Busan Software Meister High School

MICROPROCESSOR

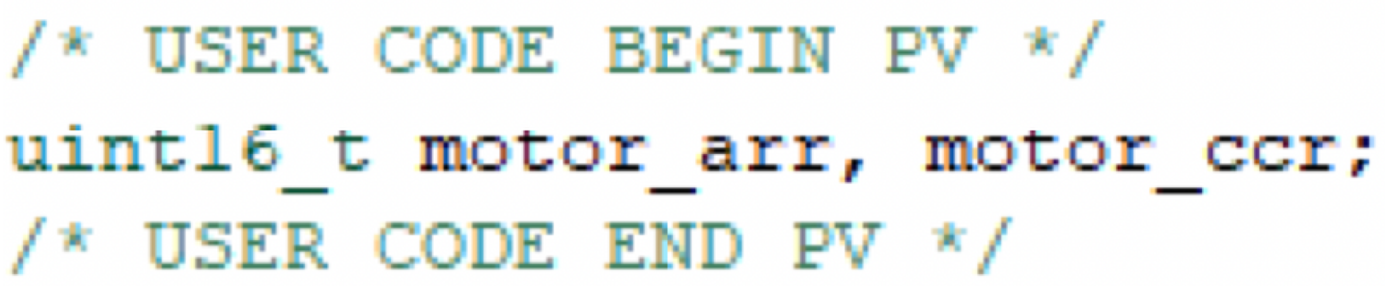
2309 양유빈

20231128 마이크로프로세서

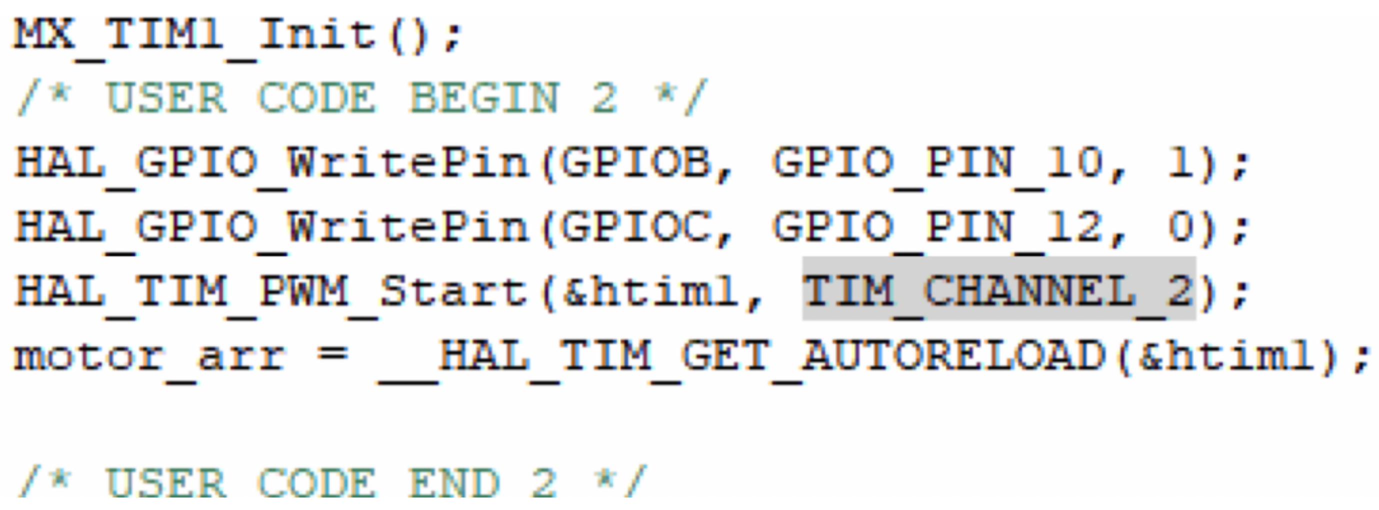
PWM으로 모터 속도 제어

Motor speed control with PWM

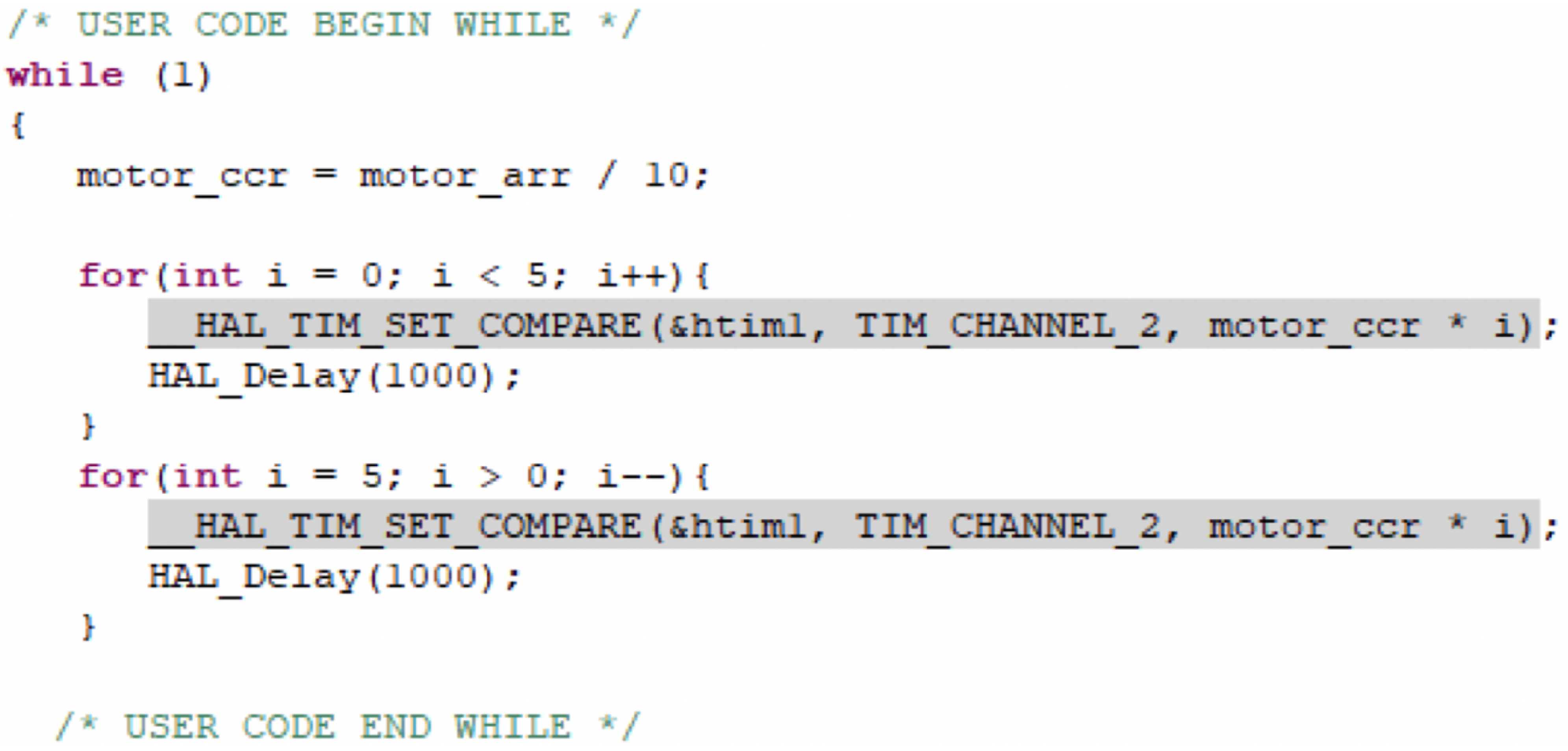
- 5V DC 모터 B_OUT1, B_OUT2에 연결, 타이머의 PWM(PA9) 기능 이용하여 모터의 속도가 증가하다가 감소하도록 프로그래밍
    - 정회전 : BIN1(PB10) == 1, BIN2(PC12) == 0
    - TIM1_CHANNEL2 : Clock = 72MHz, PSC = 0, Counter = 65535, Pulse = 0
    - PWM의 Pulse(Duty Cycle)값을 1초마다 10%씩 증감(최대 50%)



```
/* USER CODE BEGIN PV */
uint16_t motor_arr, motor_ccr;
/* USER CODE END PV */
```



```
MX_TIM1_Init();
/* USER CODE BEGIN 2 */
HAL_GPIO_WritePin(GPIOB, GPIO_PIN_10, 1);
HAL_GPIO_WritePin(GPIOC, GPIO_PIN_12, 0);
HAL_TIM_PWM_Start(&htim1, TIM_CHANNEL_2);
motor_arr = __HAL_TIM_GET_AUTORELOAD(&htim1);

/* USER CODE END 2 */
```



