

**Embedded System Design with Arm**  
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**Lecture – 24**  
**Serial Port Terminal Application (Coolterm)**

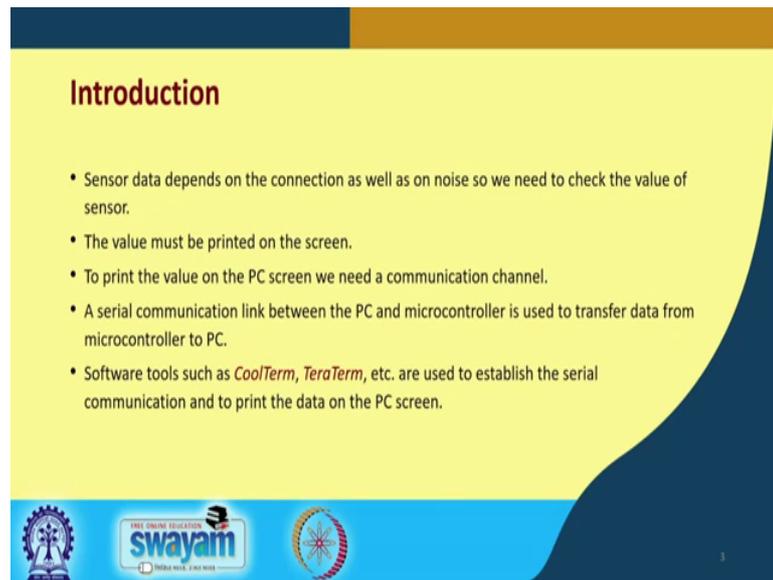
Welcome to lecture 24, in this lecture prior going towards working with sensors, we must know that what my sensor value is actually printing ok, what value we are receiving from the sensor is very important to develop the application ok. So in this regard, we will be discussing about one Serial Port Terminal Application called CoolTerm. There are other application as well, but we have considered CoolTerm in this particular lecture.

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So in this lecture, I will talk about CoolTerm the configuration and of course, the demonstration.

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**Introduction**

- Sensor data depends on the connection as well as on noise so we need to check the value of sensor.
- The value must be printed on the screen.
- To print the value on the PC screen we need a communication channel.
- A serial communication link between the PC and microcontroller is used to transfer data from microcontroller to PC.
- Software tools such as *CoolTerm*, *TeraTerm*, etc. are used to establish the serial communication and to print the data on the PC screen.

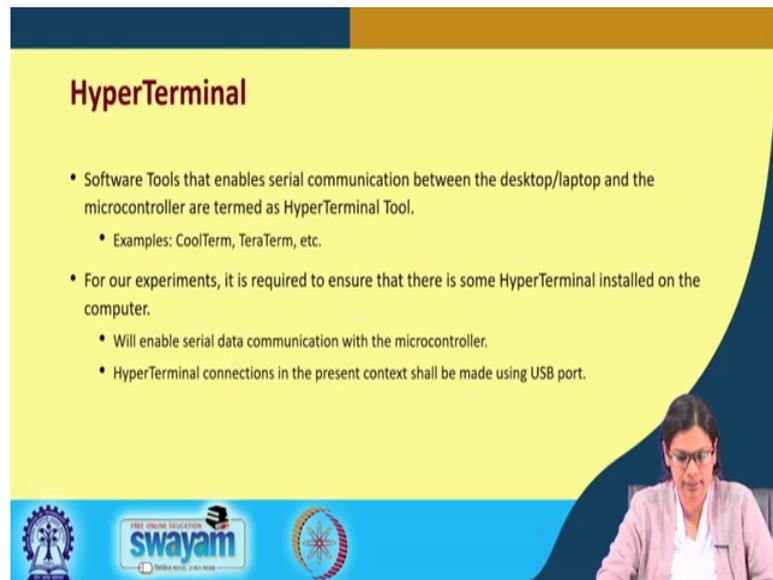
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See when we were using Arduino board in that there is a serial monitor. So, we just need to provide that connection ok, serial connection we have to create that object and through that object we can directly print it, but in STM board this is not available. So, for that purpose you need to print the value in some hyper terminal ok. So, this sensor data depends on connection as well as the noise as we need to check the value of the sensor. So, at every point of the time, we need to check what value we are receiving from that sensor. So, the value must be printed on the screen.

To print the value on the PC screen, we need a communication channel. So, a communication channel must be built from the device that is the STM board to the PC ok. So, a serial communication link between the PC and the microcontroller is used to transfer data from microcontroller to PC, that is what we will be doing. So, we will be connecting the microcontroller using the USB cable and then we will be establishing a connection with the PC and then in the PC screen we will print the value.

The software tool such as CoolTerm or Teraterm can be used to establish the serial communication and to print the data on the screen. So, let us see that.

