ex 1

DAC 10-bit

ref voltage 2.7 V

in = 260

output ?

$$V_{out} = V_{ref} \times \frac{n}{2^{10}-1} = 2.7 \times \frac{260}{1023} = 0.68v$$

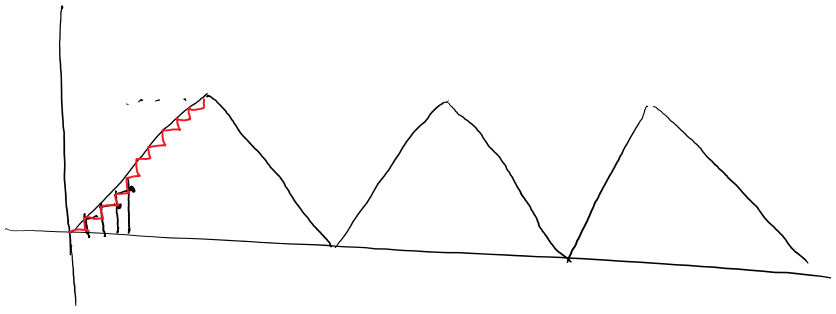
Ex 2

ADC 12 bit

ref 3.3 V

$V_{in} = 0.92$ V

$$\left\lceil \frac{V_{in}}{ref} \times (2^N - 1) \right\rceil = \left\lceil \frac{0.92}{3.3} \times 4095 \right\rceil = 1142$$



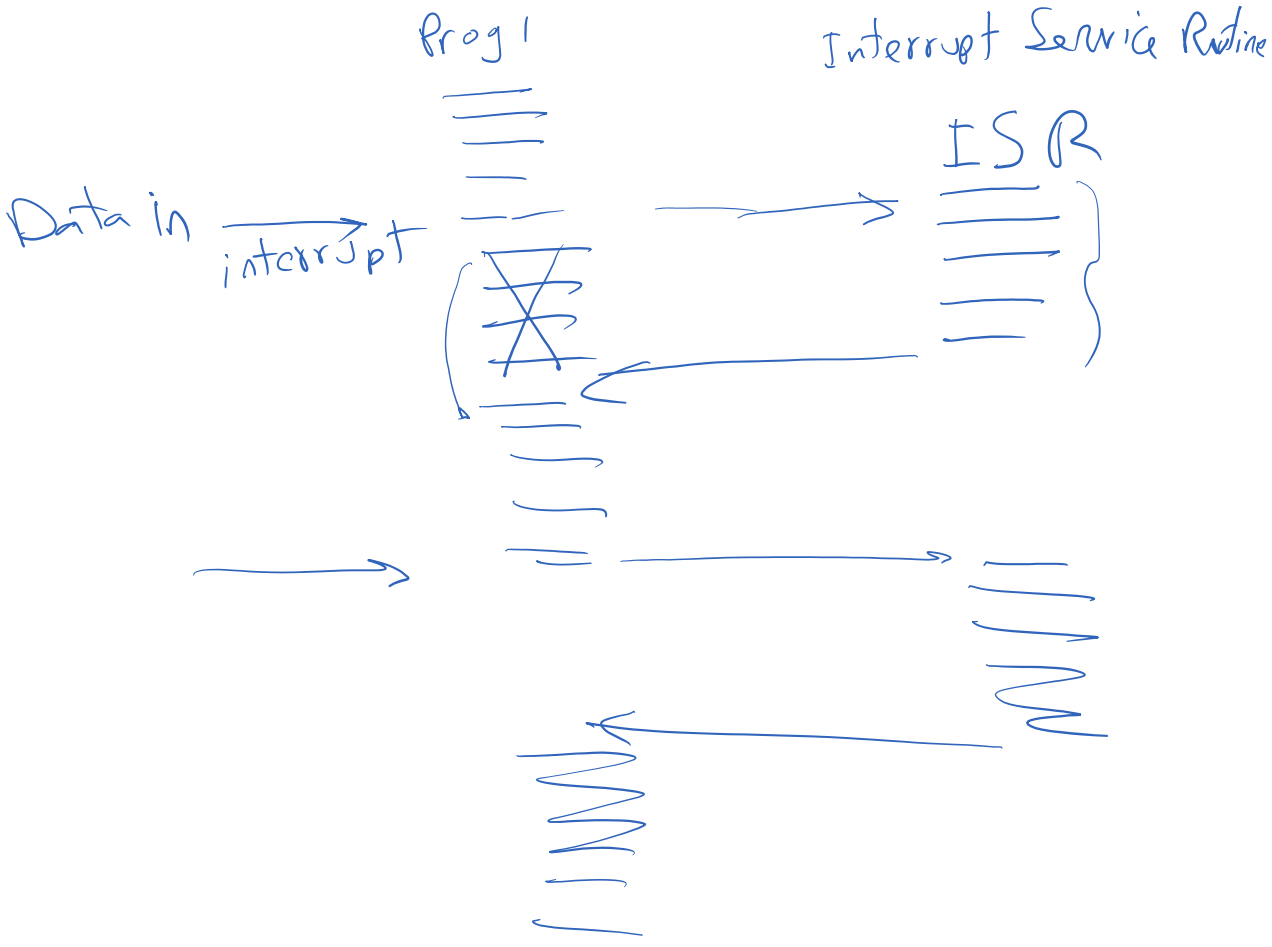
```
#include "mbed.h"
AnalogOut dac(PTE30)
int main() {
  while(1) {
    for(float i=0.0; i<=1.0; i+=0.0001){
      dac=i;
      wait(0.0001);
    }
    for(float j=1.0; j<=0.0; j-=0.0001){
      dac=j;
      wait(0.0001);
    }
  }
}
```