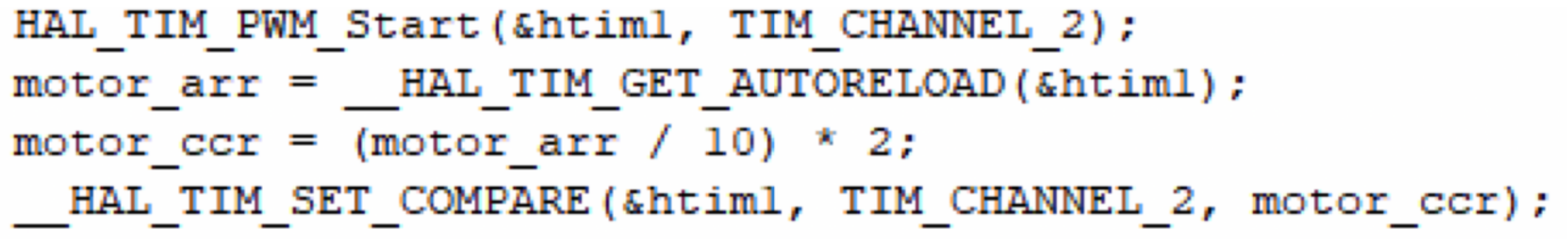
```
/* USER CODE BEGIN WHILE */
while (1)
{
   motor_ccr = motor_arr / 10;

   for(int i = 0; i < 5; i++){
      __HAL_TIM_SET_COMPARE(&htim1, TIM_CHANNEL_2, motor_ccr * i);
      HAL_Delay(1000);
   }
   for(int i = 5; i > 0; i--){
      __HAL_TIM_SET_COMPARE(&htim1, TIM_CHANNEL_2, motor_ccr * i);
      HAL_Delay(1000);
   }

 /* USER CODE END WHILE */
```

SW로 모터 회전 방향 제어

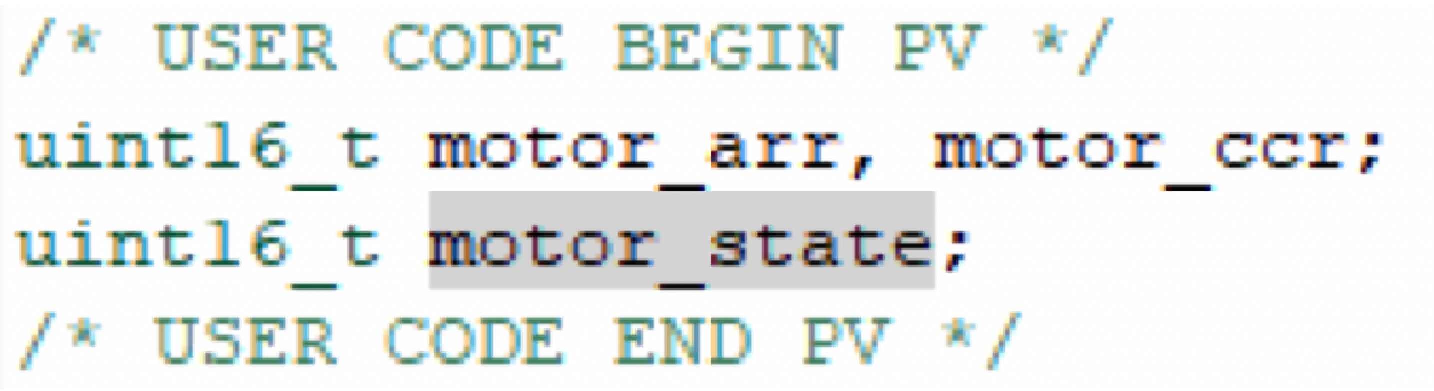
Control motor rotation direction with SW

