LAB-11 REPORT

Subject: **Embedded Hardware Design**

Subject Code: **EL203**

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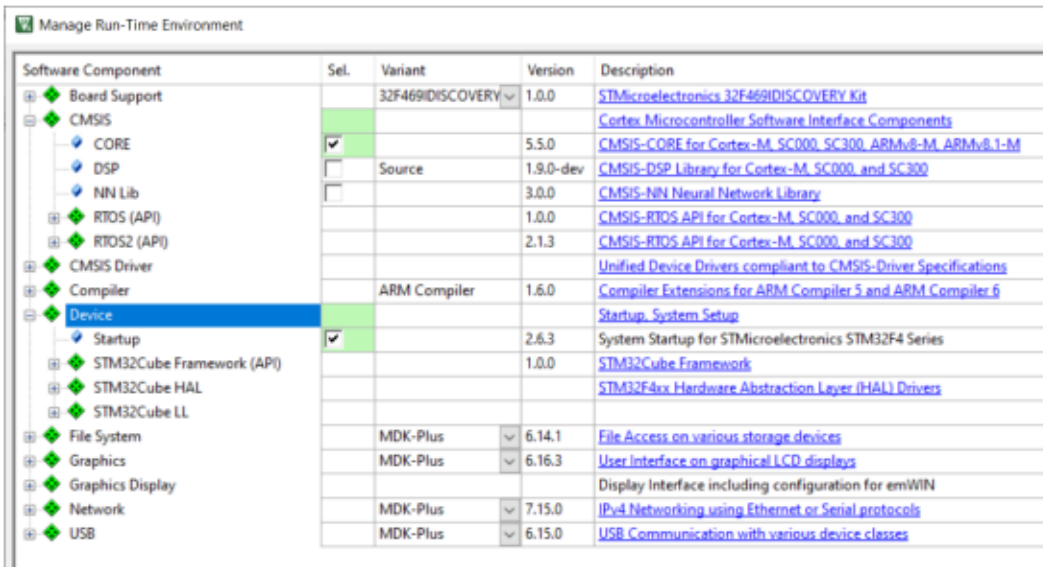
Objective: Analog-to-Digital driver development and PWM (Pulse-Width_modulation) Driver Development.

Method:

1) Creating a new project and setup configuration.
2) Select STM32F407VGTx in the search bar shown in the dialog box given below and then select it and click OK.
3) Now, tick the checkboxes against the following from the dialog box that appeared on the screen:
   CMSIS → CORE
   Device → Startup
4) Click on the Resolve button if any error occurs after ticking the checkboxes.
5) Click OK.

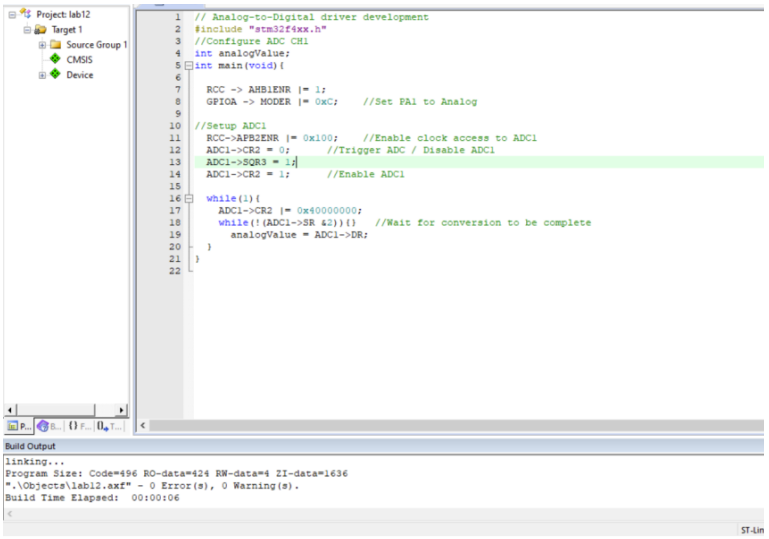


CODE:

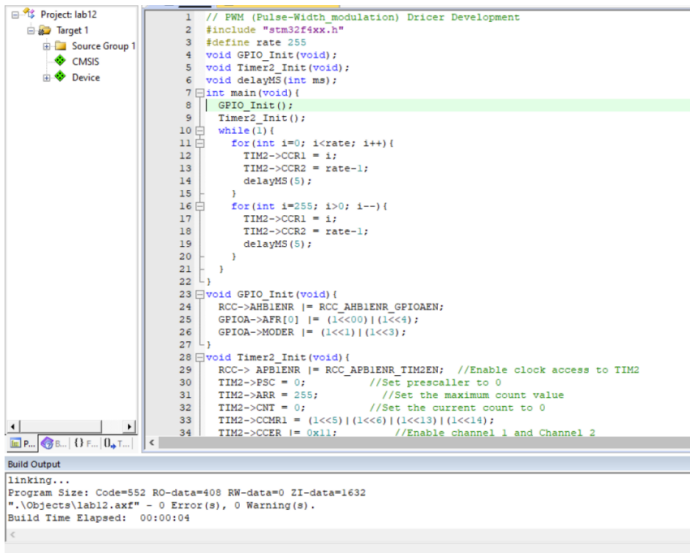
```
//Analog to digital driver developement
#include "stm32f4xx.h" //device header
int analogValue;
//configuring ADH CH1
int main(void){
  RCC->AHB1ENR |= 1;
  GPIOA->MODER |= 0xC; //Setup PA1 to analog
//Setup ADC1
  RCC->APB2ENR |= 0x100; //Enable clock address to ADC1
  ADC1->CR2 = 0; //TriggerADC1 /Disable ADC1
  ADC1->SQR3 = 1;
```

```
  ADC1->CR2 = 1; //Enable ADC1

   while(1){
      ADC1->CR2 |= 0x40000000; //start A-to-D conversion
      while(!(ADC1->SR & 2)){} //wait for conversion to be complete
      analogValue = ADC1->DR;
   }
}
//PWM(Pulse Width Modulation) driver developement
#include "stm32f4xx.h" //device header
#define rate 255
void GPIO_Init(void);
void Timer2_Init(void);
void delayMS (int ms);
int main(void){
   GPIO_Init();
   Timer2_Init();

   while(1){
      for(int i=0; i<rate; i++){
         TIM2->CCR1 = i;
         TIM1->CCR2 = rate-1;
         delayMS(5);
      }
      for(int i=255; i>0; i--){
         TIM2->CCR1 = i;
         TIM2->CCR2 = rate-1;
         delayMS(5);
      }
   }
}
void GPIO_Init(void){
   RCC->AHB1ENR |= RCC_AHB1ENR_GPIOAEN;
   GPIOA->AFR[0] |= (1<0)|(1<<4);
   GPIOA->MODER |= (1<<3)|(1<<4);
}
void Timer2_Init(void){
   RCC->AHB1ENR |= RCC_AHB1ENR_TIM2EN; //Enable clock access to TM2
   TIM2->PSC = 0; //Set prescaller to 0 ()
   TIM2->ARR = 255; //Set the maximum count value
   TIM2->CNT = 0; //set the current count
   TIM2->CCMR1 = (1<<5)|(1<<6)|(1<<13)|(1<<14); //configure the pins as PWM
   TIM2->CCER |= 0x11; //enable channel1 and channel2
   TIM2->CR1 = 1; //Enable timer
}
void delayMS (int ms) {
   int i;
   for (; ms>0 ; ms--) {
     for(i=0; i<3195; i++);
   }
}
```

Screenshot:



Build Screenshot above for Analog To digital Driver Development



PWM Driver Development