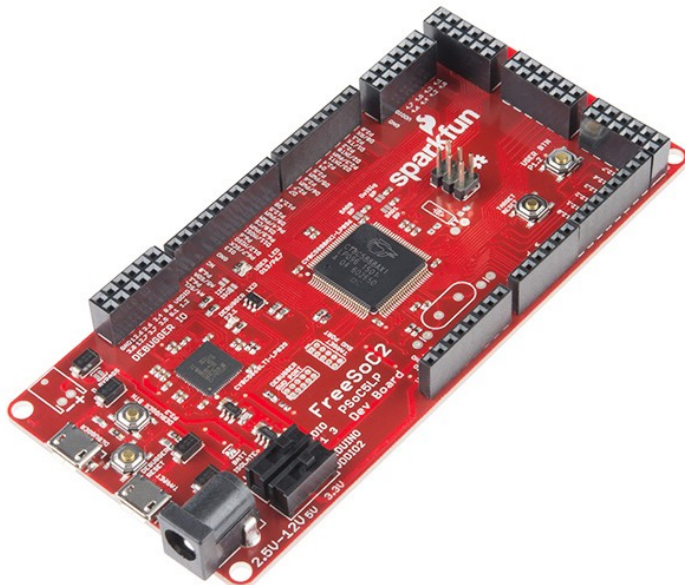




2016

***Analog Interfaces (LDR and
Potentiometer)
with
FreeSoc2 (PSoC 5LP)
using PSoC Creator***



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Version: 1.0

Introduction:

The FreeSoC2 micro-controller based on the PSoC 5LP (Programmable System on a Chip) brings together features of the programmable devices and micro-controller-type systems on chips into one package. By placing a programmable fabric between the peripherals and the pins, the FreeSoC2 allows any function to be routed to any pin! Moreover, the on-board PSoC includes a number of programmable blocks which allow the user to define arbitrary digital and analog circuits for their specific application. To get the most out of the device, you will need to use the PSoC Creator IDE.

Step 1: Open PSOC creator IDE.

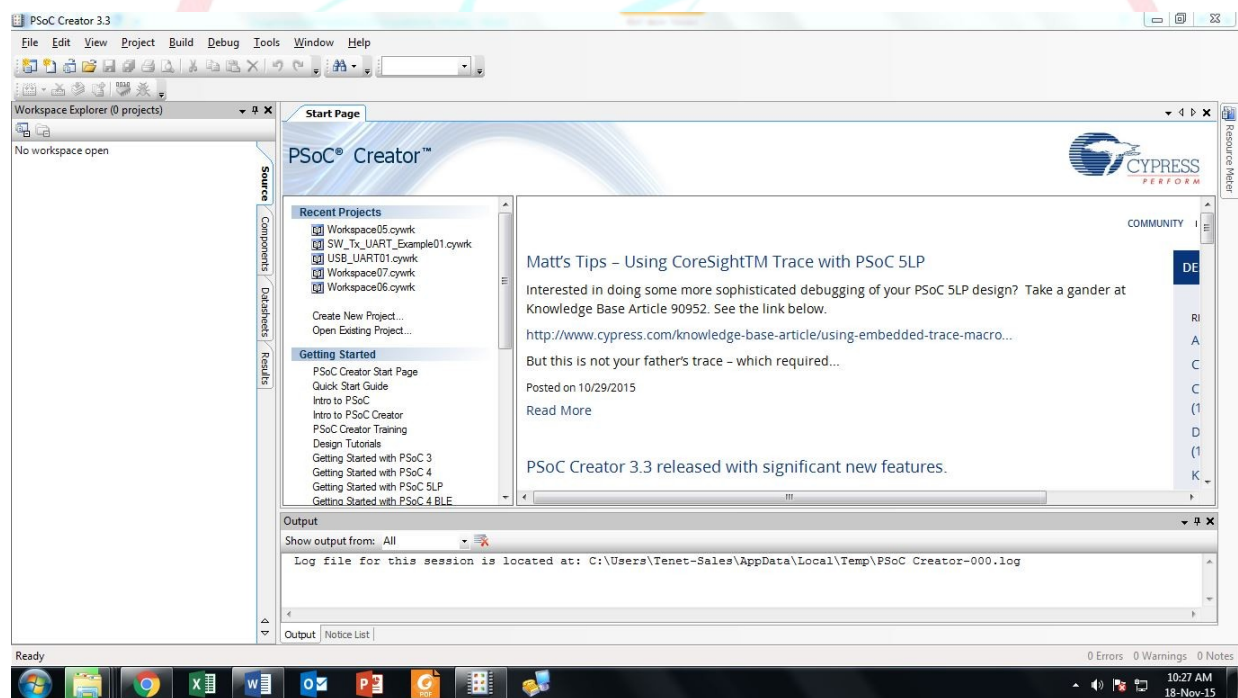


Figure 1

Step 2: File-> new project -> design -> PSoC 5LP design & save with desired name.

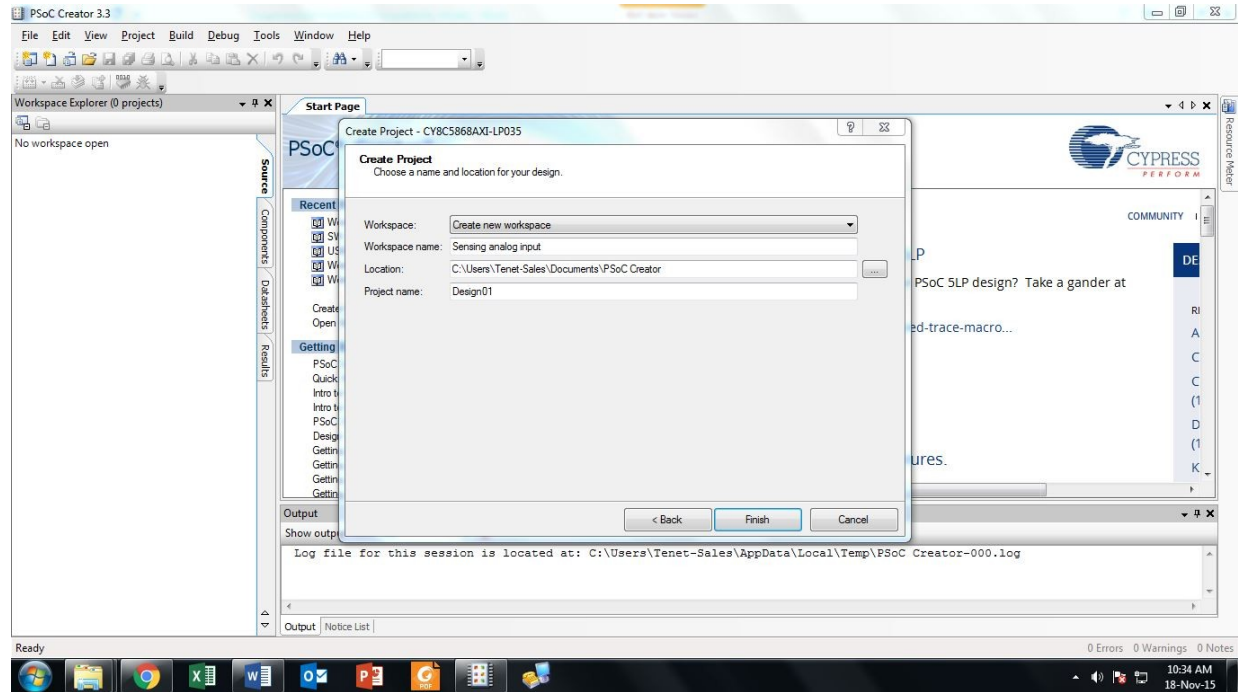


Figure 1

Step 3: Open TopDesign.cysch from workspace explorer.

