MTK driver introduction and porting steps

William Zeng

Jun,13th,2018

life.augmented

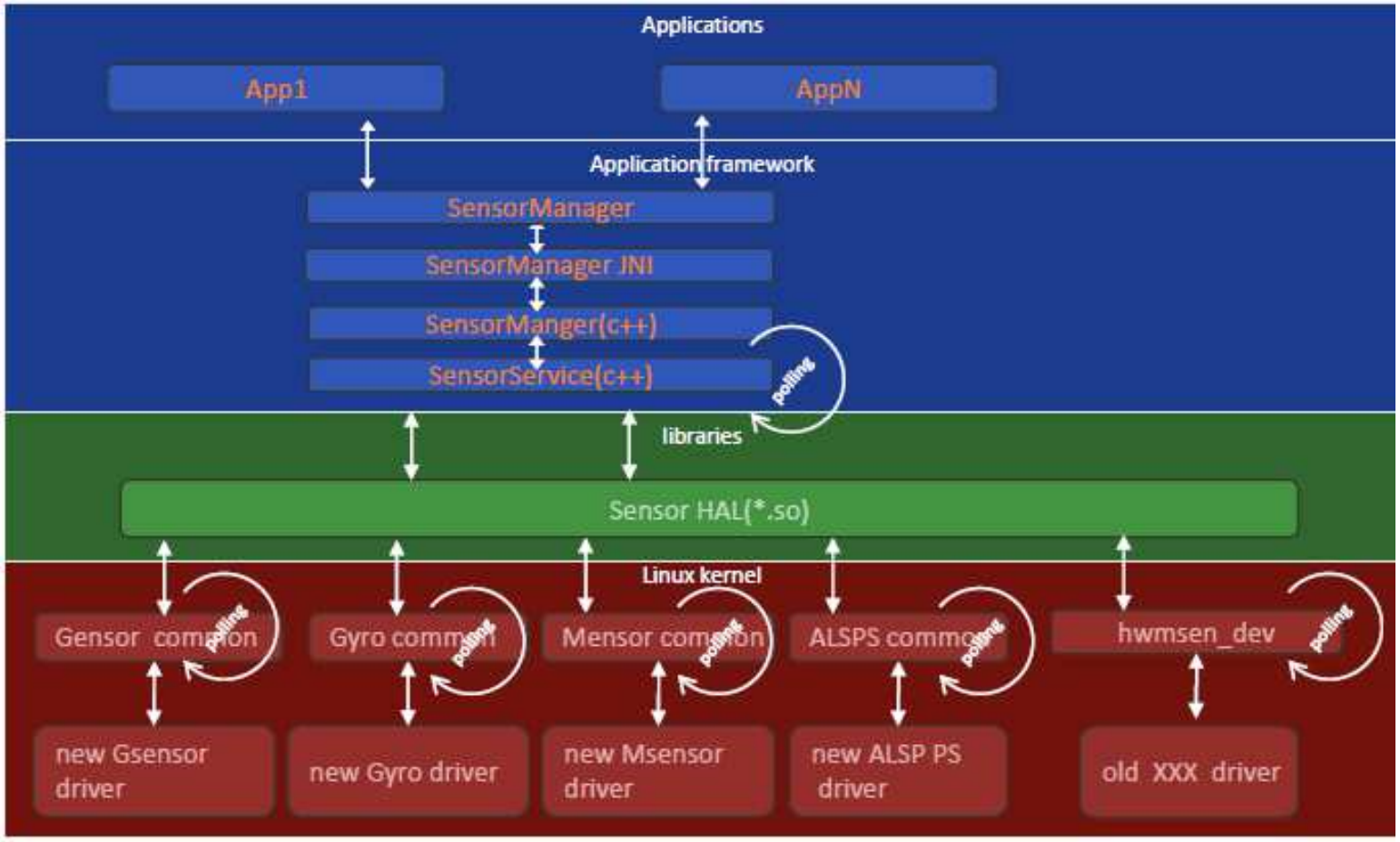
MTK驱动介绍

MTK Sensor驱动分为两类：一类是常见的AP侧的驱动（AP侧驱动），另外一类是在平台sensor hub中使用的驱动（Sensor Hub驱动）。

AP侧驱动：一般都是我们自己开发、维护，大家可以到我们的GitHub上下载：
https://github.com/ST-MEMS/MTK-AP-driver.git。
在释放给客户前，如果涉及到版本问题，请与我们核实。

