Inverted pendulum source description

1. Integrated development environment

The development environment for the code supplied by the data is：MDK5.1

2. STM32 resource allocation

The whole program has applied a large amount of STM32 resources.

ADC：Collect the battery voltage after the voltage divider, collect the data information of angular displacement sensor.

TIM1：5MS timing interrupt provides accurate control frequency.

USART1：Through serial port 1 sends data to Minibalance host computer, also is program download interface.

TIM2：Initialize to quadrature encoder mode, and hardware to collect encoder data.

TIM3：Initialized to PWM output control motor

SPI：Using IO to simulate SPI to drive OLED display screen

GPIO：Read key input, control LED, control motor forward and backward, etc.

SWD：Provide SWD interface for online debugging

3. The main user files of the program are described below.

● Source Group1

◆ Startup_stm32f10x_md.s :Startup files for stm32

● User

◆ Minibalance.c：The main function is placed, and the work of human-computer interaction is put in the dead circle.

◆ SYSTEM

◆ Delay.c：Provide system delay initialization function and related functions.
◆ Sys.c:Provide clock, interrupt, system initialization function
◆ Usart1.c：Provide serial port 1 initialization function and related functions.

● HARDWARE

◆ Led.c：Provide LED initialization function and related functions.
◆ Key.c：Provide keys to initialize functions and related functions, such as click double click

detection.

◆ Oled.c：Provide OLED initialization function and related functions.

◆ adc.c： Provide ADC initialization function and related functions, such as battery voltage detection, angular displacement sensor acquisition.

◆ Timer.c：Provides timer 1 initialization functions and related functions, but TIM1 interrupt service functions are in the control. C file

◆ Motor.c Provide motor control initialization function

◆ Encoder.c Provide encoder to collect correlation function.

◆ Exti.c：Provide external interrupt initialization function and related functions

● Balance

◆ Control.c :It provides all the control functions and executes it in the interrupt service function of TIM1.

◆ Show.c：Provides correlation functions for OLED display and host computer sending.

◆ DataScope_DP.c：Minibalance upper hangar file

4.Control algorithm

Inclination Ring: PD control, which is the core of the control, the other control is relative to the inclination control is interference.

Position loop: PD control encoder information for low-pass filtering can weaken the proportion of position control, improve the stability of the system. The control cycle is 25ms.