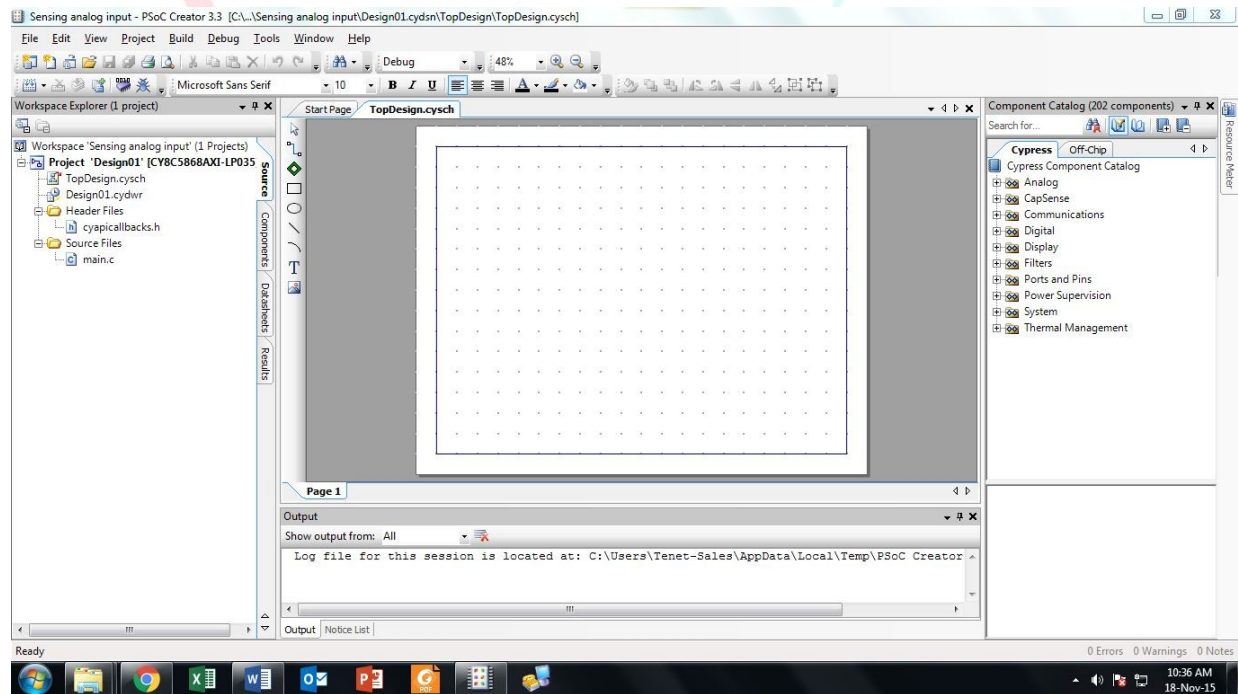


Figure 2

Step 4: To sense analog input we need Analog to Digital Converter (ADC). Let us select a Delta-Sigma ADC from Component catalog on right side of the window. Drag the ADC onto the workspace.

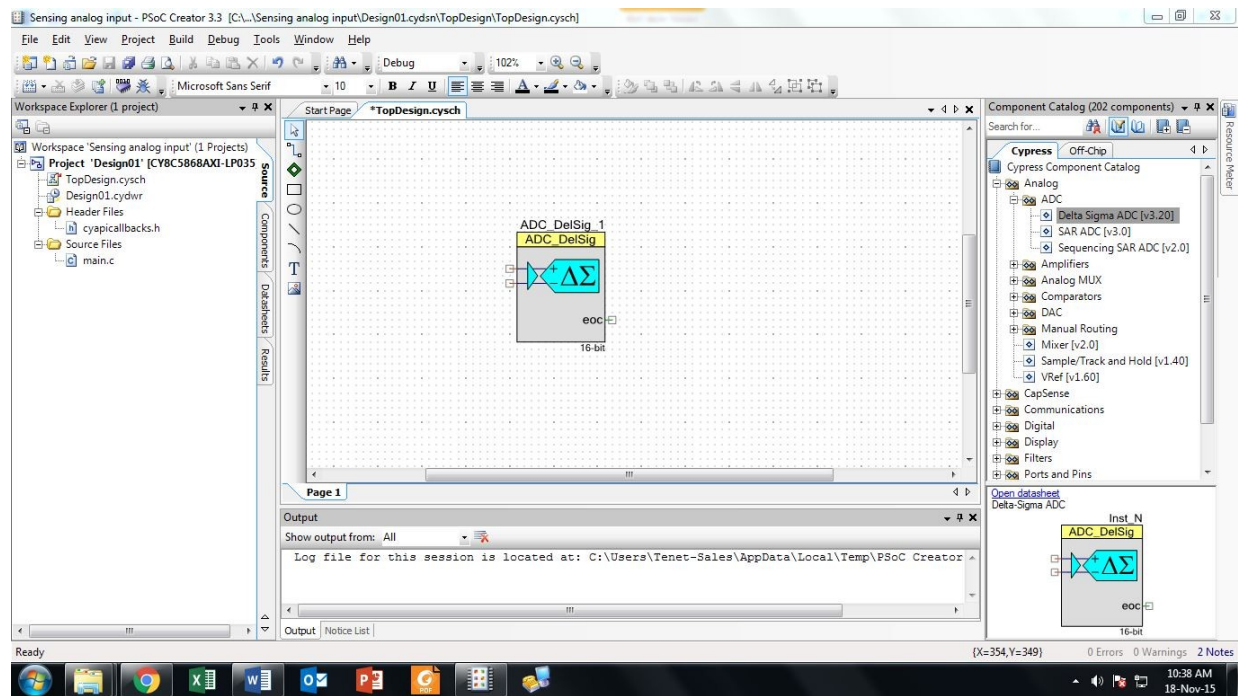


Figure 3

Step 5: Double click on the Delta-Sigma ADC and change the name if you wish to. Configure the ADC as Single ended input mode and 8-bit resolution.