Sensor Hub驱动：一般是由客户提需求给MTK，MTK会评估需求然后进行驱动开发，期间我们会支持MTK的驱动开发，最终由MTK测试、验证和释放驱动给客户。

MTK AP侧驱动框架



MTK AP侧驱动移植步骤

➢配置ProjectConfig.mk

Path: device/amt/amt6797_evb_m/ProjectConfig.mk

```
MTK_SENSOR_HUB_SUPPORT = no
MTK_SENSOR_SUPPORT = yes
CUSTOM_HAL_SENSORS = sensor
CUSTOM_KERNEL_ACCELEROMETER = yes
CUSTOM_KERNEL_GYROSCOPE = yes
CUSTOM_KERNEL_MAGNETOMETER = yes
CUSTOM_KERNEL_BAROMETER = yes
CUSTOM_KERNEL_ALSPS = no
CUSTOM_KERNEL_GRAVITY_SENSOR = no
CUSTOM_KERNEL_GRV_SENSOR = no
CUSTOM_KERNEL_RV_SENSOR = no
CUSTOM_KERNEL_LINEARACCEL_SENSOR = no
```

If porting Accelerometer, pls config:
CUSTOM_KERNEL_ACCELEROMETER = yes

If porting Gyroscope, pls config:
CUSTOM_KERNEL_GYROSCOPE = yes

MTK AP侧驱动移植步骤

➢配置dts文件

Path: kernel-3.18/arch/arm64/boot/dts/amt6797_evb_m.dts

1.Accel info config as below:

```
cust_accel@0 {
    compatible          = "mediatek,lsm6ds3_acc";
    i2c_num             = <1>;
    i2c_addr            = <0x8 0 0 0>;
    direction           = <3>;
    power_id            = <0xffff>;
    power_vol           = <0>;
    firlen              = <0>;
    is_batch_supported = <0>;
};
```

2.Gyro info config as below:

```
cust_gyro@0 {
    compatible          = "mediatek,lsm6ds3_gyro";
    i2c_num             = <1>;
    i2c_addr            = <0x6A 0 0 0>;
    direction           = <4>;
    power_id            = <0xffff>;
    power_vol           = <0>;
    firlen              = <0>;
    is_batch_supported = <0>;
};
```

MTK AP侧驱动移植步骤

➢配置dts文件

Path: kernel-3.18/arch/arm64/boot/dts/amt6797_evb_m.dts

3.Gpio config as below:

```
step_counter_intpin_default: stepdefaultcfg {

};

step_counter_intpin_cfg: steppincfg {
        pins_cmd_dat {
            pins = <PINMUX_GPIO63__FUNC_EINT2>;
            slew-rate = <0>;
            bias-disable;
        //  bias-pull-up = <00>;
        };
};
&stepcounter {
        pinctrl-names = "pin_default", "pin_cfg";
        pinctrl-0 = <&step_counter_intpin_default>;
        pinctrl-1 = <&step_counter_intpin_cfg>;
        status = "okay";

};
```

