

《嵌入式系统原理与实践》作业

10213903403 岳锦鹏

10225001410 朱宇笑

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目录

第七次实验
端口修改
代码修改
实验结果

第七次实验

端口修改

代码修改

实验结果

端口设置如图。

STM32CubeMX exp7.ioc: STM32G473RCTx

File Window Help Hello Yuxiao

Home STM32G473RCTx exp7.ioc - Pinout & Configuration GENERATE CODE

Pinout & Configuration Clock Configuration Project Manager Tools

Software Packs Pinout

GPIO Mode and Configuration

Configuration

Group By Peripherals

GPIO RCC SYS TIM

Search Signals Search (Ctrl+F) Show only Modified Pins

Pin No.	Signal on	GPIO out.	GPIO mode	GPIO Pul.	Maximum	Fast Mode	User Label	Modified
PA0	n/a	High	Output P...	Pull-up	Low	n/a	SegLedD...	<input checked="" type="checkbox"/>
PA1	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA2	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA3	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA4	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA5	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA6	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PA7	n/a	High	Output P...	Pull-up	Low	n/a		<input checked="" type="checkbox"/>
PB0	n/a	n/a	Input mode	Pull-up	n/a	n/a	KeyLine	<input checked="" type="checkbox"/>
PB1	n/a	n/a	Input mode	Pull-up	n/a	n/a		<input checked="" type="checkbox"/>
PB2	n/a	n/a	Input mode	Pull-up	n/a	n/a		<input checked="" type="checkbox"/>
PB3	n/a	n/a	Input mode	Pull-up	n/a	n/a		<input checked="" type="checkbox"/>

Select Pins from table to configure them. Multiple selection is Allowed.

Pinout view System view

STM32G473RCTx LQFP64

第七次实验

端口修改
代码修改
实验结果

添加 tim.h:

```
20  /* Define to prevent recursive inclusion -----*/
21  #ifndef __TIM_H__
22  #define __TIM_H__
23
24  #ifdef __cplusplus
25  extern "C" {
26  #endif
27
28  /* Includes -----*/
29  #include "main.h"
30
31  /* USER CODE BEGIN Includes */
32
33  /* USER CODE END Includes */
34
35  extern TIM_HandleTypeDef htim3;
36
37  extern TIM_HandleTypeDef htim4;
38
39  /* USER CODE BEGIN Private defines */
40
41  /* USER CODE END Private defines */
42
43  void MX_TIM3_Init(void);
44  void MX_TIM4_Init(void);
45
46  void HAL_TIM_MspPostInit(TIM_HandleTypeDef *htim);
47
48  /* USER CODE BEGIN Prototypes */
49
50  /* USER CODE END Prototypes */
51
52  #ifdef __cplusplus
53  }
54  #endif
55
56  #endif /* __TIM_H__ */
```

添加 tim.c:

```
20  /* Includes -----*/
21  #include "tim.h"
22
23  /* USER CODE BEGIN 0 */
24
25  /* USER CODE END 0 */
26
27  TIM_HandleTypeDef htim3;
28  TIM_HandleTypeDef htim4;
29
30  /* TIM3 init function */
31  void MX_TIM3_Init(void)
32  {
33
34      /* USER CODE BEGIN TIM3_Init 0 */
35
```

```
36  /* USER CODE END TIM3_Init 0 */
37
38  TIM_ClockConfigTypeDef sClockSourceConfig = {0};
39  TIM_MasterConfigTypeDef sMasterConfig = {0};
40
41  /* USER CODE BEGIN TIM3_Init 1 */
42
43  /* USER CODE END TIM3_Init 1 */
44  htim3.Instance = TIM3;
45  htim3.Init.Prescaler = 0;
46  htim3.Init.CounterMode =
↳ TIM_COUNTERMODE_CENTERALIGNED1;
47  htim3.Init.Period = 9;
48  htim3.Init.ClockDivision = TIM_CLOCKDIVISION_DIV1;
49  htim3.Init.AutoReloadPreload =
↳ TIM_AUTORELOAD_PRELOAD_ENABLE;
```

添加 tim.c:

```

58     if (HAL_TIM_ConfigClockSource(&htim3,          70     /* USER CODE END TIM3_Init 2 */
↪     &sClockSourceConfig) != HAL_OK)              71
59     {                                             72     }
60     Error_Handler();                             73     /* TIM4 init function */
61     }                                             74     void MX_TIM4_Init(void)
62     sMasterConfig.MasterOutputTrigger = TIM_TRGO_RESET; 75     {
63     sMasterConfig.MasterSlaveMode =              76
↪     TIM_MASTERSLAVEMODE_DISABLE;                77     /* USER CODE BEGIN TIM4_Init 0 */
64     if (HAL_TIMEx_MasterConfigSynchronization(&htim3, 78
↪     &sMasterConfig) != HAL_OK)                  79     /* USER CODE END TIM4_Init 0 */
65     {                                             80
66     Error_Handler();                             81     TIM_ClockConfigTypeDef sClockSourceConfig = {0};
67     }                                             82     TIM_MasterConfigTypeDef sMasterConfig = {0};
68     /* USER CODE BEGIN TIM3_Init 2 */           83     TIM_OC_InitTypeDef sConfigOC = {0};
69