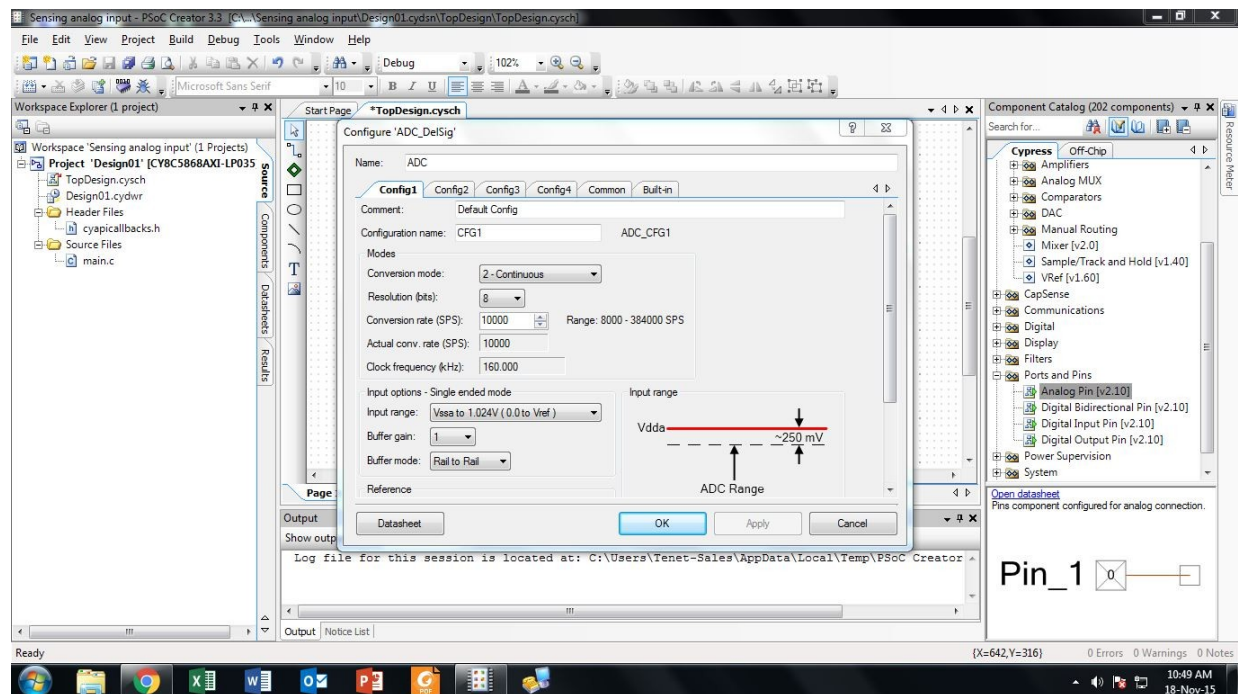


Figure 5

Step 6: Similarly drag the analog input from component catalog. Keep default configurations. Connect the analog input to ADC.

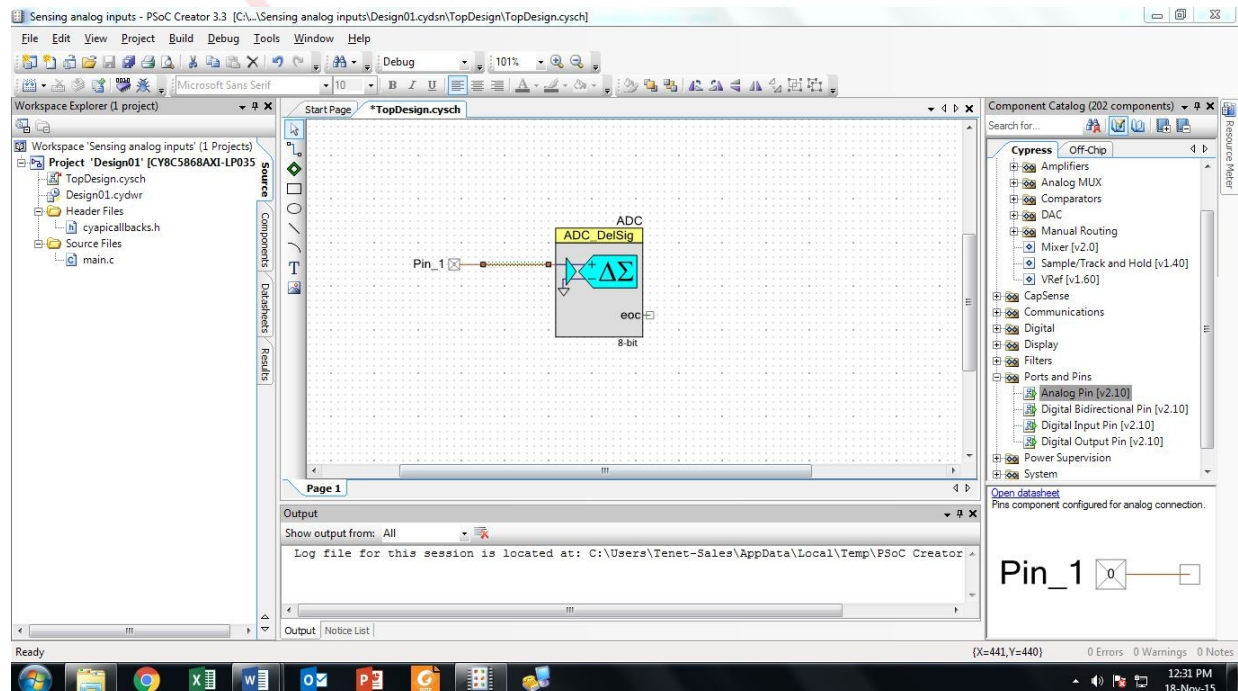


Figure 6

Step 7: Similarly we need UART for serial communication. It is required to read the digital values serially from ADC and transmits them serially onto a terminal (screen).