MTK AP侧驱动移植步骤

➢配置dws文件

1.Run the DrvGen.exe and open the codegen.dws file

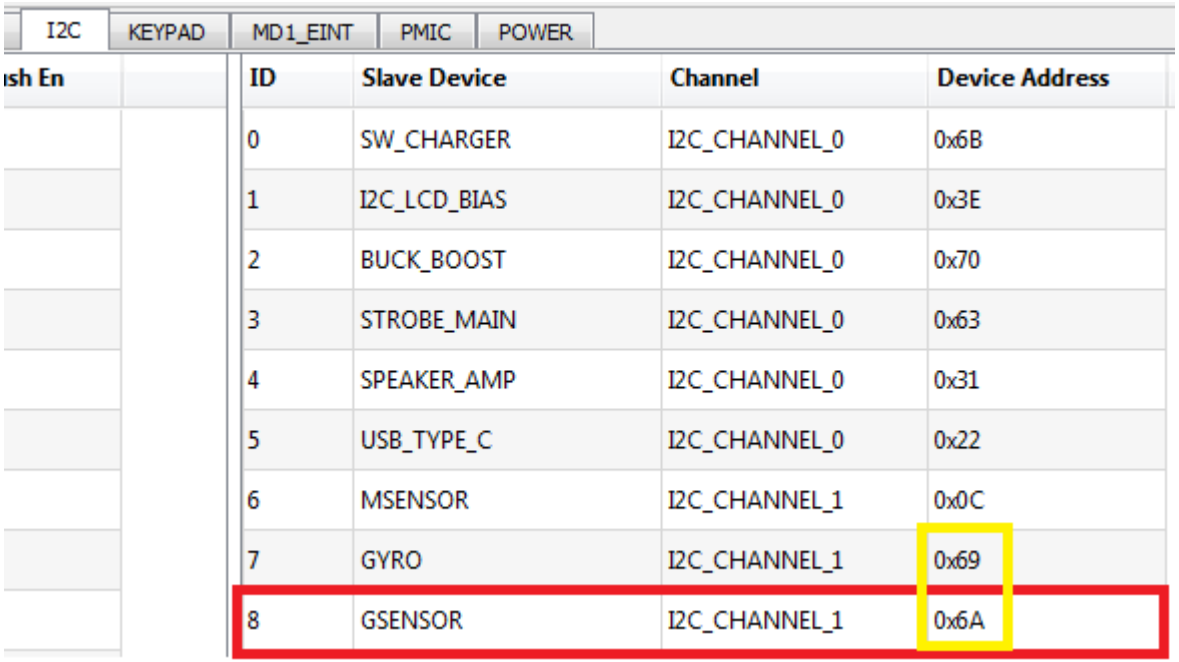
. Drvgen.exe path:

kernel-3.18/tools/dct/DrvGen.exe

. Codegen.dws path:

kernel-3.18/drivers/misc/mediatek/mach/mt6797/amt6797_evb_m/dct/dct/codegen.dws

2.Configure i2c bus channel and address



I2C | KEYPAD | MD1_EINT | PMIC | POWER

ısh En	ID	Slave Device	Channel	Device Address
	0	SW_CHARGER	I2C_CHANNEL_0	0x6B
	1	I2C_LCD_BIAS	I2C_CHANNEL_0	0x3E
	2	BUCK_BOOST	I2C_CHANNEL_0	0x70
	3	STROBE_MAIN	I2C_CHANNEL_0	0x63
	4	SPEAKER_AMP	I2C_CHANNEL_0	0x31
	5	USB_TYPE_C	I2C_CHANNEL_0	0x22
	6	MSENSOR	I2C_CHANNEL_1	0x0C
	7	GYRO	I2C_CHANNEL_1	0x69
	8	GSENSOR	I2C_CHANNEL_1	0x6A

Note:

1 LSM6DS3 is a combo driver, only use i2c info of GSENSOR;

2 The i2c address of GSENSOR must be unique in one i2c channel.

MTK AP侧驱动移植步骤

➢配置dws文件

3.Config interrupt for Step detect, Significant motion and Tilt function

ADC | ClockBuffer | EINT | GPIO | I2C | KEYPAD | MD1_EINT | PMIC | POWER

ID	Eint Var	Debounce Time(ms)	Polarity	Sensitive Level	Debounce En
EINT0	EXT_BUCK_OC	0	Low	Level	Disable
EINT1	NC	0	Low	Level	Disable
EINT2	GYRO	0	Low	Level	Disable
EINT3	MSE	0	High	Level	Disable
EINT4	NC	0	Low	Level	Disable

4.Save and exit the codegen.dws

5.Copy the codegen.dws to the follow path:

vendor/mediatek/proprietary/bootable/bootloader/lk/target/amt6797_evb_m/dct/dct/codegen.dws