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## HyperTerminal

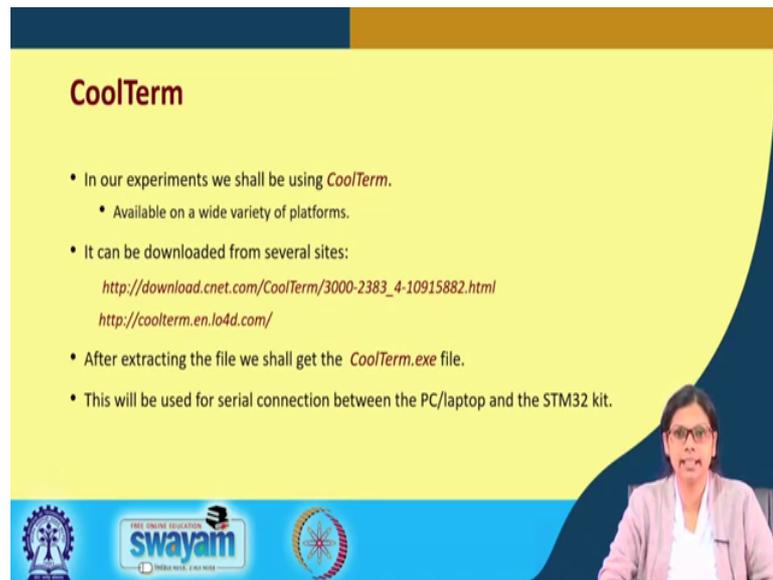
- Software Tools that enables serial communication between the desktop/laptop and the microcontroller are termed as HyperTerminal Tool.
  - Examples: CoolTerm, TeraTerm, etc.
- For our experiments, it is required to ensure that there is some HyperTerminal installed on the computer.
  - Will enable serial data communication with the microcontroller.
  - HyperTerminal connections in the present context shall be made using USB port.

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So, what is a hyper terminal? It is a software tool that enables serial communication between a desktop or a laptop and the microcontroller and are termed as hyper terminal tool. So, these are some example one is CoolTerm, one is TeraTerm, we will be working with CoolTerm. So for our experiment, it is required to ensure that there is a hyper terminal installed in the computer. So, this will enable the serial data communication with the microcontroller and this hyper terminal connection in the present context shall be made using this USB port.

So, what we are essentially doing here is that we will connect first the device the microcontroller with using the USB to our PC. Then we will use one hyper terminal, which we will set with the same baud rate with the port through which the microcontroller is connected with the PC. So, we need to check that which port there can be many ports. So, we need to make sure that the port in which, the microcontroller is connected with the PC the same port is selected by that hyper terminal software ok. .

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**CoolTerm**

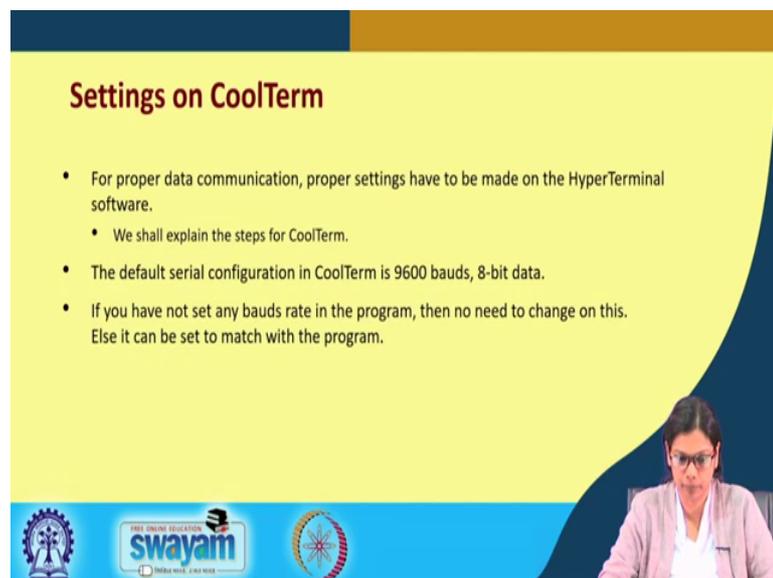
- In our experiments we shall be using *CoolTerm*.
  - Available on a wide variety of platforms.
- It can be downloaded from several sites:
  - [http://download.cnet.com/CoolTerm/3000-2383\\_4-10915882.html](http://download.cnet.com/CoolTerm/3000-2383_4-10915882.html)
  - <http://coolterm.en.lo4d.com/>
- After extracting the file we shall get the *CoolTerm.exe* file.
- This will be used for serial connection between the PC/laptop and the STM32 kit.

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So, the first thing when we use CoolTerm; so, you have to do the following it is available on a wide variety of platform, you can download it from several sites. So, I have given these 2 representative site here, these are available from other places.

So, after extracting the file we shall get this CoolTerm dot exe file and this will be used for the serial communication between the PC or laptop and the STM 32 kit ok. So, please if you want to use this hyper terminal download from this particular link extract it and then you can use it with STM.