- 5V DC 모터 B_OUT1, B_OUT2에 연결, SW1(PD2)을 누르면 정방향 회전, SW2(PA4)를 누르면 역방향 회전하도록 프로그래밍
  - 정회전 : BIN1(PB10) == 1, BIN2(PC12) == 0
  - 역회전 : BIN1(PB10) == 0, BIN2(PC12) == 1
  - TIM1_CHANNEL1 : Clock = 72MHz, PSC = 0, Counter = 65535, Pulse = 0
  - Duty Cycle은 20%로 유지

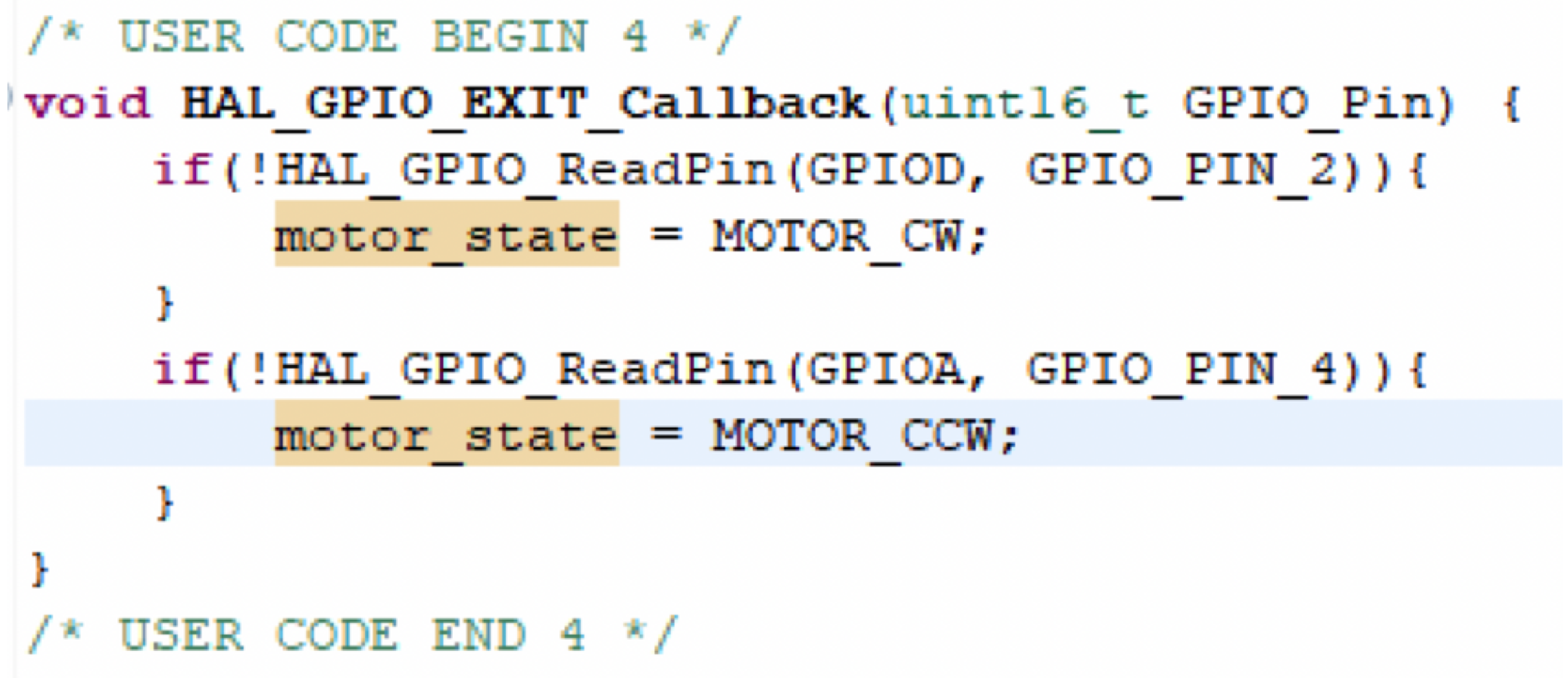
/* USER CODE BEGIN 2 */



```
HAL_TIM_PWM_Start(&htim1, TIM_CHANNEL_2);
motor_arr = __HAL_TIM_GET_AUTORELOAD(&htim1);
motor_ccr = (motor_arr / 10) * 2;
__HAL_TIM_SET_COMPARE(&htim1, TIM_CHANNEL_2, motor_ccr);
```



