAPR|=2<<10;
         RCC->APB2ENR|=1<<3;
          GPIOB->CRL&=0XFF00FF00;
          GPIOB->CRL|=0X00BB00BB;
            break;
        case 3:
            AFIO->MAPR&=0XF8FFFFFF;
            AFIO->MAPR|=0X04000000;
            AFIO->MAPR&=0XFFFFF3FF;
                 }}
```

In the above code, the output control of the PWM waveform is realized and the parameters are adjusted to realize the regulation of the duty cycle of the PWM. Realize the adjustment of the motor speed.

Summary

This paper describes the method of the smart car, the hardware circuit design is given, and the KEIL is done with C language programming, to achieve the car automatic tracking and obstacle avoidance, color detection, wireless remote control function. Because of the limited space, only the code to adjust the PWM waveform is given. Through the test, it meets the design requirements, and has certain practical value.

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