

# LITHION POWER ASSIGNMENT

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**AIM:** To measure 0 to 100Vdc using microcontroller

## Algorithm:

- 1)Read the voltage from the analog input pin using the ADC.
- 2)Scale the voltage to the range 0 to 100Vdc using a voltage divider.
- 3)Convert the scaled voltage to a digital value using the ADC.
- 4)Display the digital value on an LCD or other display device.

## Flowchart:

Start → Read voltage from analog input pin → Scale voltage to 0 to 100Vdc range → Convert scaled voltage to digital value → Display digital value on LCD or other display device → End.

## Program:

```
#include<lpc214x.h>
void adcinit(void){
    PINSEL1 |=0x01000000;
    ADOCR = 0x00200402;
}
void uartinit(void){
    PINSEL0 |= 0x00000005;
    U1LCR = 0x83;
    U1DLL = 97;
    U1DLM = 0;
    U1LCR = 0x03;
}
int main(){
    int data,val;
    float voltage;
    adcinit();
    uartinit();
```

```
while(1){
while(!(U1LSR & 0x01));
data = U1RBR;
if(data == 'A'){
ADOCR |= 0x01000000;
while(!(AD0GDR & 0x80000000));
val = (AD0GDR >> 6) & 0x3FF;
voltage = ((float)val / 1023.0)*100.0;
U1THR = (int)voltage;
while(!(U1LSR & 0x20));
}
}
```

### Theoretical accuracy:

To calculate the achievable theoretical accuracy, we'll consider the parameters provided:

1. ADC Resolution (N): 10 bits (meaning 1024 possible digital values).
2. Reference Voltage (V<sub>ref</sub>): 3.3V.
3. Input Voltage Range (V<sub>in</sub>): 0 to 100V.

Step 1: Calculate the Step Size ( $\Delta V$ ):

The step size is the smallest voltage difference that the ADC can distinguish. It is determined by the resolution of the ADC and the reference voltage.

$$\Delta V = V_{\text{ref}} / 2^N = 3.3V / 1024 \approx 0.00322V$$

Step 2: Calculate Accuracy in Percent:

Accuracy is defined as the maximum error in the measurement as a percentage of the full-scale input range.

$$\text{Accuracy}(\%) = (\Delta V / V_{\text{inmax}}) \times 100 = 0.00322V / 100V \times 100 \approx 0.00322\%$$

The achievable theoretical accuracy for this system is approximately 0.00322%. This means that under ideal conditions, the measurement could have an error of up to 0.00322% of the full-scale input range (0 to 100V).