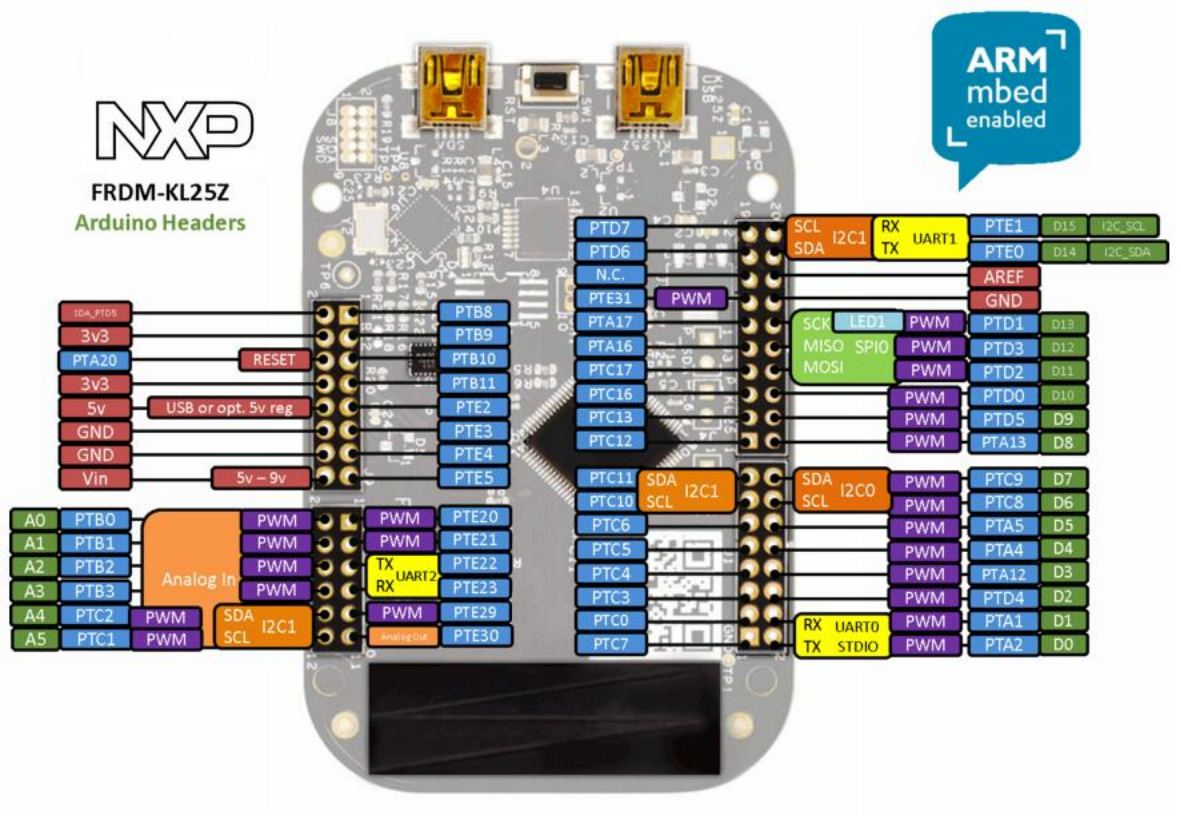
```
#include "mbed.h"
AnalogOut dac(PTE30);
AnalogIn adc(PTC1);
int main(){
  while(1){
    float analogvalue = adc;
```

```
    dac = analogValue;
  }
}
```