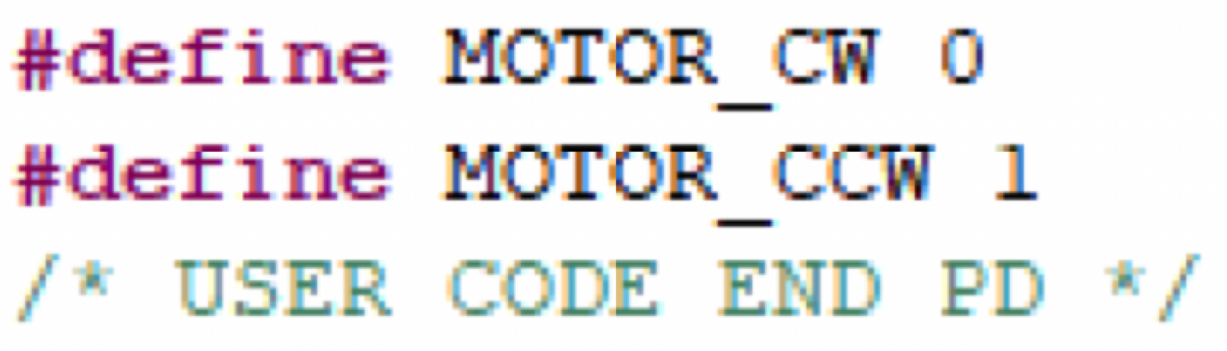
```
/* USER CODE BEGIN PV */
uint16_t motor_arr, motor_ccr;
uint16_t motor_state;
/* USER CODE END PV */
```



