Research on Vehicle tracking Based on LDC1000

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Abstract: In recent years, the research on tracking the car at home and abroad, with the focus on the photoelectric sensor and graphics technology, mainly black and white line tracking. But the black and white line tracking on the environment more stringent requirements, the strong influence of light. In order to overcome these shortcomings, this paper proposes a new method of tracking, metal runway tracking, composed of thin wire, the wire diameter of 0.6mm, using a new type of metal detection sensor LDC1000, can detect tiny metal, and the results converted to digital quantity by SPI is connected with the microprocessor interface, processed by software control of the vehicle, can be achieved on the wire tracking, opens up a new way for the automatic car tracking, and has a certain practical value.

Introduction

In recent years, the smart car is a hot research topic, the automatic tracking is one of the research contents. At present, often using photoelectric sensors to realize the automatic tracking, according to the reflected light intensity is black or white, detection, tracking implementation along the black line. But this method has its own shortcomings, it is greatly affected by natural light. When natural light is strong, it can not recognize black and white lines very well.

In order to overcome these shortcomings, in this paper use the thin wire as the runway, with new metal detection sensor LDC1000 as probe, according to the LC shock detection principle of thin wire, and the results are converted to digital signals, the digital quantity is as high as 28. Capable of accurate detection of tiny metals. Accordingly, we can achieve precise control of the tracking car.

Hardware Design

The Connection Diagram between LDC1000 and MCU

The connection diagram for LDC1000 and MCU is shown in figure 1. The LDC1000 is connected to the MCU through the SPI interface, namely, MOSI, MISO, SCLK, and CSB pins. The TBCLK is connected to the Timer output pin. The timer provides the clock needed for the LDC1000 operation. The clock frequency is 6MHz.

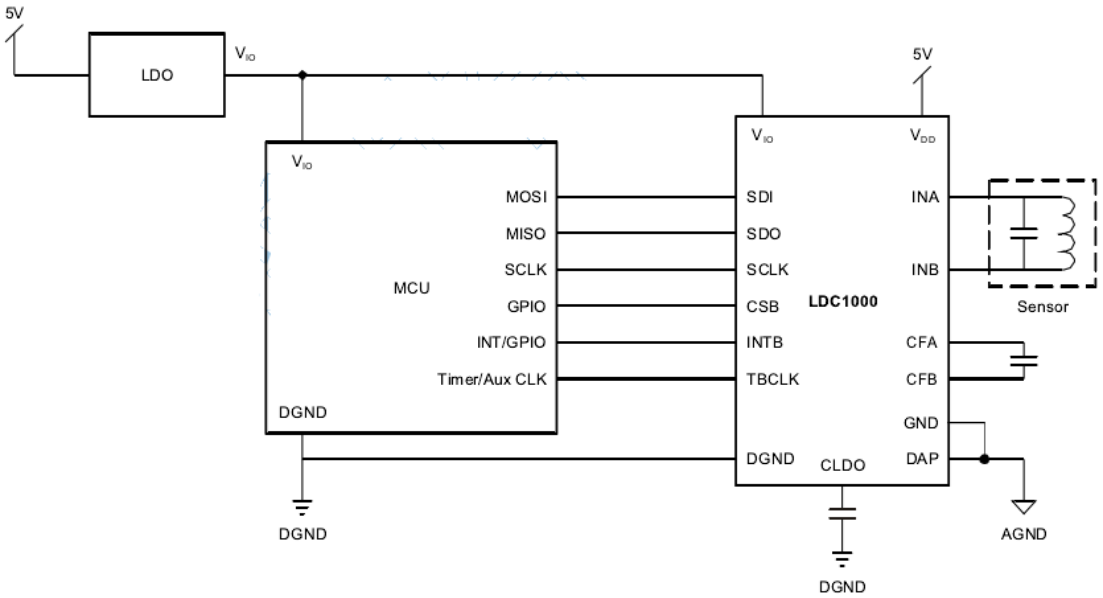

Figure 1 connection diagram of LDC1000 and MCU

Read and Write Timing of SPI

The read and write timing of the SPI is shown in Figure 2 and figure 3. The use of SPI read and write timing, SCLK as a clock signal, read and write operations, first send the address, and then data.