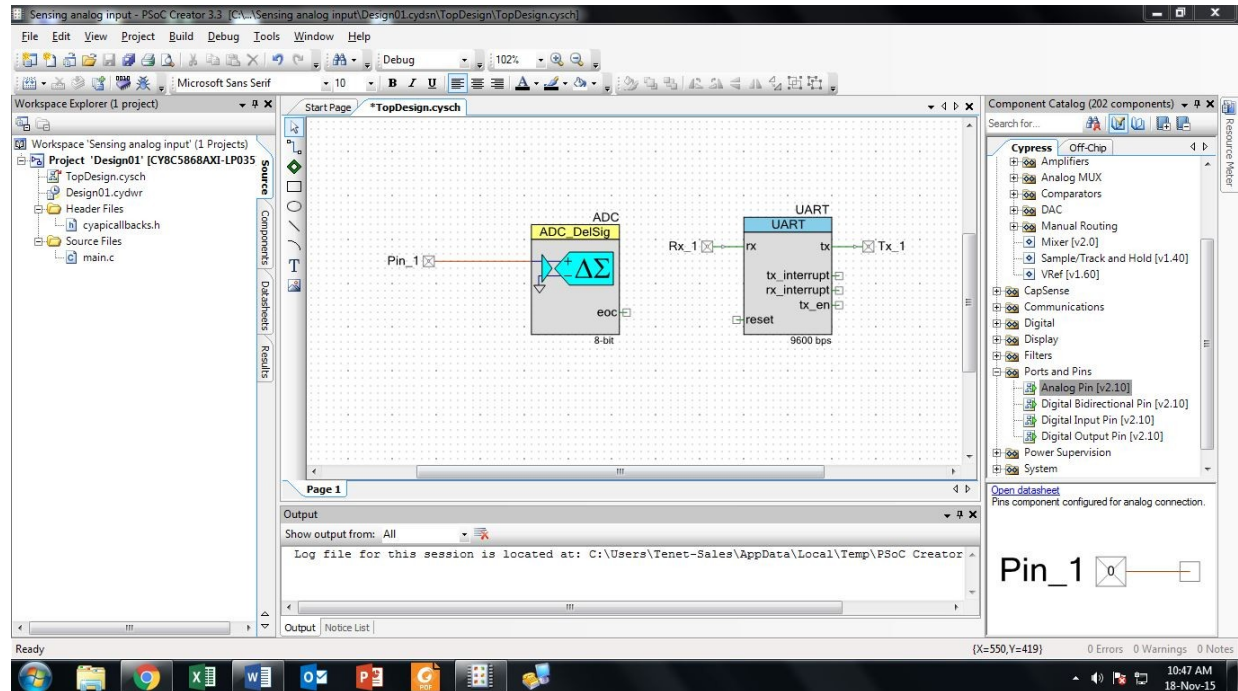
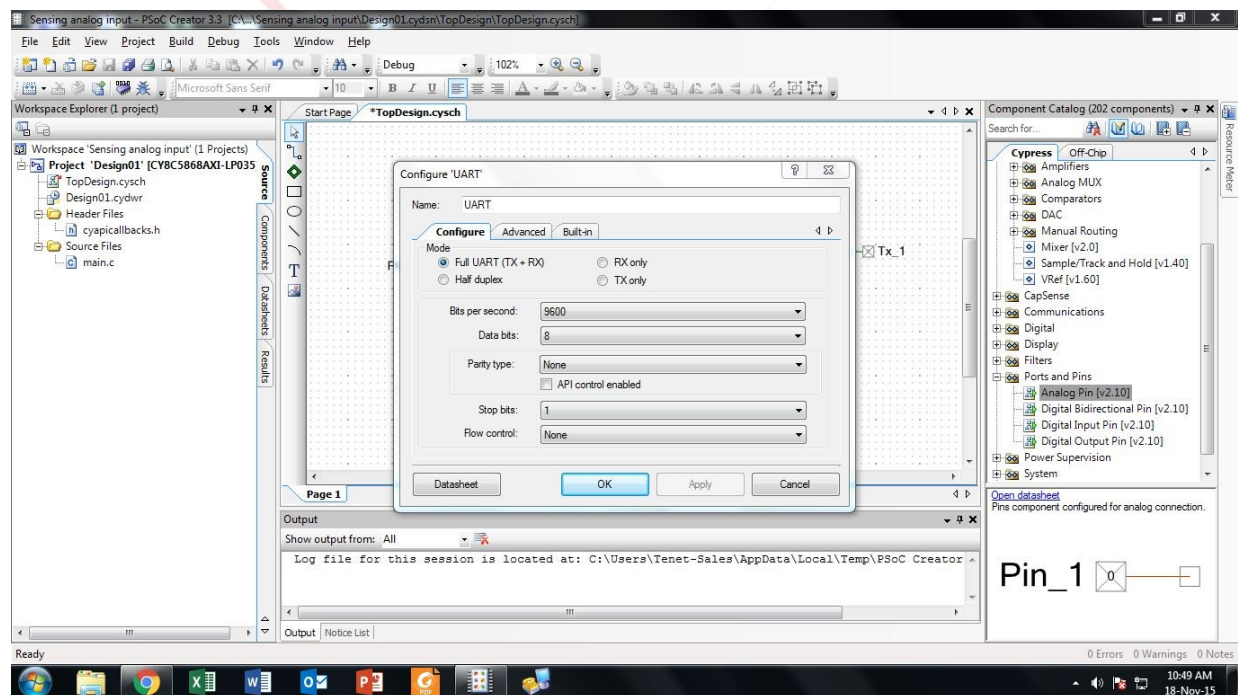


Figure 7

Step 8: Configure UART as 8-bit and baud rate of 9600 bps.



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Figure 4

Step 9: Click on main.c from Workspace Explorer. Write the code and Build it.

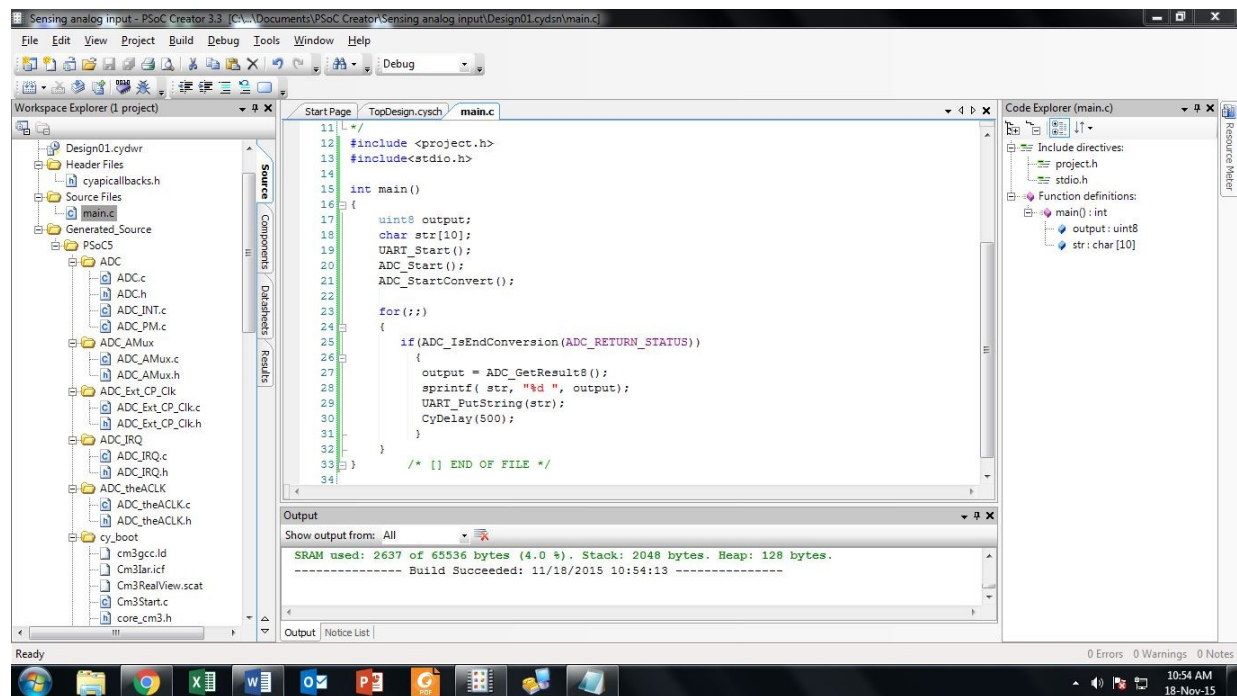


Figure 5

CODE:

```
#include <project.h>
#include<stdio.h>
```

```
int main()
{
    int8 output;
    char str[10];
    UART_Start();
    ADC_Start();
    ADC_StartConvert();

    for(;;)
    {
        if(ADC_IsEndConversion(ADC_RETURN_STATUS))
        {
            output = ADC_GetResult8();
            ADC_CountsTo_Volts(output);
            sprintf( str, "%d ", output);

            UART_PutString(str);
            CyDelay(1000);
        }
    }
}
```

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}



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Step 10: Click on Design01.cydwr from Workspace Explorer.

