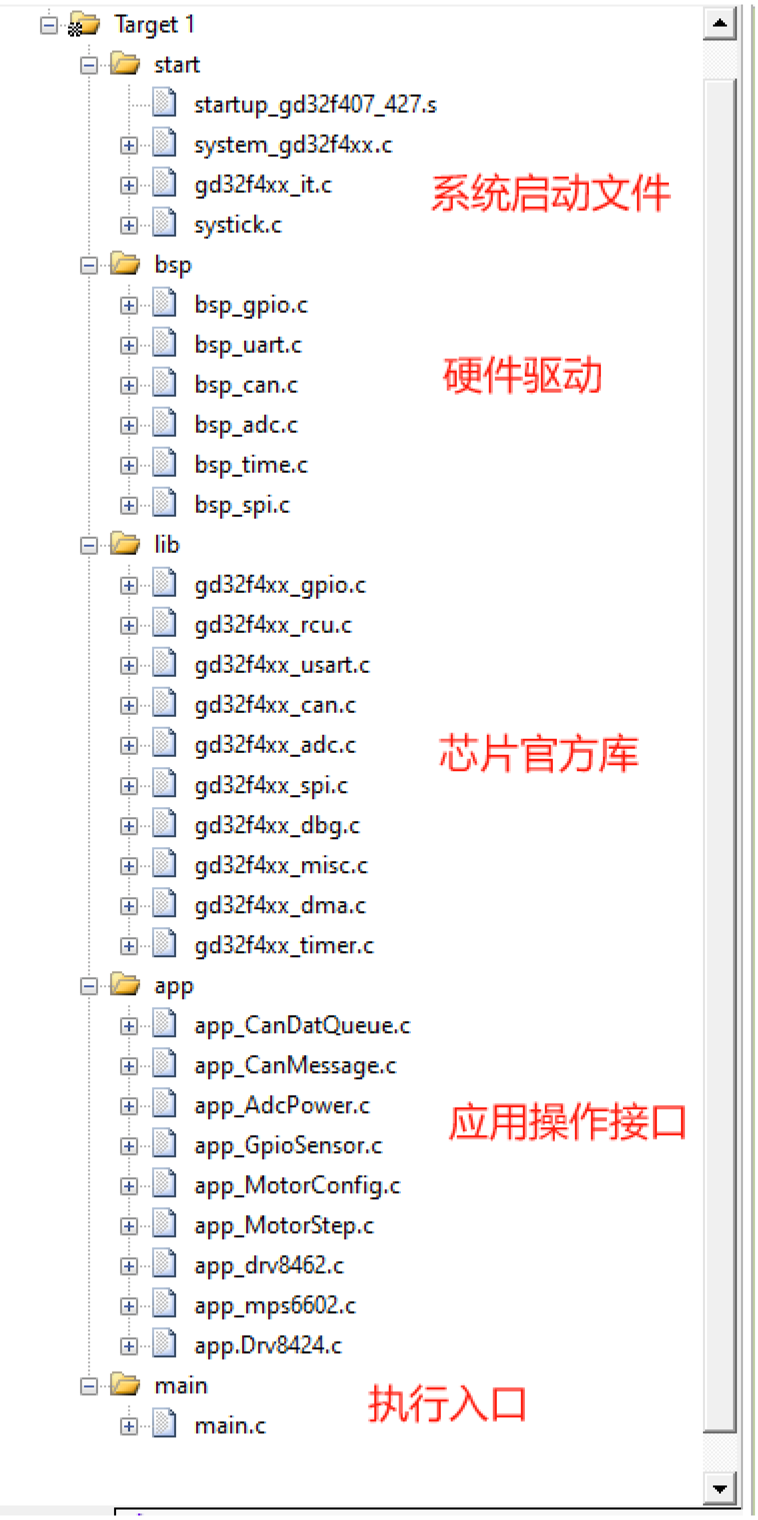
E063驱动接口及电机应用函数说明

工程文件层次



Target 1
- start
  - startup_gd32f407_427.s
  - system_gd32f4xx.c
  - gd32f4xx_it.c
  - systick.c
- bsp
  - bsp_gpio.c
  - bsp_uart.c
  - bsp_can.c
  - bsp_adc.c
  - bsp_time.c
  - bsp_spi.c
- lib
  - gd32f4xx_gpio.c
  - gd32f4xx_rcu.c
  - gd32f4xx_usart.c
  - gd32f4xx_can.c
  - gd32f4xx_adc.c
  - gd32f4xx_spi.c
  - gd32f4xx_dbg.c
  - gd32f4xx_misc.c
  - gd32f4xx_dma.c
  - gd32f4xx_timer.c
- app
  - app_CanDatQueue.c
  - app_CanMessage.c
  - app_AdcPower.c
  - app_GpioSensor.c
  - app_MotorConfig.c
  - app_MotorStep.c
  - app_drv8462.c
  - app_mps6602.c
  - app.Drv8424.c
- main
  - main.c

上电初始化流程

```
|—startup_gd32f407_427.s
  |_int main(void)
      ├─systick_config()          "开启systick中断时基1ms"
      ├bsp_uart0_int()             "printf调试打印接口"
      |_appGpioSetsInit()          "IO初始化"
      |  |_bsp_led_init()                           "系统灯初始化"
      |  |_bsp_Out24V_init()                        "24V5路输出8803故障输出输入"
      |  |_bsp_Sensor_iniit()                       "传感器检测初始化"
      |  |_bsp_Dipswitch_init()                     "拔码开关检测初始化"
      |  |_bsp_StepperMotorMicrostep_init()         "电机细分初始化"
      |  |_bsp_StepperMotorEN_DiR_FUAL_NRST_init()  "电机使能,方向,故障检测,复位"
      |_appCanMessageInit()        "CAN消息应用初始化"
      |  |_bsp_can0_init()                          "Can硬件配置"
      |  |_CanDataEnQueueCallback                   "数据入队回调函数指针地址赋值"
      |  |_appCanQueueInit();                       "  接收数据队列配置"
      |_appMotorStepInit()         "步进电机控制初始化"