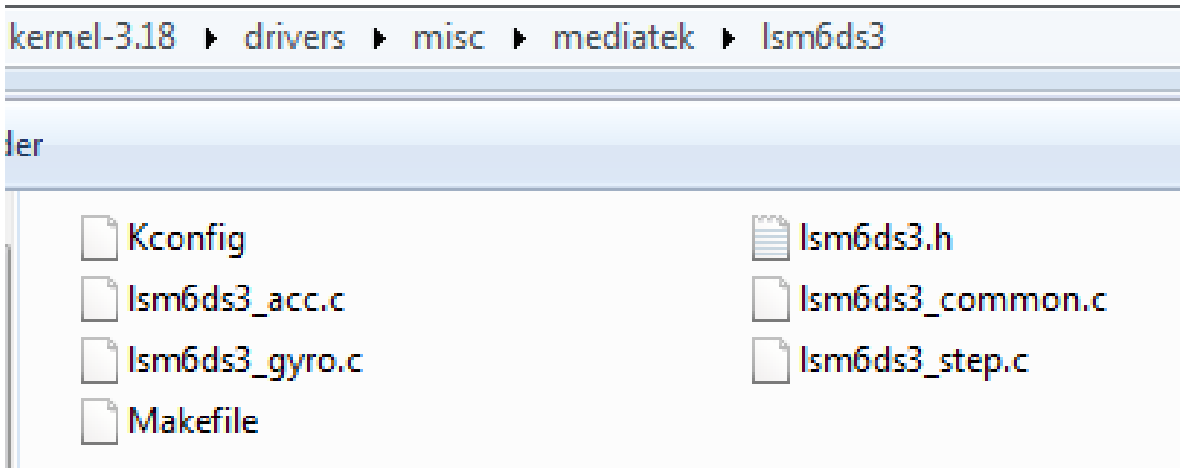
and

vendor/mediatek/proprietary/bootable/bootloader/preloader/custom/amt6797_evb_m/dct/dct/codegen.dws

MTK AP侧驱动移植步骤

➢配置驱动

1.Put the lsm6ds3 driver to kernel-3.18/drivers/misc/mediate/



2.Add lsm6ds3 to Kconfig and Makefile in the path kernel-3.18/drivers/misc/mediatek/

2.1 Add to Makefile:
obj-$(CONFIG_ST_LSM6DS3_IMU) += lsm6ds3/

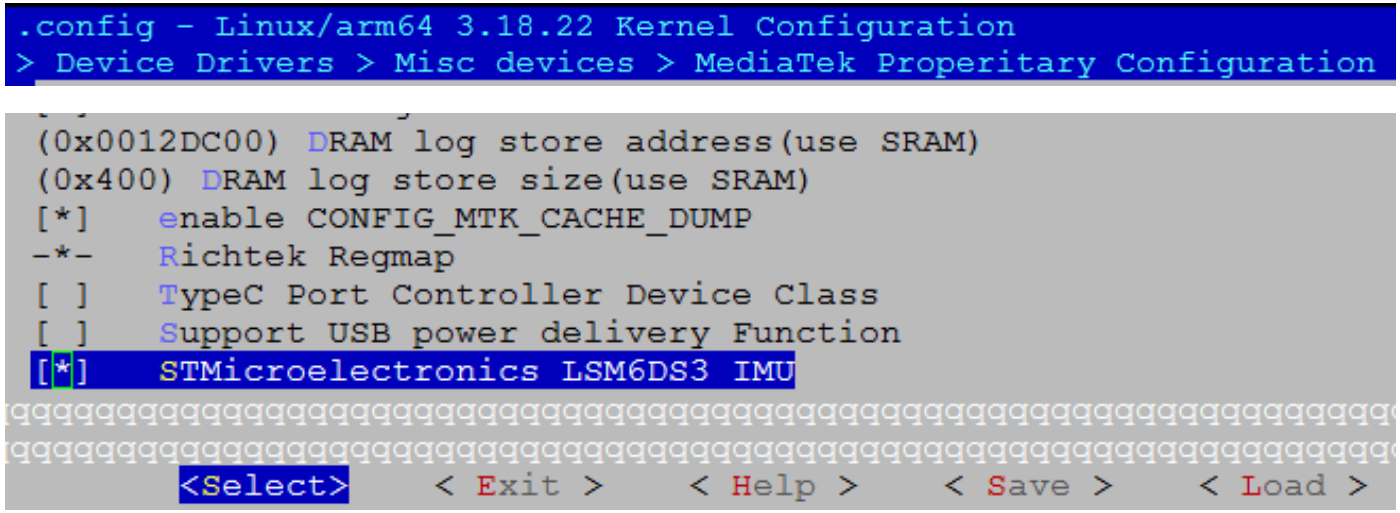
2.2 Add to Kconfig:
source "drivers/misc/mediatek/lsm6ds3/Kconfig"