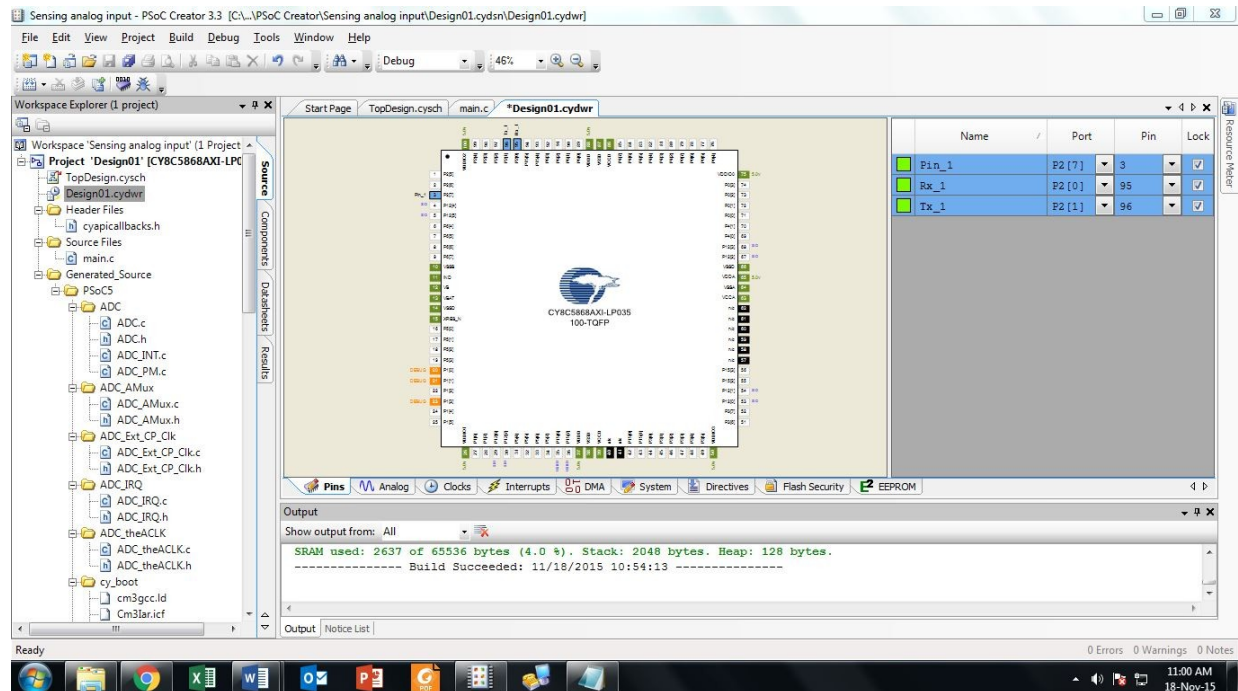


Figure 10

Step 11: Finally, assign pins to desired ports. Pin P2.0 is RX and P2.1 is TX for target IC. Then we connect the two pins to RX/TX pins on the debugger/programmer which is 12.6 (RX) and 12.7 (TX). Note that the RX pin from the PSoC 5LP MCU should be connected to the TX pin of the debugger. And the P2.1 TX pin should be connected to the debugger's RX pin (12.6).

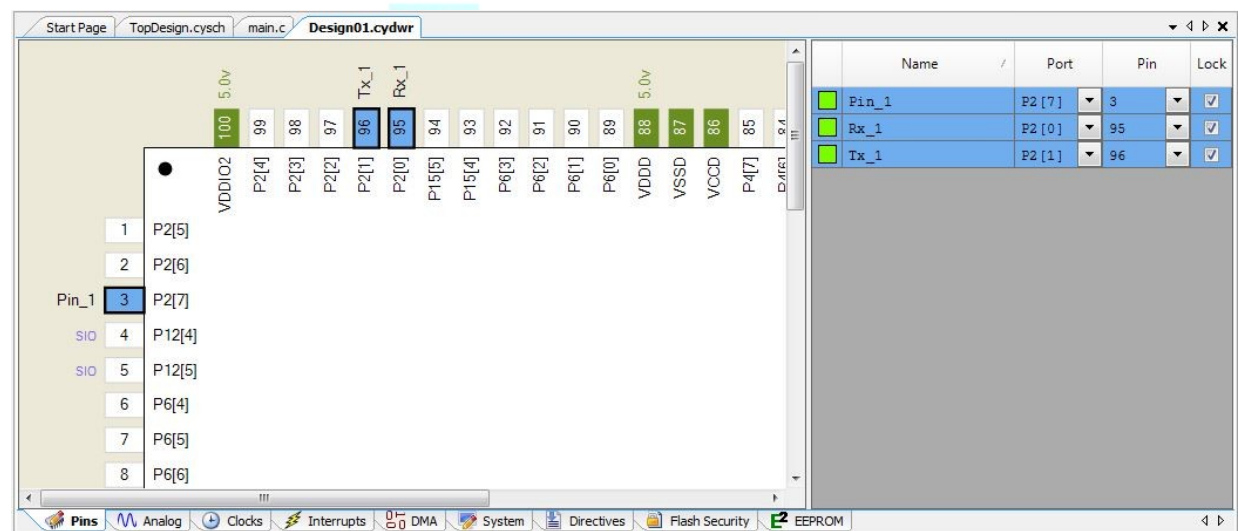


Figure 6

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Step 12: Click on Build on menu bar and build the project, check for errors.

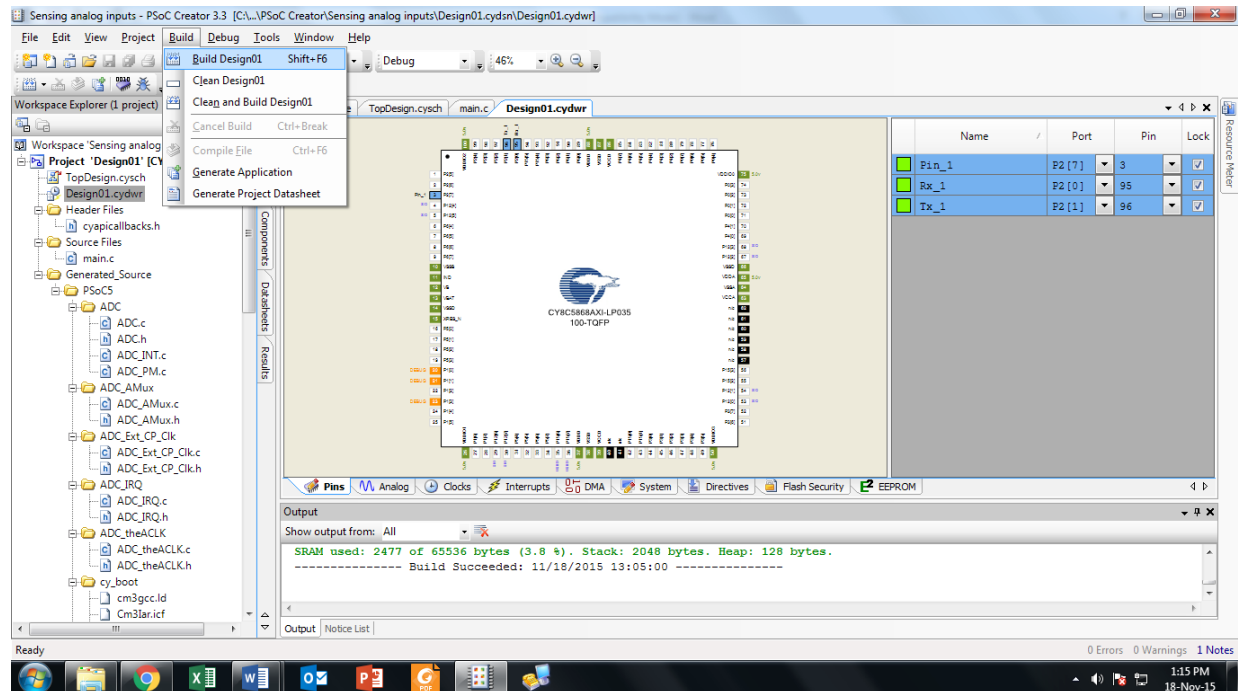


Figure 7

Step 13: Connect Micro B cable to debugger port of Freesoc2. To upload the file to Freesoc2 click on Debug --> Program.

