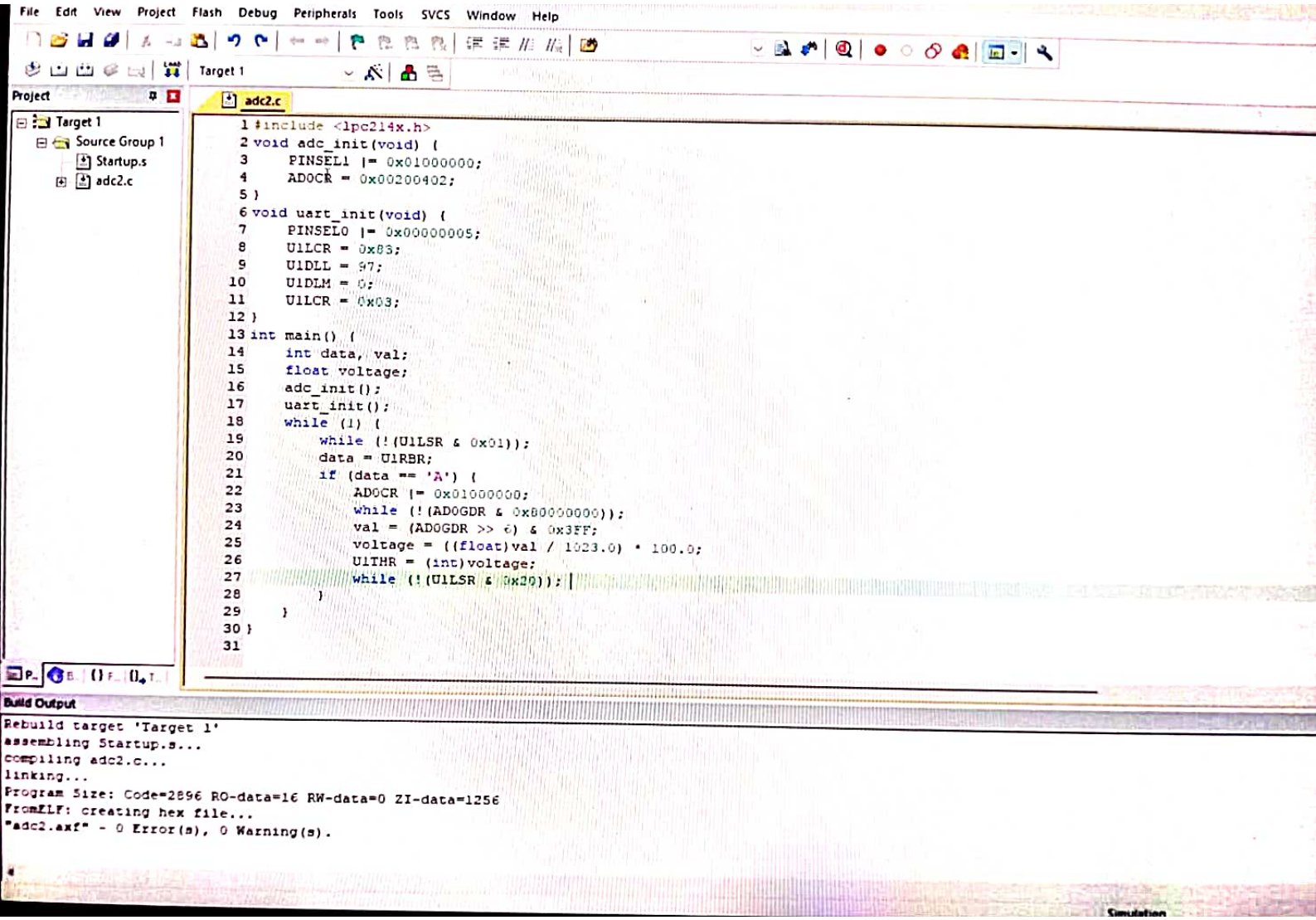
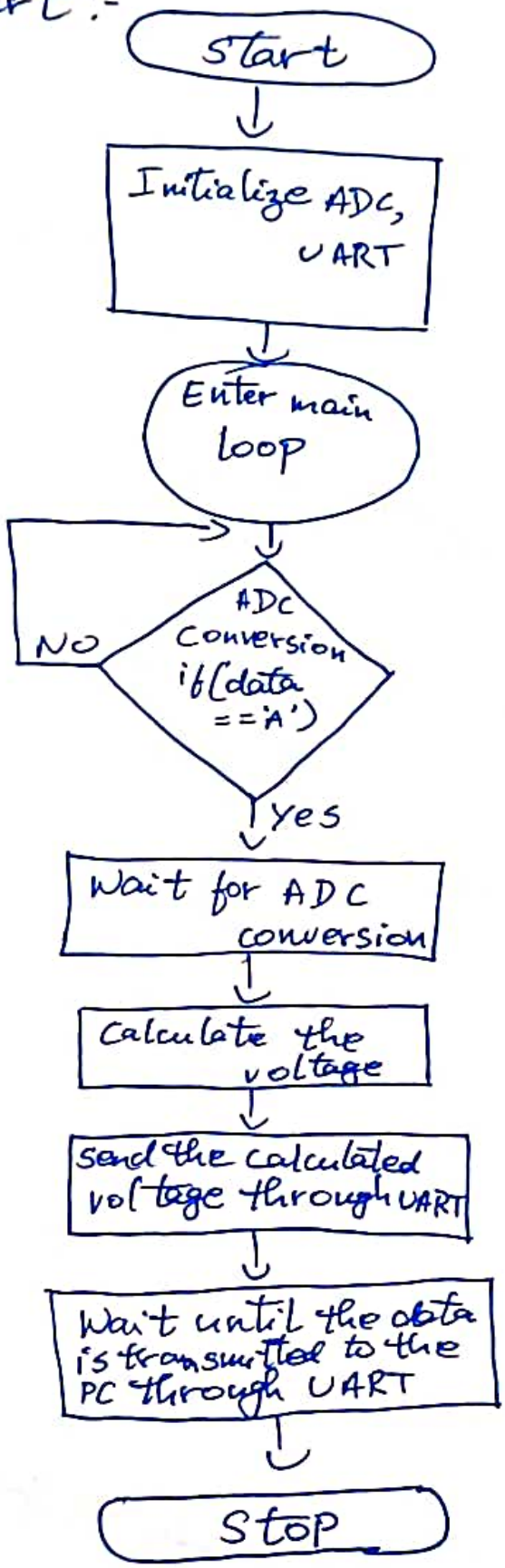