MTK AP侧驱动移植步骤

➢配置驱动

3.Config kernel with the cmd as below to choose LSM6DS3 driver to build into kernel:

$mmm kernel-3.18:kernel-menuconfig



4.Exit and save the .config. Then use the cmd as below to build:

$make bootimage –j4

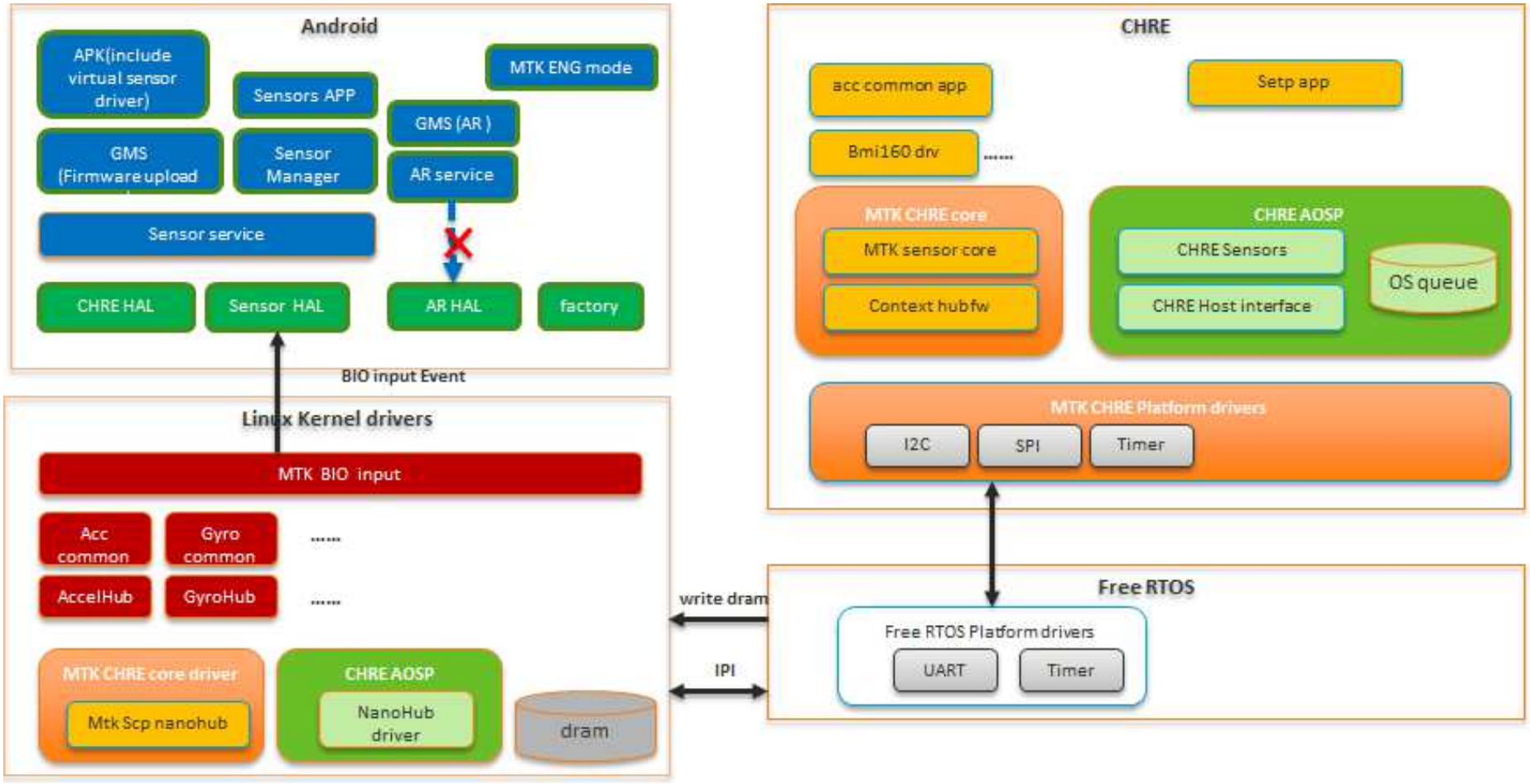
MTK AP侧驱动移植步骤

➢配置HAL

Path: vendor/mediatek/proprietary/hardware/sensor/sensors.c

```
#ifdef CUSTOM_KERNEL_ACCELEROMETER
    #ifndef ACCELEROMETER
        #define ACCELEROMETER              "LSM6DS3 3-axis Accelerometer Sensor"
        #define ACCELEROMETER_VENDER       "STMicroelectronics"
    #endif
    #ifndef ACCELEROMETER_RANGE
        #define ACCELEROMETER_RANGE        (16*GRAVITY_EARTH)
    #endif
    #ifndef ACCELEROMETER_RESOLUTION
        #define ACCELEROMETER_RESOLUTION    0.0f
    #endif
    #ifndef ACCELEROMETER_POWER
        #define ACCELEROMETER_POWER         0.03f
    #endif
    #ifndef ACCELEROMETER_MINDELAY
    #define ACCELEROMETER_MINDELAY          10000
    #endif
#endif
#ifdef CUSTOM_KERNEL_ACCELEROMETER
    {
        .name       = ACCELEROMETER,
        .vendor     = ACCELEROMETER_VENDER,
        .version    = 3,
    .handle     = ID_ACCELEROMETER+ID_OFFSET,
        .type       = SENSOR_TYPE_ACCELEROMETER,
        .maxRange   = ACCELEROMETER_RANGE,//32.0f,
        .resolution = ACCELEROMETER_RESOLUTION,//4.0f/1024.0f,
        .power      = ACCELEROMETER_POWER,//130.0f/1000.0f,
        .minDelay   = ACCELEROMETER_MINDELAY,
    .maxDelay   = 1000000,
        .reserved   = {}
    },
#endif
```

MTK Sensor Hub侧驱动框架



MTK Sensor Hub侧驱动移植步骤

➢使能SCP