      |  |_Step1_TIM1InterruptCallback              "脉冲中断处理回调函数_1"
      |  |          :
      |  |_Step9_TIM12InterruptCallback             "脉冲中断处理回调函数_9"
      |  |_bsp_TimexStep_init()                     "第1路定时器初始化"
      |  |          :
      |  |_bsp_TimexStep_init() ()                  "第9路定时器初始化"
      |  |_app_NineStepperMotorsDefaultParameter()  "9路电机上电默认参数"
      |  |_appDrv8424Init()                         "剪刀夹子,PWM,config"
      |  |_appDrv8462Init()                         "升降,spi1Init,config"
      |  |_appMps6602Init()                         "拉线,spi0Init,config"
      |_appPowerDetectionInit()    "电源检测初始化(DMA轮询方式)"
    while(1)
    {  //指示灯状态翻转ms
       app_System_Led(500)
    }
```

函数接口说明

systeme

```
开启了systick中断时基1ms,中断优先级最低,程序中所用到的时间都基于此
void SysTick_Handler(void)
```

GPIO

```
#include "app_GpioSensor.h"
"指示灯状态翻转time:间隔时间"
void app_System_Led(unsigned short)
"获取拨码号 return bit-ID0 bit-ID1"
unsigned char appGetDipSwitchNum(void);
"4路输出DRV8803复位"
void appDrv88033_RST(void);
"获取Drv8803故障状态 低有效"
unsigned char appGetDrv88033FaultStatus(void);
"
5路输出操作 1-4路: DRV8803 - 高有效  第5路  : 开漏输出- 高有效
```

```
num   : 1-5路  0-全部
status: 1-开  0-关
return: -1-参数传入错误 1-执行完成 0-未执行
"
int  appRead5wayOutputPinStatus(unsigned char);
"
读5路输出管脚状态
num   : 1-5路   0-全部: bit0-out1,bit1-out2, bit2-out3,bit3-out4,bit4-out5
return: -1-参数传入错误  1-执行完成 0-未执行
"
int  app5wayOutputEnWrite(unsigned char,unsigned char);
"
获取传感器状态
num   : 1-24路
        0-全部: bit0-IN0...bit23-IN27
return: -1-参数传入错误
"
int  appGetSensorStatus(unsigned char);
```

