

ACD time: 129 microseconds

LCD time: 5314 milliseconds

| Position | Analog Input | ADC Sample |
|----------|--------------|------------|
| 10 | 0.28 V | 130 |
| 30 | 0.80 V | 845 |
| 70 | 1.87 V | 2259 |
| 90 | 2.45 V | 2957 |
| 120 | 3.13 V | 3952 |

```

uint32_t delay;
void ADC_Init(void){
    SYSTCL_RCGCGPIO_R |= 0x08; // activate clock for Port D
    while ((SYSTCL_PRGPIO_R&0x08) == 0){};
    GPIO_PORTD_DIR_R &= ~0x04; // make PD2 input
    GPIO_PORTD_AFSEL_R |= 0x04; // enable alternate function on PD2
    GPIO_PORTD_DEN_R &= ~ 0x04; // disable digital I/O on PD2
    GPIO_PORTD_AMSEL_R |= 0x04; // enable analog function on PD2
    SYSTCL_RCGCADR_R |= 0x01; // activate ADC0
    delay = SYSTCL_RCGCADR_R; ; //extra TIMER0_CFG_R to stabilize
    delay = SYSTCL_RCGCADR_R; //extra TIMER0_CFG_R to stabilize
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    delay = SYSTCL_RCGCADR_R; //extra TIMER0_CFG_R to stabilize
    ADC0_PC_R = 0x01; // configure for 125K
    ADC0_SSRI_R = 0x0123; // Seq 3 is highest priority
    ADC0_ACTSS_R &= ~0x0008; // disable sample sequencer 3
    ADC0_EMUX_R &= ~0xF000; // seq3 is software trigger
    ADC0_SSMUX3_R = (ADC0_SSMUX3_R&0xFFFFFFF0)+5; // Ain5 PD2
    ADC0_SSCTL3_R = 0x0006; // no TS0 D0, yes IE0 END0
    ADC0_IM_R &= ~0x0008; // disable SS3 interrupts
    ADC0_ACTSS_R |= 0x0008; // enable sample sequencer 3
}

//-----ADC_In-----
// Busy-wait Analog to digital conversion
// Input: none
// Output: 12-bit result of ADC conversion
// measures from PD2, analog channel 5
uint32_t data;
uint32_t ADC_In(void){
    ADC0_PSSI_R = 0x0008; // 1) initiate SS3
    while((ADC0_RIS_R&0x08)==0){}; // 2) wait for conversion done
    data = ADC0_SSFIFO3_R&0xFFF; // 3) read result
    ADC0_ISC_R = 0x0008; // 4) acknowledge completion
    return data;
}

uint32_t Convert(uint32_t Data){
    return (Data*118)/4096+6; // replace this line with your Lab 8 solution
}

```

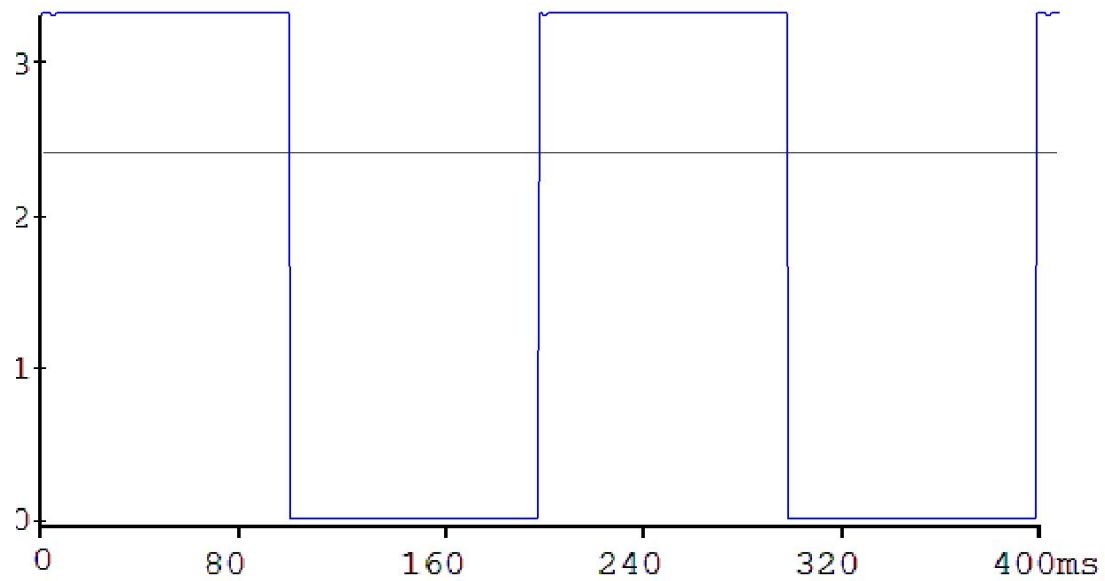
```

void SysTick_Init(){
    NVIC_ST_CTRL_R = 0;
    NVIC_ST_RELOAD_R = 7999999; // (80*10^6/10) - 1; //reload value for 10Hz
    NVIC_ST_CURRENT_R = 0;
    NVIC_SYS_PRI3_R = (NVIC_SYS_PRI3_R & 0X00FFFFFF) | 0X20000000; //set priority
    NVIC_ST_CTRL_R = 7; //allow interrupts
}

void SysTick_Handler(void){
    GPIO_PORTF_DATA_R ^= 0X02; //heart
    ADCMail = ADC_In(); //sample 12-bit ADC value and store in ADCMail
    ADCStatus = 1; //set flag to indicate new data
}

int main(void){ //you're Lab 8
    TExaS_Init();
    ST7735_InitR(INITR_REDTAB);
    ADC_Init(); // turn on ADC, set channel to 5
    SysTick_Init();
    PortF_Init();
    EnableInterrupts();
    while(1){
        while(ADCStatus == 0){}; //
        Data = ADCMail;
        ADCStatus = 0; //clear flag
        Position = Convert(Data);
        ST7735_SetCursor(0,0);
        LCD_OutFix(Position);
        ST7735_SetCursor(6,0);
        ST7735_OutString("cm");
    }
}

```



Ave=1.68V, Peak-peak=3.27V, Period=200.0ms, Freq= 5Hz
 high-pulse=100.0ms, low-pulse=100.0ms

Average accuracy (with units in cm) = 0.004

| True position x_{ti} | Measured Position x_{mi} | Error $x_{ti} - x_{mi}$ |
|------------------------------|----------------------------------|----------------------------|
| .10 | .10 | 0.000 |
| .30 | .31 | -0.010 |
| .70 | .70 | 0.000 |
| .90 | .91 | -0.010 |
| 1.20 | 1.20 | 0.000 |