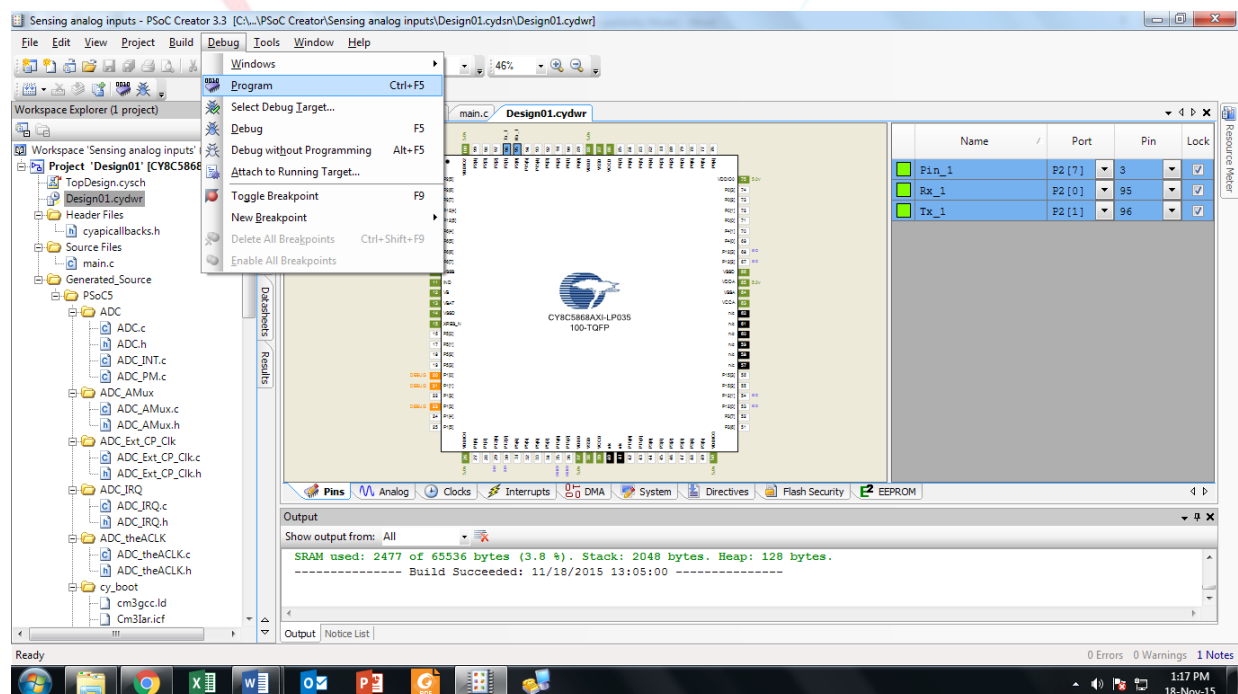


Figure 8

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Step 14: Now to output the analog input onto screen we need a terminal. A terminal used to display via COM ports. You can use any terminal such as Putty, Hyper-Terminal, X-CTU and so on. I have used here Hyper-Terminal. Select appropriate COM port.

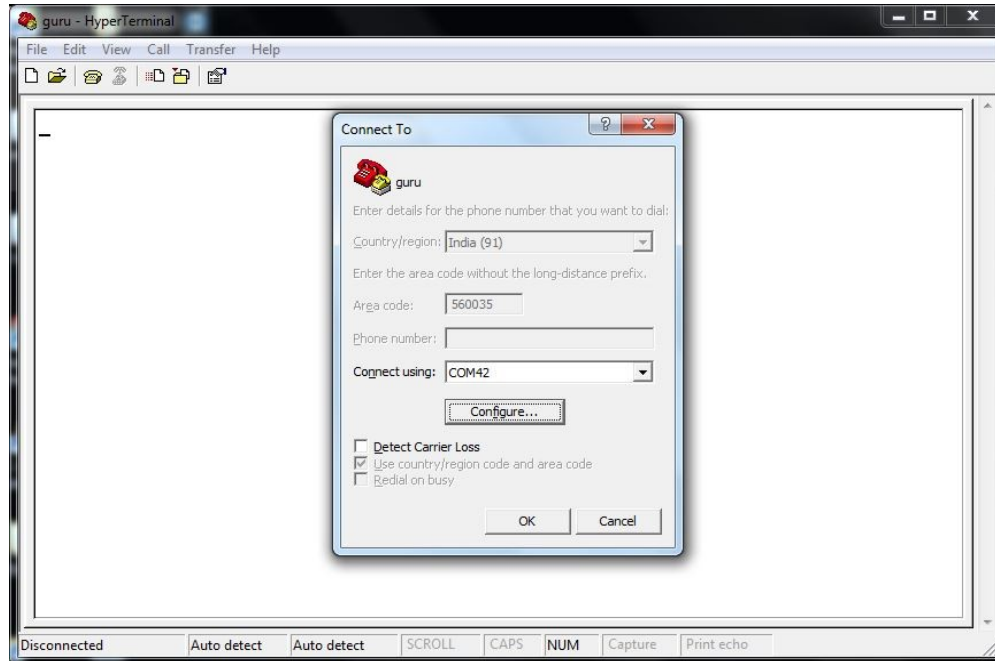


Figure 14

Step 15: Configure as 8-bit and baud rate of 9600 bps.

