Design of a New Type of Automatic Charging Car

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Abstract: At present, with the continuous improvement of intelligent manufacturing technology, the performance requirements of automobiles are getting higher and higher. To meet this demand, a wireless charging electric vehicle including a wireless charging device is designed and manufactured. The mechanical part of the electric car can be reformed by the finished four-wheeled car. Small size and light weight. Super capacitor power supply, when the power is insufficient, it can automatically detect and drive to the accessories of the charging pile for wireless charging.

Introduction

In order to meet the above requirements, the automatic charging smart car needs to meet the following indicators:

(1) Make a set of wireless charging device, whose transmitter coil is placed on the road surface. The transmitter is powered by a DC regulated power supply with constant current and voltage mode switching automatically. The supply voltage is 5V and the supply current is not more than 1A. The wireless charging receiver is installed on the chassis of the car. Each charging time is limited to 1 minute.

(2) Make a wireless charging electric vehicle. Electric vehicles use appropriate capacity supercapacitor (farad capacitor) to store energy and supply power to electric vehicles through DC-DC conversion. Batteries and other energy storage power supply devices shall not be used on vehicles.

(3) After charging for 1 minute, when the electric vehicle detects that the wireless charging emitter stops charging, it will start itself immediately and drive straight ahead horizontally until the energy is exhausted and the driving distance is not less than 1 m.

(4) After charging for 1 minute, the electric vehicle climbs straight along the inclined woodworking board road surface. The length of the road surface is not more than 1m, and the inclination angle of the slope is self-determined. By synthesizing multi-factor design, the climbing height h = LSIn theta of the electric vehicle is the largest after charging for 1 minute each time. Type L is the distance of the car running in a straight line.

Hardware Design

The hardware circuit design is shown in Figure 1. The circuit diagram of wireless charging is given. The pre-frequency dividing coefficient is set and the principle of electromagnetic coupling is used for charging. A brief explanation is as follows:

(1) DC-DC conversion is proposed to adopt TI TPS63020 chip.

(2) The capacity of the supercapacitor can be considered comprehensively according to the charge charged by the charger in one minute and the current, time and weight required by the car.

(3) The driving distance is located at the rear wheel contact point of the car. The inclination gradient is self-determined.

(4) When testing, the car is required to charge and discharge several times. Ensure that the car has no additional energy storage in advance during the test.

(5) Wireless charging electric vehicle is a relatively complex engineering problem. By improving charging and discharging efficiency, reducing vehicle weight, optimizing motor drive, properly

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selecting supercapacitor (farad capacitor) capacity and road inclination angle, the climbing height of electric vehicle can be improved.

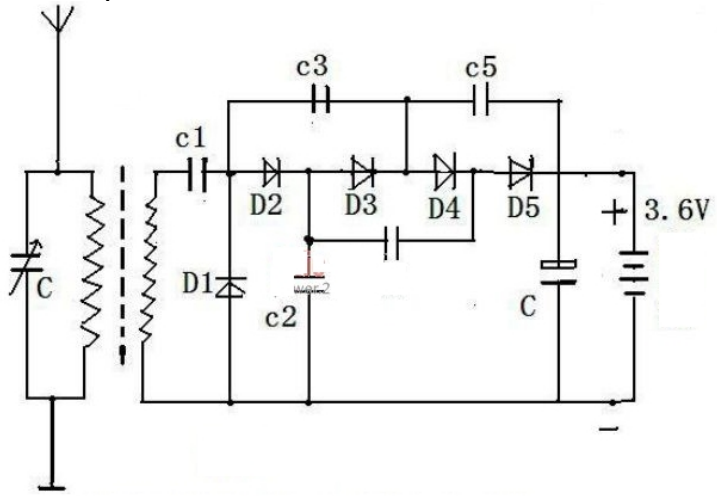

Fig. 1 Wireless charge diagram

Software

In this design, KEIL 5 is programmed using C language.

```
void MiniBalance_Motor_Init(void)
{
    RCC->APB2ENR|=1<<3;
    GPIOB->CRH&=0X0000FFFF;
    GPIOB->CRH|=0X22220000;
}
void MiniBalance_PWM_Init(u16 arr,u16 psc)
{
MiniBalance_Motor_Init();
    RCC->APB1ENR|=1<<1;
    RCC->APB2ENR|=1<<3;
    GPIOB->CRL&=0XFFFFFF00;
    GPIOB->CRL|=0X000000BB;
    TIM3->ARR=arr;
    TIM3->PSC=psc;
    TIM3->CCMR2|=6<<12;
    TIM3->CCMR2|=6<<4;
    TIM3->CCMR2|=1<<11;
    TIM3->CCMR2|=1<<3;
    TIM3->CCER|=1<<12;
    TIM3->CCER|=1<<8;
    TIM3->CR1=0x8000;
    TIM3->CR1|=0x01;
}
int Read_Position(u8 TIMX)
{
     int Encoder_TIM;
    switch(TIMX)
     {
        case 2:    Encoder_TIM= (short)TIM2 -> CNT;    break;
```

```
            case 3:    Encoder_TIM= (short)TIM3 -> CNT;    break;
            case 4:    Encoder_TIM= (short)TIM4 -> CNT;    break;
            default:    Encoder_TIM=0;
        }
            return Encoder_TIM;
    }
    void TIM4_IRQHandler(void)
    {
        if(TIM4->SR&0X0001)
        {

        }
        TIM4->SR&=~(1<<0);
    }
    void TIM2_IRQHandler(void)
    {
        if(TIM2->SR&0X0001)
        {

        }
        TIM2->SR&=~(1<<0);
    }
    int Read_Velocity(u8 TIMX)
    {
         int Encoder_TIM;
        switch(TIMX)
        {
            case 2:    Encoder_TIM= (short)TIM2 -> CNT;    TIM2 -> CNT=0; break;
            case 3:    Encoder_TIM= (short)TIM3 -> CNT;    TIM3 -> CNT=0; break;
case 4:    Encoder_TIM= (short)TIM4 -> CNT;    TIM4 -> CNT=0; break;
            default:    Encoder_TIM=0;
        }
            return Encoder_TIM;
    }
```


Summary

This paper describes the principle and method of designing wireless charging intelligent car, gives the hardware circuit design diagram, describes the timing of timer acquisition in detail, and compiles the program in C language under KEIL, which can realize automatic charging and meet the design requirements. It has certain practical value.

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