uart0

```
用于printf调试打印接口，波特率默认115200bps,
bsp_uart.h提供以下接口；宏定义LOG_ENABLE为打印开关
#define LOG_ENABLE      1
#if LOG_ENABLE
    #define log_info(...)    printf(__VA_ARGS__)
    #define log_error(...)   printf(__VA_ARGS__)
    #define log_warning(...) printf(__VA_ARGS__)
    #define log_debug(...)   printf(__VA_ARGS__)
#else
    #define log_info(...)
    #define log_warning(...)
    #define log_error(...)
    #define log_debug(...)
#endif
#define log_funcName()   log_debug("call %s \n", __FUNCTION__)
```

can0

```
波特率默认1Mbps，开启接收中断,中断优先级最高,接收ID与掩码为列表模式可通过条件编译修改
 /* 1MBps */
#if CAN_BAUDRATE == 1000
      can_parameter.prescaler = 2;
#elif CAN_BAUDRATE == 500
      can_parameter.prescaler = 4;
#elif CAN_BAUDRATE == 250
      can_parameter.prescaler = 8;
#endif
/*列表模式接收ID*/
```

```
#ifdef CANREVIDBASS_2
    can_filter.filter_number=1;
    can_filter.filter_list_high = (CANREVIDBASS_2)<<5;
    can_filter.filter_mask_high = (CANREVIDBASS_2)<<5;
    can_filter_init(&can_filter);
    #endif
    #ifdef CANREVIDBASS_3
    can_filter.filter_number=2;
    can_filter.filter_list_high = (CANREVIDBASS_3)<<5;
    can_filter.filter_mask_high = (CANREVIDBASS_3)<<5;
    can_filter_init(&can_filter);
#endif
app_CanDataQueue.c为数据队列操作，接收数据入队已在void CAN0_RX0_IRQHandler(void)完成
#include "app_CanMessage.h"
#include "app_CanDataQueue.h"
"循环队列长度"
#define  CANDATALEN  50
"队列操作句柄"
Queue    CanRevQueue;
"CAN队列缓存区"
ElemType CanDataBuff[CANDATALEN]
"接收数据入队回调"
void (*CanDataEnQueueCallback)(void *dat)
"循环队列入队"
int appCanDataEnQueue(Queue* q, ElemType *data)
"循环队列出队"
int appCanDataDeQueue(Queue* q, ElemType *val)
"Can0发送消息"
int appCanDataSend(unsigned char *data,unsigned char len,unsigned short id)
```

ADC_DMA

```
#include "app_AdcPower.h"
"
获取检测电压值(0-3.3)未滤波
DC12V:12V电压值
DC24V:24V电压值
"
int appGetPowerVoltageValue(float* DC12V,float* DC24V)
"
获取检测实际电压值(0-12/24V)未滤波
DC12V:12V电压值
DC24V:24V电压值
"
int appGetPowerActualVoltageValue(float* DC12V,float* DC24V)
```