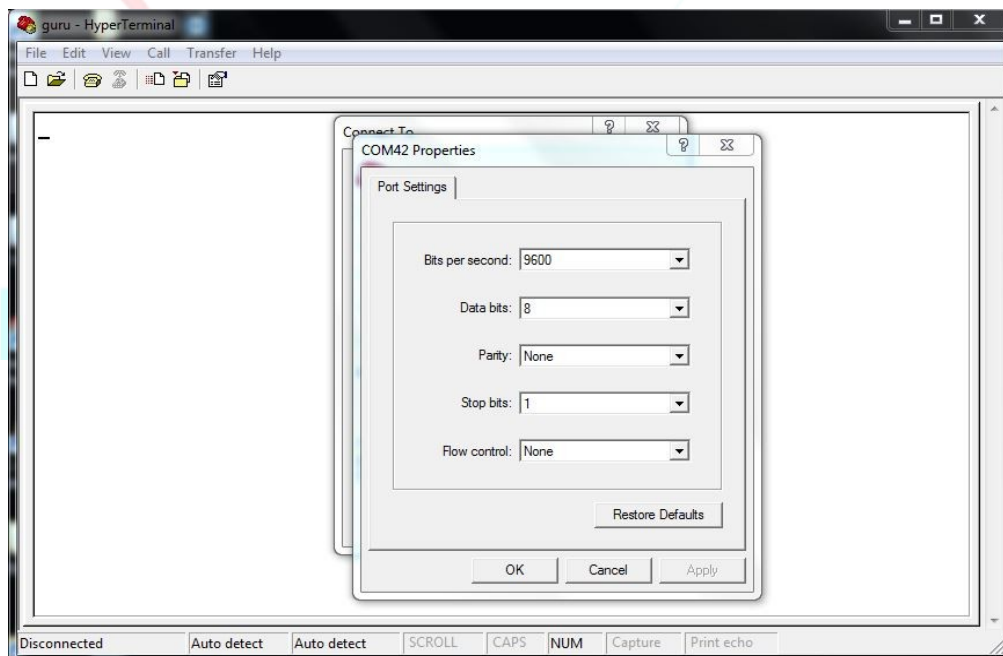


Figure 15

Step 16: Figure below shows the output of an LDR values (analog input).

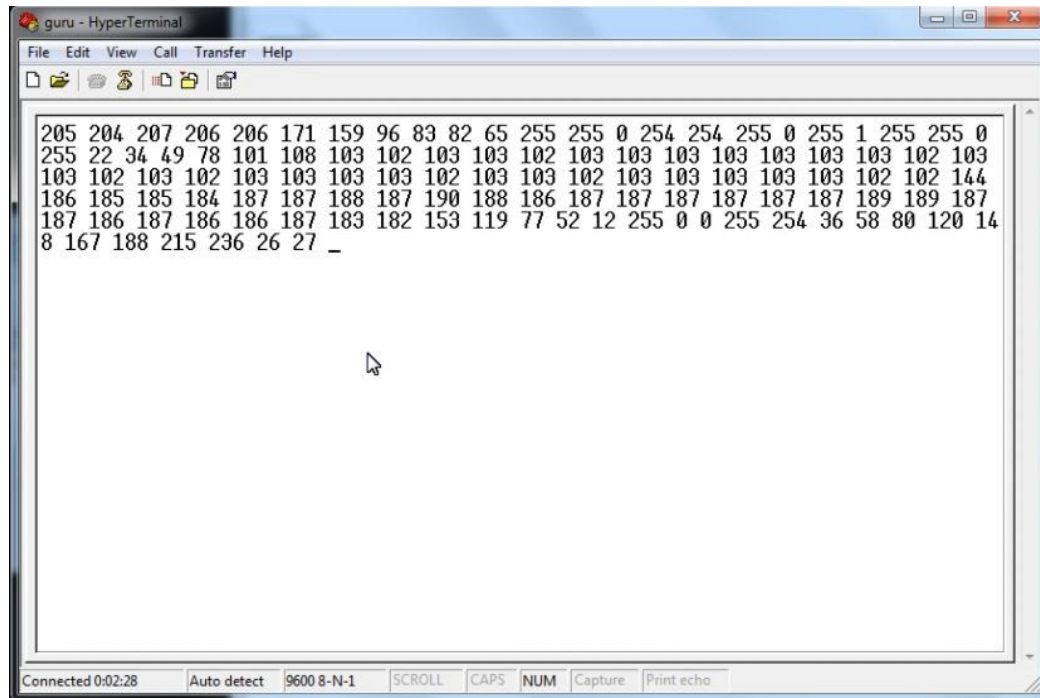


Figure 16

Similarly we can use potentiometer as an analog input, as shown below

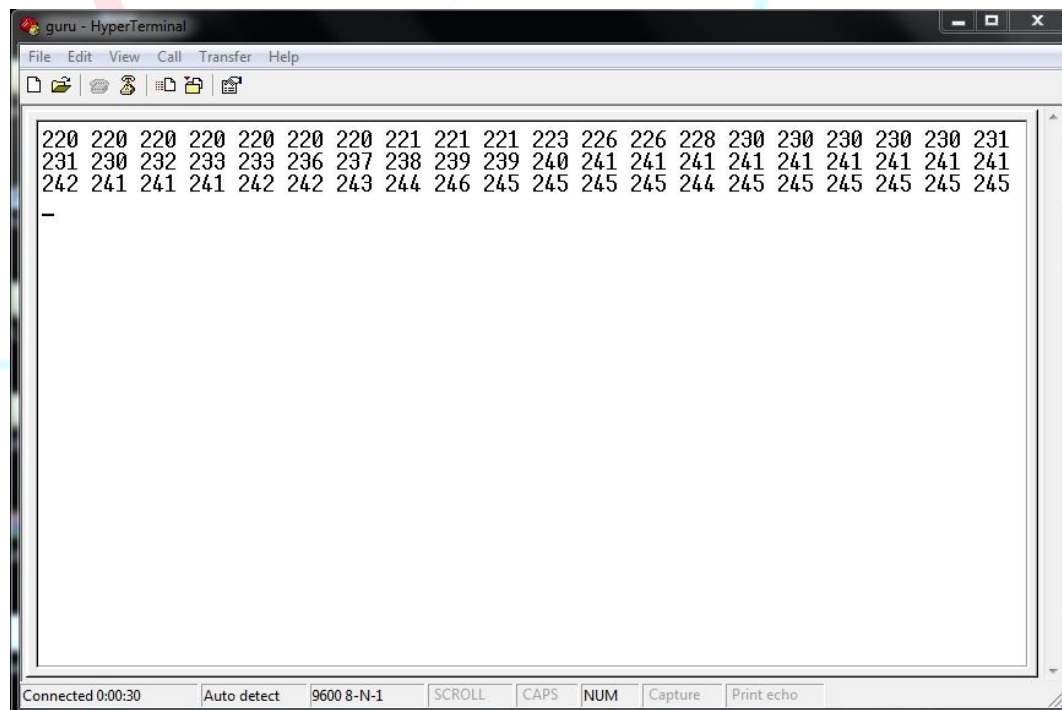


Figure 17

CIRCUIT EXPLANATION:

The UART peripheral we just added is typically used to have a serial communication between micro-controller and PC. Using UART peripheral we are able to transfer our data through the USB to our PC.

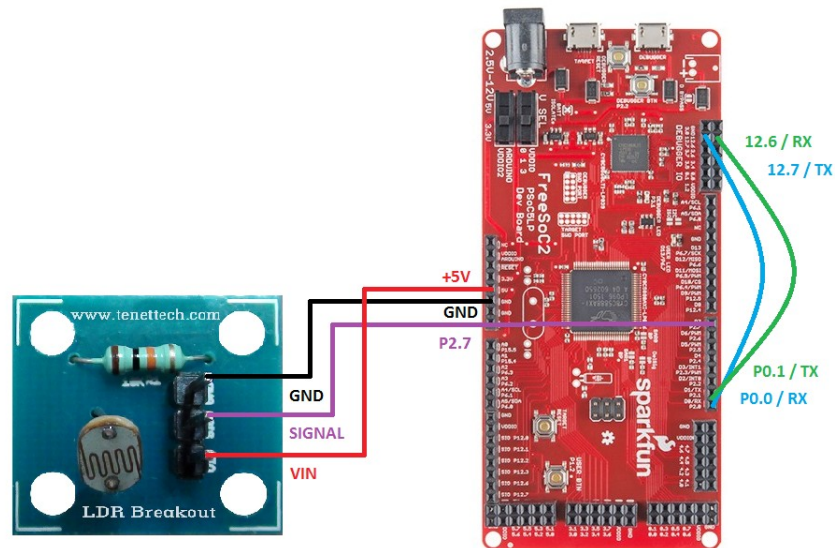


Figure 18

Pin P2.0 is RX and P2.1 is TX. We connect the two pins to RX/TX pins on the debugger/programmer which is 12.6 (RX) and 12.7 (TX). Note that the RX pin from the PSoC 5LP MCU should be connected to the TX pin of the debugger. And the P2.1 TX pin should be connected to the debugger's RX pin (12.6).