```


添加 tim.c:

```

85      /* USER CODE BEGIN TIM4_Init 1 */           106      }
86                                                    107      sMasterConfig.MasterOutputTrigger = TIM_TRGO_RESET;
87      /* USER CODE END TIM4_Init 1 */           108      sMasterConfig.MasterSlaveMode =
88      htim4.Instance = TIM4;                     109      ↪ TIM_MASTERSLAVEMODE_DISABLE;
89      htim4.Init.Prescaler = 170-1;              110      if (HAL_TIMEx_MasterConfigSynchronization(&htim4,
90      htim4.Init.CounterMode = TIM_COUNTERMODE_UP; 111      ↪ &sMasterConfig) != HAL_OK)
91      htim4.Init.Period = 99;                    112      {
92      htim4.Init.ClockDivision = TIM_CLOCKDIVISION_DIV1; 113      Error_Handler();
93      htim4.Init.AutoReloadPreload =             114      }
94      ↪ TIM_AUTORELOAD_PRELOAD_ENABLE;           115      sConfigOC.OCMode = TIM_OC_MODE_PWM1;
95      if (HAL_TIM_Base_Init(&htim4) != HAL_OK)  116      sConfigOC.Pulse = 50;
96      {                                           117      sConfigOC.OCpolarity = TIM_OCPOLARITY_HIGH;
97      Error_Handler();                            118      sConfigOC.OCFastMode = TIM_OCFAST_DISABLE;
98      }                                           119      if (HAL_TIM_PWM_ConfigChannel(&htim4, &sConfigOC,
99      sClockSourceConfig.ClockSource =           120      ↪ TIM_CHANNEL_1) != HAL_OK)
100      ↪ TIM_CLOCKSOURCE_INTERNAL;                 121      {
101      if (HAL_TIM_ConfigClockSource(&htim4,     122      Error_Handler();
102      ↪ &sClockSourceConfig) != HAL_OK)          123      }
103      {                                           124      /* USER CODE BEGIN TIM4_Init 2 */
104      Error_Handler();                            125      /* USER CODE END TIM4_Init 2 */
105      }                                           126      HAL_TIM_MspPostInit(&htim4);
                                                    }

```

添加 tim.c:

```

128 void HAL_TIM_Base_MspInit(TIM_HandleTypeDef*           149
↳ tim_baseHandle)                                     150
129 {                                                    151
130                                                       152
131     GPIO_InitTypeDef GPIO_InitStruct = {0};          153
132     if(tim_baseHandle->Instance==TIM3)                154
133     {                                                  155
134         /* USER CODE BEGIN TIM3_MspInit 0 */        156
135                                                       157
136         /* USER CODE END TIM3_MspInit 0 */          158
137         /* TIM3 clock enable */                      159
138         __HAL_RCC_TIM3_CLK_ENABLE();                 160
139                                                       161
140         __HAL_RCC_GPIOC_CLK_ENABLE();                162
141         /**TIM3 GPIO Configuration                  163
142         PD2      -----> TIM3_ETR                  164
143         */                                             165
144         GPIO_InitStruct.Pin = GPIO_PIN_2;            166
145         GPIO_InitStruct.Mode = GPIO_MODE_AF_PP;      167
146         GPIO_InitStruct.Pull = GPIO_NOPULL;          168
147         GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW; 169
148         GPIO_InitStruct.Alternate = GPIO_AF2_TIM3;   170
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添加 tim.c:

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170 void HAL_TIM_MspPostInit(TIM_HandleTypeDef* timHandle)84
171 { 185
172 186
173     GPIO_InitTypeDef GPIO_InitStruct = {0}; 187
174     if(timHandle->Instance==TIM4) 188
175     { 189
176         /* USER CODE BEGIN TIM4_MspPostInit 0 */ 190
177 191
178         /* USER CODE END TIM4_MspPostInit 0 */ 192
179 193
180         __HAL_RCC_GPIOA_CLK_ENABLE(); 194
181         /**TIM4 GPIO Configuration 195
182         PA11 -----> TIM4_CH1 196
183         */ 196
184
185         GPIO_InitStruct.Pin = GPIO_PIN_11;
186         GPIO_InitStruct.Mode = GPIO_MODE_AF_PP;
187         GPIO_InitStruct.Pull = GPIO_NOPULL;
188         GPIO_InitStruct.Speed = GPIO_SPEED_FREQ_LOW;
189         GPIO_InitStruct.Alternate = GPIO_AF10_TIM4;
190         HAL_GPIO_Init(GPIOA, &GPIO_InitStruct);
191
192         /* USER CODE BEGIN TIM4_MspPostInit 1 */
193
194         /* USER CODE END TIM4_MspPostInit 1 */
195     }
196 }
```

