CEC 322

Lab 3: Joystick LED with CubeMX and USART with HAL
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Introduction

The purpose of this lab was to convert our previous code to no longer use HAL, which was a simple change that did not take much time. Afterwards, we needed to be able to print statements to a PuTTY console, which was set up using the USART functionality of the Discovery board and CubeMX. This way, we could view the debug print out without using Keil.

Code

The essentially has the same function and operates the same as the code from the previous lab, where the left click on the joystick keeps the red LED on, right is the green LED, up is both on, down is both off and center click is both toggling on and off.

The difference was that instead of using the built in HAL functions we made use of the bitwise operations of & (and), | (or), ~ (not), and ^ (xor), which directly affected and reacted to the bit value of the designated pins for joystick input and LED output. The modified code is below.

```
130
131     /* USER CODE BEGIN 3 */
132
133     if ((GPIOA -> IDR & JOY_L_Pin) == JOY_L_Pin) {          //Left Button - Red LED
134       printf("Left %s\r\n", baseText);
135
136       GPIOB -> ODR |= LED_R_Pin;
137       GPIOE -> ODR &= ~LED_G_Pin;
138       HAL_Delay(2000);
139
140     } else if ((GPIOA -> IDR & JOY_R_Pin) == JOY_R_Pin) {   //Right Button - Green LED
141       printf("Right %s\r\n", baseText);
142
143       GPIOB -> ODR &= ~LED_R_Pin;
144       GPIOE -> ODR |= LED_G_Pin;
145       HAL_Delay(2000);
146
147     } else if ((GPIOA -> IDR & JOY_U_Pin) == JOY_U_Pin) {   //Up Button - Both LEDs
148       printf("Up %s\r\n", baseText);
149
150       GPIOB -> ODR |= LED_R_Pin;
151       GPIOE -> ODR |= LED_G_Pin;
152       HAL_Delay(2000);
153     } else if ((GPIOA -> IDR & JOY_D_Pin) == JOY_D_Pin) {   //Down Button - Both Off
154       printf("Down %s\r\n", baseText);
155
156       GPIOB -> ODR &= ~LED_R_Pin;
157       GPIOE -> ODR &= ~LED_G_Pin;
158       HAL_Delay(2000);
159     } else if ((GPIOA -> IDR & JOY_C_Pin) == JOY_C_Pin) {   //Center Button - Blinking together
160       printf("Center %s\r\n", baseText);
161
162       GPIOB -> ODR |= LED_R_Pin;
163       GPIOE -> ODR |= LED_G_Pin;
164       for(int i = 0; i < 10; i++) {
165         HAL_Delay(200);
166         GPIOB -> ODR ^= LED_R_Pin;
167         GPIOE -> ODR ^= LED_G_Pin;
168       }
169
170     } else { //NONE
171       GPIOB -> ODR |= LED_R_Pin;                            //None - Alternative blink
172       GPIOE -> ODR &= ~LED_G_Pin;
173
174       HAL_Delay(100);
175       GPIOB -> ODR ^= LED_R_Pin;
176       GPIOE -> ODR ^= LED_G_Pin;
177       HAL_Delay(100);
178
179     }
180   }
181   /* USER CODE END 3 */
182 }
```

The lab also wanted the output (printf) statement to be outputted from the devices serial port and visible to PuTTy to do this we modified to pins in the board for USART and added in the two below code segments to modify the built in printf command to print to the PuTTy window and the following outputs are what is displayed in the PuTTy window

```
79  /* USER CODE BEGIN PFP */
80 #ifdef __GNUC__
81  #define PUTCHAR_PROTOTYPE int __io_putchar(int ch)
82  #else
83  #define PUTCHAR_PROTOTYPE int fputc(int ch, FILE *f)
84 #endif /* __GNUC__ */
85  /* USER CODE END PFP */
```

```
312  /* USER CODE BEGIN 4 */
313 PUTCHAR_PROTOTYPE {
314    HAL_UART_Transmit(&huart2, (uint8_t *)&ch, 1, 0xFFFF);
315    return ch;
316 }
317  /* USER CODE END 4 */
```

```
Left key is just pressed by Cameron Stark and Oleksandr Hendrik
Down key is just pressed by Cameron Stark and Oleksandr Hendrik
Right key is just pressed by Cameron Stark and Oleksandr Hendrik
Up key is just pressed by Cameron Stark and Oleksandr Hendrik
Up key is just pressed by Cameron Stark and Oleksandr Hendrik
Center key is just pressed by Cameron Stark and Oleksandr Hendrik
```