- project config:
  Path: device/amt/amt6799_evb_n/ProjectConfig.mk
  MTK_TINYSYS_SCP_SUPPORT=yes

- kernel config:
  Path: kernel-4.4/arch/arm64/configs/amt6799_evb_n_defconfig
  CONFIG_MTK_TINYSYS_SCP_SUPPORT=y

- lk config
  Path:
vendor/mediatek/proprietary/bootable/bootloader/lk/project/amt6799_evb_n.mk
  MTK_TINYSYS_SCP_SUPPORT = yes

MTK Sensor Hub侧驱动移植步骤

➢添加和配置CHRE sensor驱动

Step 1:
Path:vendor/mediatek/proprietary/tinysys/freertos/source/middleware/contexthub/MEMS_Driver/accGyro/lsm6ds3c.c

Step 2:
Path:vendor/mediatek/proprietary/tinysys/freertos/source/project/CM4_A/mt6799/amt6799_evb_n/ProjectConfig.mk

```
CFG_LSM6DS3C_SUPPORT = yes
```

Step 3:
Path:vendor/mediatek/proprietary/tinysys/freertos/source/project/CM4_A/mt6799/platform/feature_config/chre.mk

```
ifeq ($(CFG_LSM6DS3C_SUPPORT),yes)
C_FILES  += $(SENDRV_DIR)/accGyro/lsm6ds3c.c
endif
```

MTK Sensor Hub侧驱动移植步骤

➢添加和配置CHRE sensor驱动

Step 4:
Path:vendor/mediatek/proprietary/tinysys/freertos/source/project/CM4_A/mt6799/amt6799_evb_n/cust/accGyro/cust_accGyro.c

```
#ifdef CFG_LSM6DS3C_SUPPORT
    {
        .name = "lsm6ds3c",
        .i2c_num = 1,
        .direction = 4,
        .i2c_addr = {0x6A, 0},
        .eint_num = 10,
    },
#endif
```

MTK Sensor Hub侧驱动移植步骤

➢编译SCP

Step 1:
$ source buid/envsetup.sh

Step 2:
$ lunch full_amt6799_evb_n-userdebug

Step 3:
$ ./vendor/mediatek/proprietary/tinysys/freertos/source/tools/build_tinysys.sh

Step 4:
img path: out/target/product/amt6799_evb_n/tinysys-scp.bin. Only need to update tinysys-scp.bin to EVB by flash tool.