concurrency

Interrupt



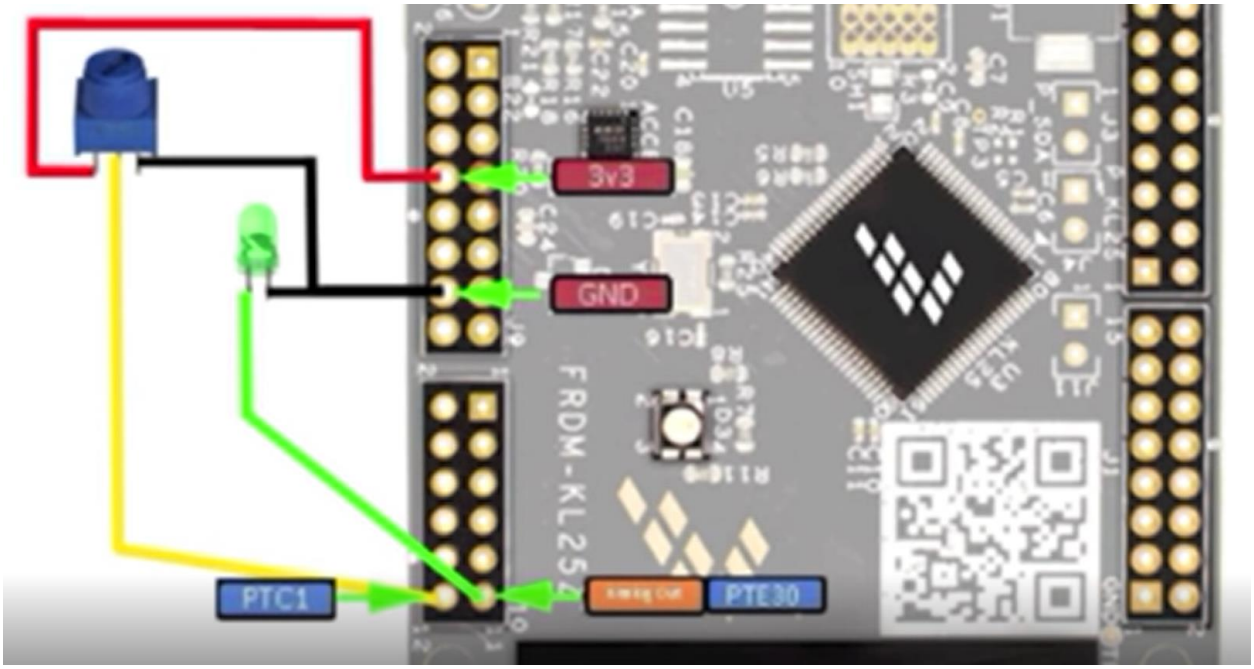


main.cpp

```
#include "mbed.h"

AnalogOut dac(PTE30);
AnalogIn adc(PTC1); //float analogValue = adc;  0 <=adc <= 1, where 0 means 0V and 1 means 3.3V

int main() {
    while(1) {
        //read in a voltage value from the adc
        float analogValue = adc;
        //spit out that voltage value to the dac
        dac = analogValue;
    }
}
```



main.cpp

```
#include "mbed.h"

AnalogOut dac(PTE30); // dac = 0.0f, 0 = 0V, 1.0f = 3.3V, 0.5f = 1.65V

int main() {
    while(1) {
        //increase the voltage steadily from 0V to 3.3V
        for (float i = 0.0f; i <= 1.0f; i += 0.0001f) {
            dac = i;
            wait(0.0001);
        }
        //decrease the voltage steadily from 3.3V to 0V
        for (float j = 1.0f; j >= 0.0f; j -= 0.0001f) {
            dac = j;
            wait(0.0001);
        }
    }
}
```