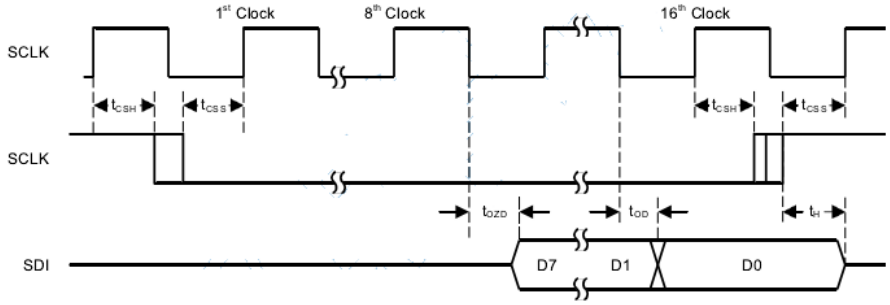

Figure 2 read sequence of SPI

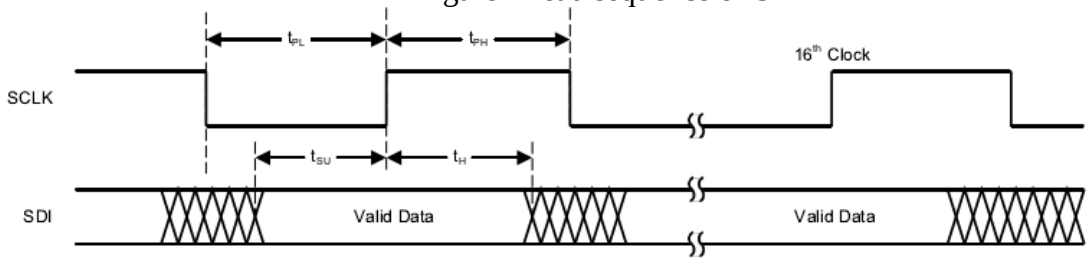

Figure 3 SPI write timing

Software Program

In this design, under KEIL 5, programming with C language. Complete the initialization of LDC1000, digital volume of reading operations. Some code is given below:

```
void SPI_LDC1000_Init(void)
{
SPI_LDC1000_WriteByte(LDC1000_CMD_RPMAX,TEST_RPMAX_INIT);
SPI_LDC1000_WriteByte(LDC1000_CMD_RPMIN,TEST_RPMIN_INIT);
SPI_LDC1000_WriteByte(LDC1000_CMD_SENSORFREQ,0x94);
SPI_LDC1000_WriteByte(LDC1000_CMD_LDCCONFIG,0x17);     //
```

```
SPI_LDC1000_WriteByte(LDC1000_CMD_CLKCONFIG,0x02);
SPI_LDC1000_WriteByte(LDC1000_CMD_CLKCONFIG,0x00);
 SPI_LDC1000_WriteByte(LDC1000_CMD_INTCONFIG,0x02);
 SPI_LDC1000_WriteByte(LDC1000_CMD_THRESHILSB,0x50);
SPI_LDC1000_WriteByte(LDC1000_CMD_THRESHIMSB,0x14);
SPI_LDC1000_WriteByte(LDC1000_CMD_THRESLOLSB,0xC0);
SPI_LDC1000_WriteByte(LDC1000_CMD_THRESLOMSB,0x12);
SPI_LDC1000_WriteByte(LDC1000_CMD_PWRCONFIG,0x01);                    }
```

The above code implements the initialization of the LDC1000

```
u8 SPI_LDC1000_ReadBytes(char ReadAddr,char* pBuffer,u8 NumByteToRead){
    u8 i,readback;
    u8 txReadAddr;
    txReadAddr = ReadAddr | 0x80;
    SPI_LDC1000_CS=0;
      SPIx_ReadWriteByte(txReadAddr);
      for(i=0;i<NumByteToRead;i++)
    {
          pBuffer[i]=SPIx_ReadWriteByte(0XFF);
      }
    SPI_LDC1000_CS=1;
    return readback;
 }
```

The above code implements the SPI read operation, the conversion completed 28 bit digital read into the MCU.

Summary

This paper describes a new type of car tracking method, using fine wire for runway. The paper gives the design scheme, the hardware circuit design and software programming, realize the identification and tracking of fine wire. Since the new digital inductance sensor LDC1000 is used, it is possible to recognize tiny metals. Suitable for application in oil, water, wet working environment, provides a new method for automatic car tracking.

Reference

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