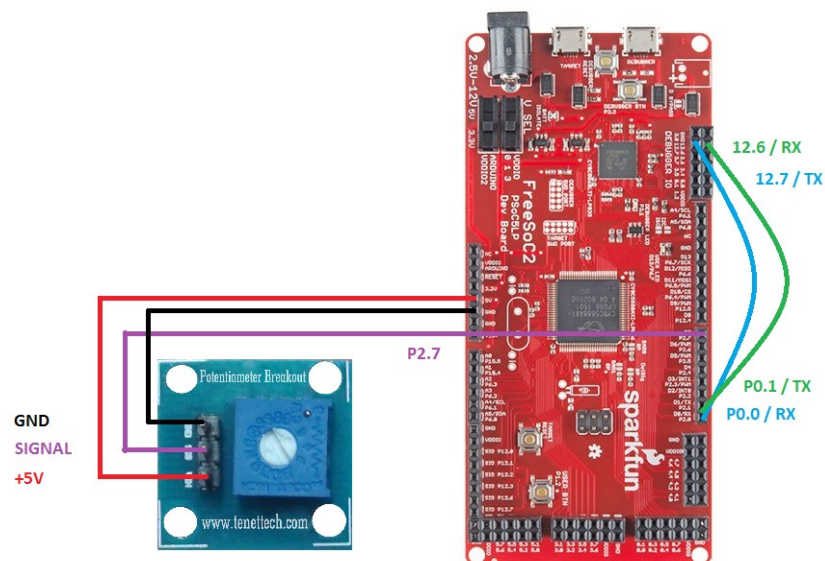


Figure 19

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OUTPUT:

Reading LDR values

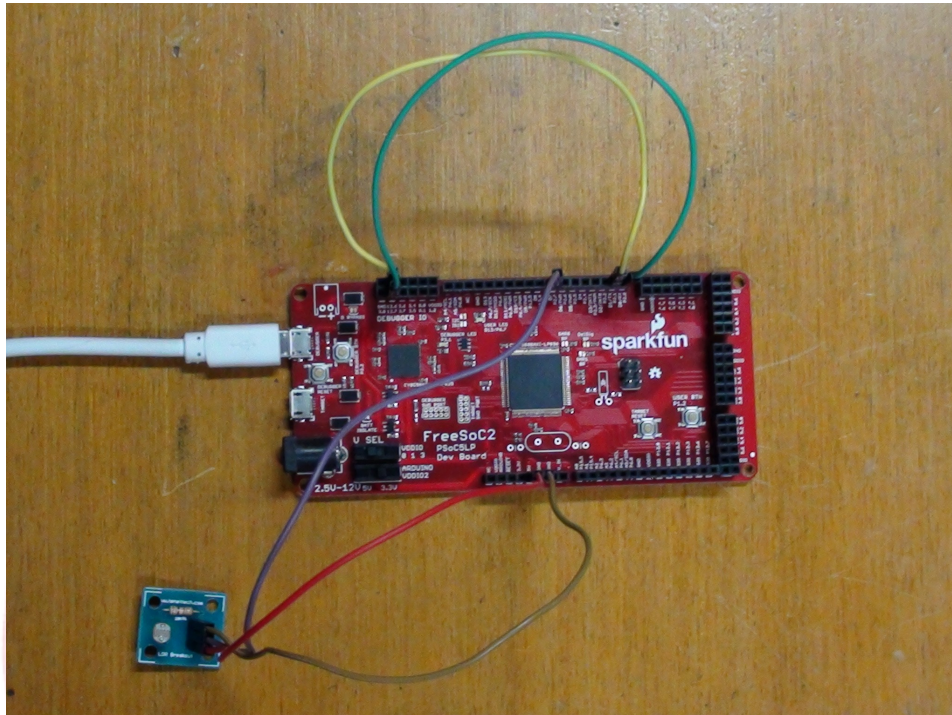


Figure 19

Reading Potentiometer values

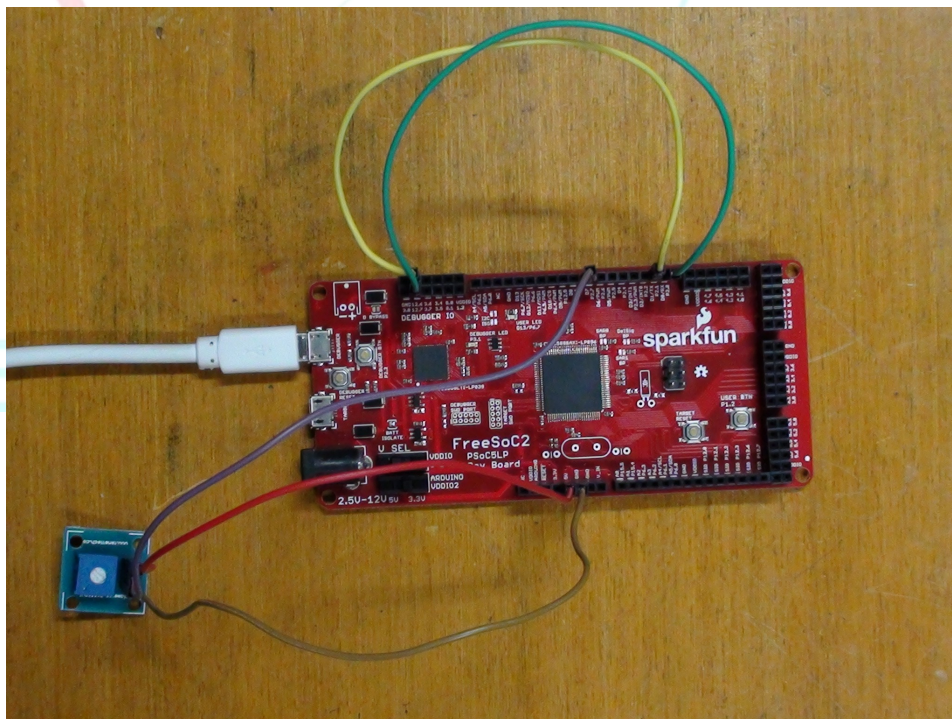


Figure 20

For product link:

1. <http://www.tenettech.com/product/7241/freesoc2-development-board-psoc5lp>
2. <http://tenettech.com/product/6655/universal-gpio-board>

For more information please visit: www.tenettech.com

For technical query please send an e-mail: info@tenettech.com



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