添加 tim.c:

```

198 void HAL_TIM_Base_MspDeInit(TIM_HandleTypeDef*      215
↳ tim_baseHandle)                                  216
{                                                    217
219                                                    218
200                                                    219
201 if(tim_baseHandle->Instance==TIM3)                220
202 {                                                    221
203 /* USER CODE BEGIN TIM3_MspDeInit 0 */          222
204                                                    223
205 /* USER CODE END TIM3_MspDeInit 0 */            224
206 /* Peripheral clock disable */                   225
207 __HAL_RCC_TIM3_CLK_DISABLE();                    226
208                                                    227
209 /**TIM3 GPIO Configuration                        228
210 PD2 -----> TIM3_ETR                             229
211 */                                                 230
212 HAL_GPIO_DeInit(GPIOD, GPIO_PIN_2);              231
213                                                    }
214 /* TIM3 interrupt Deinit */

```

main.c:

```
25  /* USER CODE BEGIN Includes */
26  #include "variable.h"
27  #include "directkey.h"
28  #include "MatrixKey.h"
29  #include "SegLed.h"
30  /* USER CODE END Includes */

49  /* USER CODE BEGIN PV */
50  stSysTickTimer sSysTickTimer = {
51     0, 0, 0, 0
52 };
53  uint8_t tempValue;

54  structTime stTime = {
55     .mSecond = 50,
56     .mMinute = 45,
57     .mHour = 8,
58     .mTimeCount = 0,
59     .bSecondIsOk = 0,
60     .mTenMilCount = 0,
61     .bTenMilIsOk = 0
62 };
63  /* USER CODE END PV */

65  /* Private function prototypes -----*/
66  void SystemClock_Config(void);
```

main.c:

```

76  /**                                93
77   * @brief The application entry point. 94   /* USER CODE END Init */
78   * @retval int                        95
79   */                                    96   /* Configure the system clock */
80  int main(void)                        97  SystemClock_Config();
81  {                                      98
82                                          99   /* USER CODE BEGIN SysInit */
83   /* USER CODE BEGIN 1 */              100
84   uint8_t KeyValue = 0;                101   /* USER CODE END SysInit */
85   /* USER CODE END 1 */                102
86                                          103   /* Initialize all configured peripherals */
87   /* MCU Configuration-----*/        104  MX_GPIO_Init();
88                                          105  MX_TIM3_Init();
89   /* Reset of all peripherals, Initializes the Flash 106  /* USER CODE BEGIN 2 */
   ↪ interface and the Systick. */      107  // FlashLeds_GPIO_Port->ODR &= 0xff01;
90  HAL_Init();                            108  HAL_TIM_Base_Start_IT(&htim3);
91                                          109  TimeToBuff(&stTime);
92   /* USER CODE BEGIN Init */          110  /* USER CODE END 2 */

```

main.c:

```

112  /* Infinite loop */
113  /* USER CODE BEGIN WHILE */
114  while (1)
115  {
116      /* USER CODE END WHILE */
117
118      /* USER CODE BEGIN 3 */
119      if (stTime.bTenMilIsOk) {
120          stTime.bTenMilIsOk = 0;
121      }
122      if (stTime.bSecondIsOk) {
123          stTime.bSecondIsOk = 0;
124          if (++stTime.mSecond >= 60) {
125              stTime.mSecond = 0;
126              if (++stTime.mMinute >= 60) {
127                  stTime.mMinute = 0;
128                  if (++stTime.mHour >= 24) {
129                      stTime.mHour = 0;
130                  }
131              }
132          }
133          TimeToBuff(&stTime);
134      }
135      if (sSysTickTimer.bTenMilSecOk) {
136          sSysTickTimer.bTenMilSecOk = 0;
137          KeyValue = MatrixKeyScan();
138          if (KeyValue != NO_KEY) {
139              for (int i = 0; i < 16; i++) {
140                  if (KeyValue == KeyTable[i]) {
141                      tempValue = i;
142                  }
143              }
144              // DispToBuff(tempValue);
145          }
146      }
147      if (sSysTickTimer.bTimeOk) {
148          sSysTickTimer.bTimeOk = 0;
149          // TimeToBuff();
150          HAL_GPIO_TogglePin(LED_GPIO_Port, LED_Pin);
151      }
152  }
153  /* USER CODE END 3 */
154  }

```

第七次实验

端口修改
代码修改
实验结果

数码管显示 08-45-50，循环闪烁，逻辑与正常定时器相同，但时间变化很慢。



完整视频可以查看：

https://gitea.librastalker.top/423A35C7/STM32CubeMX-Keil_uVision5