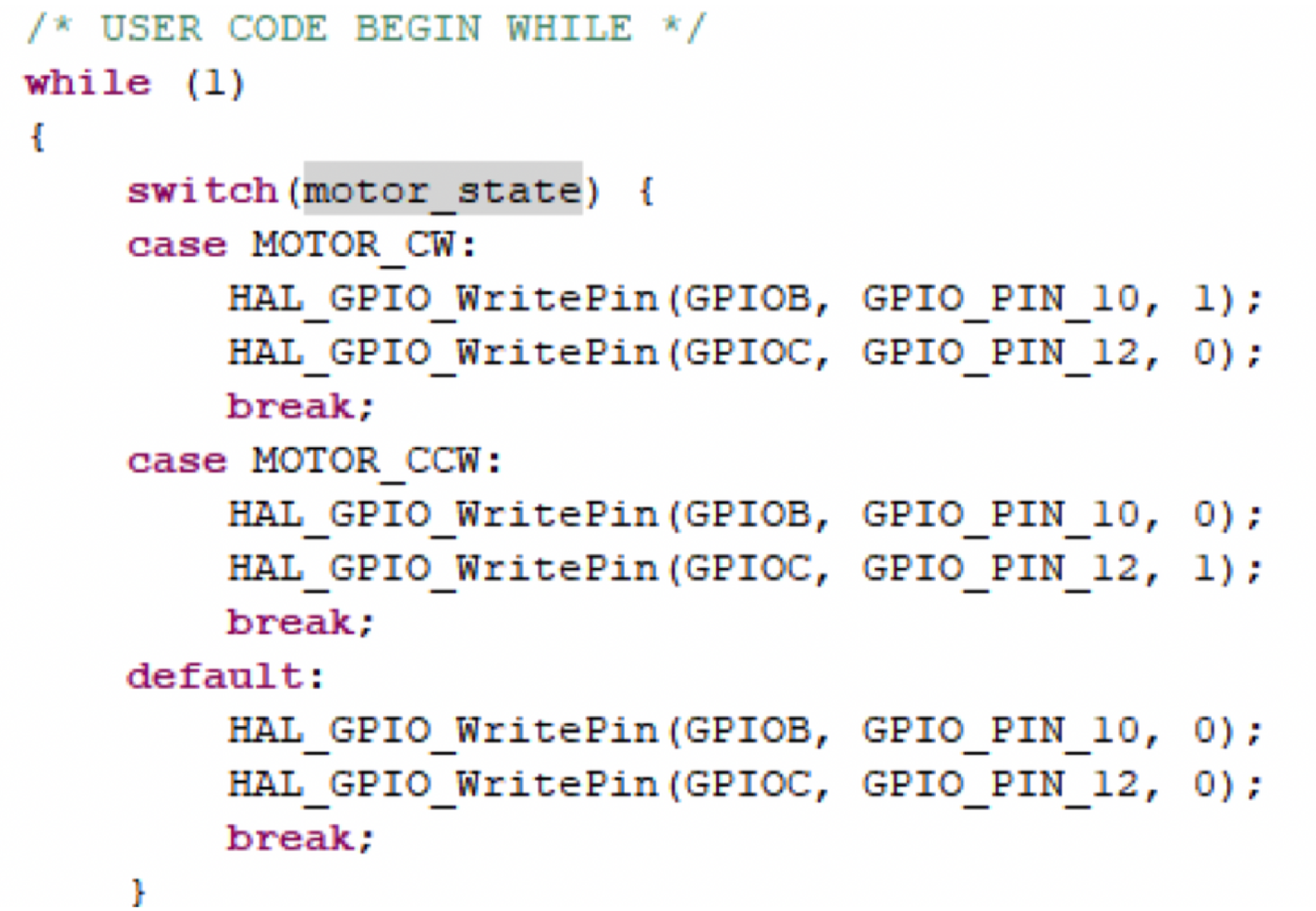
```
/* USER CODE BEGIN 4 */
void HAL_GPIO_EXIT_Callback(uint16_t GPIO_Pin) {
    if(!HAL_GPIO_ReadPin(GPIOD, GPIO_PIN_2)){
        motor_state = MOTOR_CW;
    }
    if(!HAL_GPIO_ReadPin(GPIOA, GPIO_PIN_4)){
        motor_state = MOTOR_CCW;
    }
}
/* USER CODE END 4 */
```

SW로 모터 회전 방향 제어

Control motor rotation direction with SW



```c
#define MOTOR_CW 0
#define MOTOR_CCW 1
/* USER CODE END PD */
```



```c
/* USER CODE BEGIN WHILE */
while (1)
{
    switch(motor_state) {
    case MOTOR_CW:
        HAL_GPIO_WritePin(GPIOB, GPIO_PIN_10, 1);
        HAL_GPIO_WritePin(GPIOC, GPIO_PIN_12, 0);
        break;
    case MOTOR_CCW:
        HAL_GPIO_WritePin(GPIOB, GPIO_PIN_10, 0);
        HAL_GPIO_WritePin(GPIOC, GPIO_PIN_12, 1);
        break;
    default:
        HAL_GPIO_WritePin(GPIOB, GPIO_PIN_10, 0);
        HAL_GPIO_WritePin(GPIOC, GPIO_PIN_12, 0);
        break;
    }
```