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Target 1
Project
Target 1
Source Group 1
Startup.s
adc2.c
adc2.c
1 #include <lpc214x.h>
2 void adc_init(void) {
3 PINSEL1 |= 0x01000000;
4 AD0CR = 0x00200402;
5 }
6 void uart_init(void) {
7 PINSEL0 |= 0x00000005;
8 U1LCR = 0x83;
9 U1DLL = 97;
10 U1DLM = 0;
11 U1LCR = 0x03;
12 }
13 int main() {
14 int data, val;
15 float voltage;
16 adc_init();
17 uart_init();
18 while (1) {
19 while (!(U1LSR & 0x01));
20 data = U1RBR;
21 if (data == 'A') {
22 AD0CR |= 0x01000000;
23 while (!(AD0GDR & 0x80000000));
24 val = (AD0GDR >> 6) & 0x3FF;
25 voltage = ((float)val / 1023.0) * 100.0;
26 U1THR = (int)voltage;
27 while (!(U1LSR & 0x20));
28 }
29 }
30 }
31
Build Output
Rebuild target 'Target 1'
assembling Startup.s...
compiling adc2.c...
linking...
Program Size: Code=2896 RO-data=16 RW-data=0 ZI-data=1256
FromELF: creating hex file...
"adc2.axf" - 0 Error(s), 0 Warning(s).

Flowchart:-


Start
Initialize ADC, UART
Enter main loop
ADC Conversion if(data == 'A')
NO
Yes
Wait for ADC conversion
Calculate the voltage
Send the calculated voltage through UART
Wait until the data is transmitted to the PC through UART
Stop

Voltage Measurement Algorithm

Step 1: * Initialize the microcontroller and required Peripherals
* Configure ADC pins and setting s (eg) reference voltage, resolution)
* Configure UART or other communication if necessary

Step 2: Enter an infinite loop for continuous voltage measurement

Step 3: * Trigger an ADC conversion for the desired input channel
* Wait for the ADC conversion to complete and read the ADC result

Step 4: Convert the ADC result to voltage using the formula :-

voltage = (ADC_Result/ADC_Max) * VoltageRange

Step 5: ~~Display or~~ Transmit the voltage value over a communication interface (eg) UART

Step 6: Add a delay

Step 7: Return to the main loop to continue measuring voltage

Step 8: the program runs continuously measuring and displaying/ transmitting the voltage

Achievable theoretical accuracy:

$$1\,LSB = \frac{FSR}{2^N}$$

LSB → Least Significant Bit

FSR → Full scale Range

For 10 bit ADC $N = 10$

So $$1LSB = \frac{100\,V}{2^{10}} = \frac{100\,V}{1024} = 0.0977V$$

$$\text{Accuracy (\%.)} = \frac{0.0977V}{100V} \times 100\%.$$

The theoretical accuracy will be $= 0.0977\%$