StepMotor

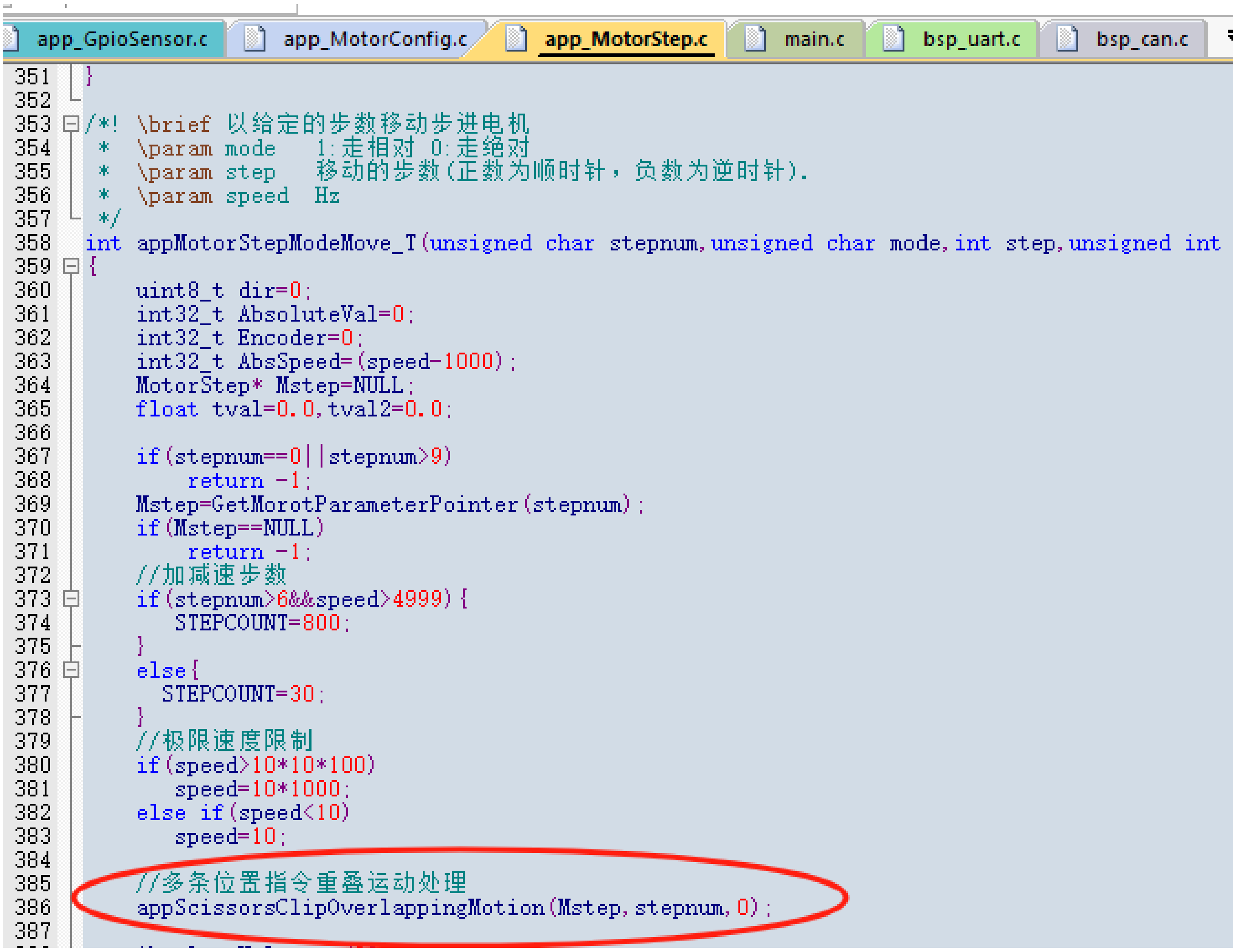
---

config

```
#include "app_MotorConfig.h"
"9路电机上电默认参数赋值  -运行电流 -锁定电流 -电机运动默认正方向"
void app_NineStepperMotorsDefaultParameter(void);
"9路电机使能/失能设置 num: 1-9  0-全部;  En: 0/!0  "
int appNineMotorEnbleSet(unsigned char num,unsigned char Enb);
"电机故障状态获取(低电平有效) num: 1-9 bit0;  0-全部 bit0--bit8"
int appNineMotorGetFaultStatus(unsigned char num);
"
9路电机电流设设置并记录 因三款电机IC电流调节方式差别大故不支持群操作
特殊使用对应IC接口(drv8424,drv8462,mps6602)
num: 1-9
current:电流值
"
int appNineMotorRunCurrentSet(unsigned char num,unsigned short current);
"
9路电机锁定电流设设置并记录 因三款电机IC电流调节方式差别大故不支持群操作,
特殊使用对应IC接口(drv8424,drv8462,mps6602)
num: 1-9
current:电流值
"
int appNineMotorLockCurrentSet(unsigned char num,unsigned short current);
"
9路电机细分设置(上电默认配置4细分)因三款电机IC细分调节方式差别大紧支持4种情况
特殊使用对应IC接口(drv8424,drv8462,mps6602))
num: 1--左剪刀,右剪刀
     2-右夹1,右夹2,左夹1,左夹2
     7-升降电机
     8/9-拉线电机
     0-全部
microstep:  0-全步
            2-1/2步
            4-1/4步
            8-1/8步
"
int appNineMotorMicrostepSet(unsigned char num,unsigned char microstep);
```

StepMove

```
bsp_Time1Step_init()bsp_Time2Step_init()bsp_Time4Step_init()bsp_Time5Step_init()
bsp_Time6Step_init()bsp_Time9Step_init()bsp_Time10Step_init()bsp_Time11Step_init()
bsp_Time12Step_init();9个定时器开启的定时中断优先级均是最高与CAN接收一样
"
appMotorStepModeMove_T()与appMotorSpeedModeMove_T()用那个位置编码值EnCoder都会更新
所以两种模式尽量不混用,特殊场景下必须混用注意SpeedMode转到StepMode要执行回零校准
"
```



```
}

