MCU ASSINGMENT NO:-3

```
targetmcu - Duty_cycle/Core/Src/main.c - STM32CubeIDE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        o ×
 File Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Navigate Search Project Run Window Help

The Edit Source Refactor Run Window Help

The Edit Source Run Window Help

                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          Q | 128 | 128 存 123
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       □ 1½ % ½ • # 8 ° □
   Project Explorer □ □ 🧐 🥫 🗸 □ 🖟 main.c 🖟 *main.c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                □ 📴 Build Targets

✓ 

assign_4

    main.h
    hdfsdm1_channel1: DFSDM_Channel_HandleTypeDef

                                                                                                  102 SystemClock_Config();
                                                                                                              103
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ndtsom; channel; 1 DSDM_channel; Hai

hi2c; 12c/AndicliypeDef

hspi; CSP[HandlelTypeDef

hspi; SPLHandleTypeDef

html; TiM[HandleTypeDef

huart: UART; HandleTypeDef

huart: UART; HandleTypeDef

hpd; USB_OTG_FS: PCD_HandleTypeDef

hpd; USB_OTG_FS: PCD_HandleTypeDef
            /* USER CODE BEGIN SysInit */
              @ Core
            Drivers

Middlewares

Debug

assign_4.ioc
                                                                                                              105
                                                                                                                                      /* USER CODE END SysInit */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   -
                                                                                                              107
                                                                                                                                        /* Initialize all configured peripherals */
               assign_4.launch
STM32L475VGTX_FLASH.ld
                                                                                                                                        MX GPIO Init():
                                                                                                               109
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        MX_DFSDM1_Init();
                STM32L475VGTX RAM.Id

    □ Duty_cycle
    □ Binaries
    □ Simulation    □ Simula
                                                                                                                                        MX_I2C2_Init();
MX_QUADSPI_Init();
                                                                                                               111
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        # MX DESDM1 Init(void) : void
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        #* MX_DFSDM1_Init(void) : void

#$ MX_I2C2_Init(void) : void

#$ MX_QUADSPI_Init(void) : void

#$ MX_SPI3_Init(void) : void

#$ MX_USART1_UART_Init(void) : void
                                                                                                                                        MX_SPI3_Init();
MX_USART1_UART_Init();
                                                                                                                113
              v 🗁 Inc
                                                                                                                                        MX USART3 UART Init()
                     MX_USART3_UART_Init(void) : void
                                                                                                                                         MX_USB_OTG_FS_PCD_Init();

⇔

<sup>S</sup> MX USB OTG FS PCD Init(void): void

                           stm32l4xx it.h
                                                                                                               117
                                                                                                                                        MX_TIM2_Init();
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         + MX_TIM2_Init(void): void
main(void): int
main(void): int
SystemClock_Config(void): void
MX_DFSDM1_Init(void): void
MX_U2C2_Init(void): void
MX_QUADSPI_Init(void): void
                                                                                                                                                                                                   BEGIN 2 */
                        HAL_TIM_PWM_Start(&htim2, TIM_CHANNEL_1); // " this line added "
                                                                                                                                        /* USER CODE END 2 */
                                                                                                               121
                           syscalls.c

    MX_SPI3_Init(void) : void

                           sysmem.c
                                                                                                                                        /* Infinite loop */
                           system_stm32l4xx.c
                                                                                                               123

 S MX_TIM2_Init(void): void

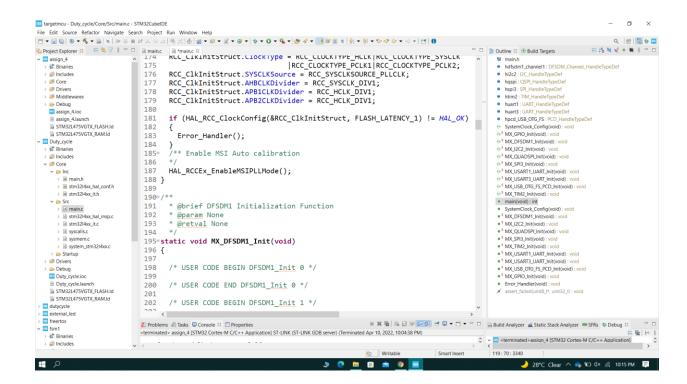
    Startup

                                                                                                                124
                                                                                                                                          /* USER CODE BEGIN WHILE */
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         • * MX USART1 UART Init(void) : void
        > ② Startup
> ③ Drivers
> ③ Drivers
> ② Debug
□ Duty_cycle.ioc
□ Duty_cycle.launch
□ STM32L475vGTX_FLASH.id
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         e S MX USART3 UART Init(void) : void
                                                                                                                                        while (1)

    MX_USB_OTG_FS_PCD_Init(void): void
    MX_GPIO_Init(void): void
    Error_Handler(void): void

                                                                                                                                        {
                                                                                                                                                /* USER CODE END WHILE */
                                                                                                               127
                                                                                                                                                /* USER CODE BEGIN 3 */
                STM32L475VGTX_RAM.Id
                                                                                                               129
        dutycycle
        external led
                                                                                                                                                                                                                                                                                                                                                      ■ 🗶 🍇 🖟 🔝 🥯 🔑 🗗 🗗 🕶 🕶 🕶 🗆 🔛 Build Analyzer 📠 Static Stack Analyzer 🗯 SFRs 🌣 Debug 🖾
                                                                                                           <terminated > assign_4 [STM32 Cortex-M C/C++ Application] ST-LINK (ST-LINK GDB server) (Terminated Apr 10, 2022, 10:04:38 PM)
            Binaries

Includes
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  119:70:3340
 # 2
                                                                                                                                                                                                                                                                                                      🤰 🤨 🛅 🖽 📦 🦠
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 🌙 28°C Clear ∧ 🐔 № 4× 🖟 10:15 PM 📮
```



```
targetmcu - Duty_cycle/Core/Src/main.c - STM32CubeIDE
                                                                                                                                                                                                                                                                                                                                                    пх
 File Edit Source Refactor Navigate Search Project Run Window Help
[ ] ▼ [ ] * ▼ ¶ * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] * [ ] *
                                                                                                                                                                                                                                                                                                                                            Q | 28 | 電本 🔟
□ □ B Outline □ ® Build Targets
                                                                                                                                                                                                                                                                                                                                □ ½ ½ ½ ° ¥ 8 □ □
                                                                                                                                                                                                                                                                          main.h
                                                              287
                                                                                                                                                                                                                                                                          hdfsdm1_channel1 : DFSDM_Channel_HandleTy

    hi2c2: I2C_HandleTypeDef

     > @ Includes
                                                              288
                                                                            /* USER CODE END QUADSPI_Init 1 */
                                                                                                                                                                                                                                                                          hqspi : QSPI_HandleTypeDef
                                                                            /* QUADSPI parameter configuration*/
                                                              289
    > 🐸 Drivers
                                                                                                                                                                                                                                                                          hspi3: SPI_HandleTypeDef
                                                                            hqspi.Instance = QUADSPI;
                                                              290
     > @ Middlewares
                                                                                                                                                                                                                                                                          htim2:TIM_HandleTypeDef
                                                                            hqspi.Init.ClockPrescaler = 2;
                                                              291

    huart1 : UART_HandleTypeDef

     > 🗁 Debug
                                                                            hqspi.Init.FifoThreshold = 4;
                                                              292
        assign_4.ioc

    huart3: UART HandleTypeDef

                                                                            hqspi.Init.SampleShifting = QSPI SAMPLE SHIFTING HALFCYCLE;

    hpcd_USB_OTG_FS : PCD_HandleTypeDet

                                                              293
        assign_4.launch
                                                                                                                                                                                                                                                                          \begin{tabular}{ll} $\dot{\oplus}$ & SystemClock\_Config(void): void \\ $\dot{\oplus}$ & MX\_GPIO\_Init(void): void \\ \end{tabular} 
        STM32I 475VGTX FLASH Id
                                                              294
                                                                            hqspi.Init.FlashSize = 23;
         STM32L475VGTX_RAM.Id
                                                                             hqspi.Init.ChipSelectHighTime = QSPI_CS_HIGH_TIME_1_CYCLE;
 hqspi.Init.ClockMode = QSPI_CLOCK_MODE_0;
                                                                                                                                                                                                                                                                          \ensuremath{\ensuremath{\,\div\,}^{\hspace{-.2em}\mathsf{S}}} MX_I2C2_Init(void) : void
                                                              297
                                                                            if (HAL_QSPI_Init(&hqspi) != HAL_OK)
    > 🔊 Includes
                                                                                                                                                                                                                                                                          #$ MX OUADSPI Init(void) : void
                                                              298
                                                                            {
        v 🗁 Inc
                                                              299
                                                                                 Error_Handler();
                                                                                                                                                                                                                                                                          # MX USART1 UART Init(void) : void
                                                                                                                                                                                                                                                                          ⊕ MX_USART3_UART_Init(void) : void
                                                              300
            > a stm32l4xx_hal_conf.h

⊕<sup>S</sup> MX_USB_OTG_FS_PCD_Init(void): void