/*! \brief 以给定的步数移动步进电机
 *  \param mode   1:走相对 0:走绝对
 *  \param step   移动的步数(正数为顺时针，负数为逆时针).
 *  \param speed  Hz
 */
int appMotorStepModeMove_T(unsigned char stepnum,unsigned char mode,int step,unsigned int
{
    uint8_t dir=0;
    int32_t AbsoluteVal=0;
    int32_t Encoder=0;
    int32_t AbsSpeed=(speed-1000);
    MotorStep* Mstep=NULL;
    float tval=0.0,tval2=0.0;

    if(stepnum==0||stepnum>9)
        return -1;
    Mstep=GetMorotParameterPointer(stepnum);
    if(Mstep==NULL)
        return -1;
    //加减速步数
    if(stepnum>6&&speed>4999){
      STEPCOUNT=800;
    }
    else{
     STEPCOUNT=30;
    }
    //极限速度限制
    if(speed>10*10*100)
      speed=10*1000;
    else if(speed<10)
      speed=10;

    //多条位置指令重叠运动处理
    appScissorsClipOverlappingMotion(Mstep,stepnum,0);

```

```
#include "app_Motorstep.h"
"
多条位置指令重叠运动处理(阻塞) appMotorStepModeMove_T中调用此函数接口
tye: 1:终止当前运动减速停机,阻塞时间STEPCOUNT个脉冲周期(保障最后一条位置指令)
    !1(默认):等当前运动结束,阻塞剩余N个未走完脉冲周期(重叠位置指令都能走完位置)
mtn:电机编号
"
static int appScissorsClipOverlappingMotion(MotorStep* Mstep, uint8_t mtn,uint8_t
tye)
"   \brief 以给定的步数移动步进电机
 *  \param mode   1:走相对 0:走绝对
 *  \param step   移动的步数(>0正转, <0反转).
 *  \param speed  Hz
"
int appMotorStepModeMove_T(unsigned char stepnum,unsigned char mode,int
step,unsigned int speed)
"   \brief 以给定的速度移动步进电机
*   \param  stepnum:电机编号 1-9
*   \param speed(Hz):>0正转, <0反转  ==0减速停止
"
int appMotorSpeedModeMove_T(unsigned char stepnum,int speed)
```