                                                                            /* USER CODE BEGIN QUADSPI_Init 2 */
                                                              301
               stm32l4xx_it.h
                                                                                                                                                                                                                                                                          302
                                                                                                                                                                                                                                                                          main(void): int
                                                              303
                                                                            /* USER CODE END QUADSPI Init 2 */

    SystemClock_Config(void) : void
    MX_DFSDM1_Init(void) : void

            > 🖻 main.c
                                                              304
            > la stm32l4xx_hal_msp.c
               stm32I4xx_it.c
                                                                                                                                                                                                                                                                          • S MX_I2C2_Init(void) : void
• S MX_QUADSPI_Init(void) : void
                                                              305 }
            > @ syscalls.c
                                                               306
                                                                                                                                                                                                                                                                          • S MX_SPI3_Init(void) : void
• S MX_TIM2_Init(void) : void
                                                              307⊕/**
            > @ system_stm32l4xx.c
                                                              308
                                                                           * @brief SPI3 Initialization Function
         > 🗁 Startup
                                                                                                                                                                                                                                                                          • S MX USART1 UART Init(void) : void
                                                                           * @param None
                                                              309

    MX_USART3_UART_Init(void) : void

     > 🕮 Drivers
                                                                            * @retval None
     > 🍅 Debug
                                                              310

    S MX USB OTG FS PCD Init(void): void

        Duty_cycle.ioc
                                                                                                                                                                                                                                                                          • S MX_GPIO_Init(void) : void
                                                              311
       Duty_cycle.launch
STM32L475VGTX_FLASH.ld
                                                                                                                                                                                                                                                                          • Error_Handler(void) : void
                                                              312 static void MX_SPI3_Init(void)
                                                              313 {
        STM32L475VGTX RAM.Id
                                                              314
    dutycycle
   external led
                                                                                                                                                                                                 ■ 🗶 🐞 🔝 📝 🥬 🗗 🗗 🖻 🔻 🖺 🔻 🖺 🔻 🖺 🗎 Build Analyzer 🚊 Static Stack Analyzer 📟 SFRs 🎋 Debug 🛭
                                                             Problems  a Tasks □ Console ⋈ □ Properties
 ∨ 100 fsm1
                                                             <terminated> assign_4 [STM32 Cortex-M C/C++ Application] ST-LINK (ST-LINK GDB server) (Terminated Apr 10, 2022, 10:04:38 PM)
                                                                                                                                                                                                                                                                                                                                                      = % | i⇒ §
      119 - 70 - 3340
# p
                                                                                                                                                                                      🗎 🗈 💼 🦻
                                                                                                                                                                                                                                                                                         28°C Clear ^ 6 1□ 4× 6 10:16 PM
```

CODE: -

```
TIM_ClockConfigTypeDef sClockSourceConfig = {0};
TIM_MasterConfigTypeDef sMasterConfig = {0};
TIM_OC_InitTypeDef sConfigOC = {0};
```

```
/* USER CODE BEGIN TIM2 Init 1 */
/* USER CODE END TIM2 Init 1 */
htim2.Instance = TIM2;
htim2.Init.Prescaler = 32000;
htim2.Init.CounterMode = TIM COUNTERMODE UP;
htim2.Init.Period = 5000;
htim2.Init.ClockDivision = TIM CLOCKDIVISION DIV1;
htim2.Init.AutoReloadPreload = TIM AUTORELOAD PRELOAD ENABLE;
if (HAL TIM Base Init(&htim2) != HAL OK)
  Error Handler();
sClockSourceConfig.ClockSource = TIM CLOCKSOURCE INTERNAL;
if (HAL TIM ConfigClockSource(&htim2, &sClockSourceConfig) != HAL OK)
  Error Handler();
if (HAL TIM PWM Init(&htim2) != HAL OK)
 Error_Handler();
sMasterConfig.MasterOutputTrigger = TIM TRGO RESET;
sMasterConfig.MasterSlaveMode = TIM MASTERSLAVEMODE DISABLE;
if (HAL TIMEx MasterConfigSynchronization(&htim2, &sMasterConfig) !=
HAL OK)
 Error Handler();
sConfigOC.OCMode = TIM OCMODE PWM1;
sConfigOC.Pulse = 2000;
sConfigOC.OCPolarity = TIM OCPOLARITY HIGH;
sConfigOC.OCFastMode = TIM OCFAST DISABLE;
if (HAL TIM PWM ConfigChannel(&htim2, &sConfigOC, TIM CHANNEL 1) !=
HAL OK)
 Error_Handler();
```

```
/* USER CODE BEGIN TIM2 Init 2 */
/* USER CODE END TIM2 Init 2 */
 HAL TIM MspPostInit(&htim2);
}
/**
 * @brief USART1 Initialization Function
 * @param None
 * @retval None
static void MX USART1 UART Init(void)
/* USER CODE BEGIN USART1 Init 0 */
/* USER CODE END USART1 Init 0 */
 /* USER CODE BEGIN USART1 Init 1 */
 /* USER CODE END USART1 Init 1 */
 huart1.Instance = USART1;
 huart1.Init.BaudRate = 115200;
 huart1.Init.WordLength = UART WORDLENGTH 8B;
huart1.Init.StopBits = UART_STOPBITS_1;
 huart1.Init.Parity = UART PARITY NONE;
 huart1.Init.Mode = UART MODE TX RX;
 huart1.Init.HwFlowCtl = UART_HWCONTROL_NONE;
 huart1.Init.OverSampling = UART OVERSAMPLING 16;
 huart1.Init.OneBitSampling = UART ONE BIT SAMPLE DISABLE;
 huart1.AdvancedInit.AdvFeatureInit = UART ADVFEATURE NO INIT;
 if (HAL UART Init(&huart1) != HAL OK)
 {
  Error_Handler();
```

```
/* USER CODE BEGIN USART1_Init 2 */
/* USER CODE END USART1_Init 2 */
```

}