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**Settings on CoolTerm**

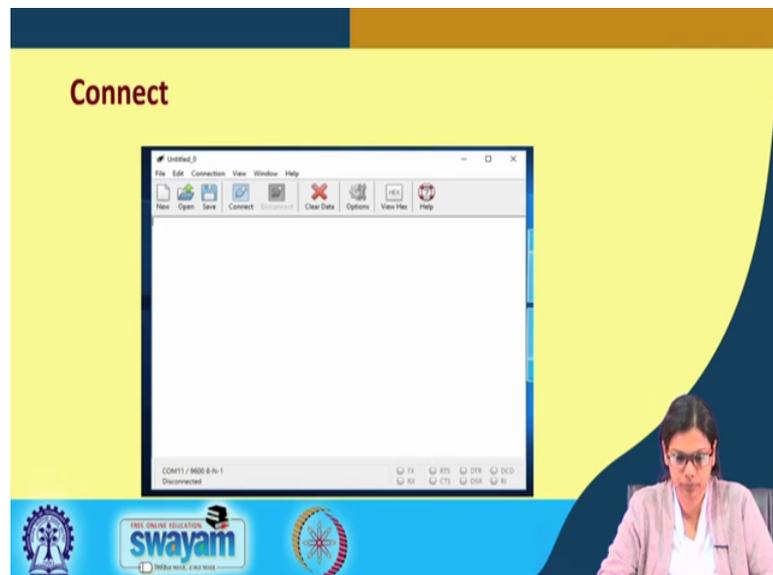
- For proper data communication, proper settings have to be made on the HyperTerminal software.
  - We shall explain the steps for CoolTerm.
- The default serial configuration in CoolTerm is 9600 bauds, 8-bit data.
- If you have not set any bauds rate in the program, then no need to change on this. Else it can be set to match with the program.

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Now, for setting the CoolTerm, you know for proper data communication proper settings have to be made on the hyper terminal software, we will explain you the steps for the CoolTerm. Now the default serial configuration in the code term is 9600 baud rate an 8 bits. So, if you want to change that you have to do the change, but for this we need not have to change.

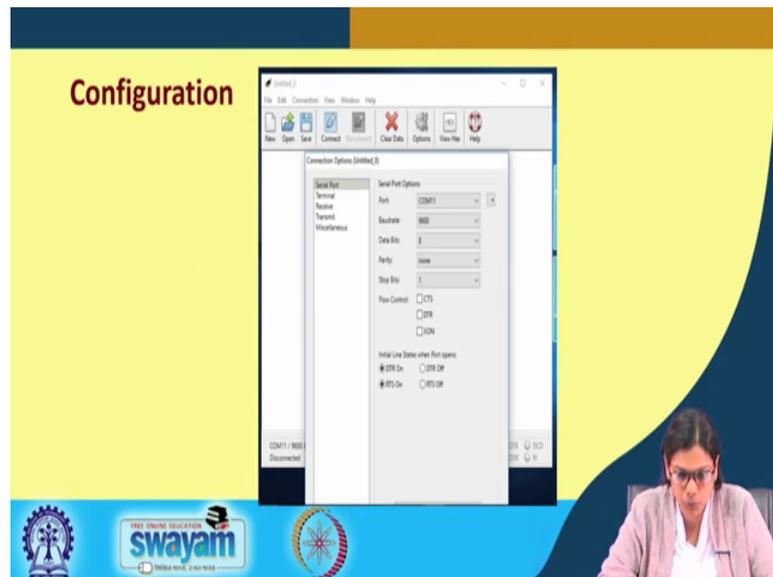
If you have not set any baud rate in the program then no need to change on this else it can be set to match with the program ok. So, this setting must be done prior to using this CoolTerm.

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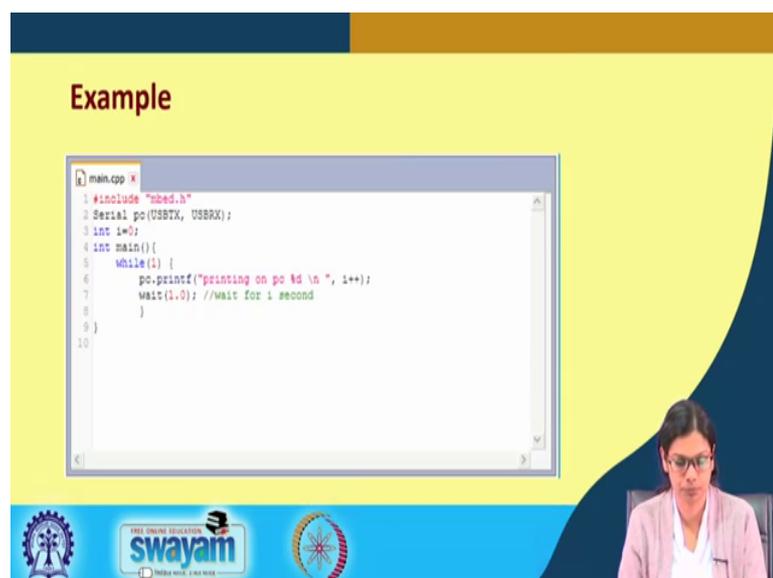
Now once, you open the CoolTerm you will get a screen like this and then you have to go to this option.

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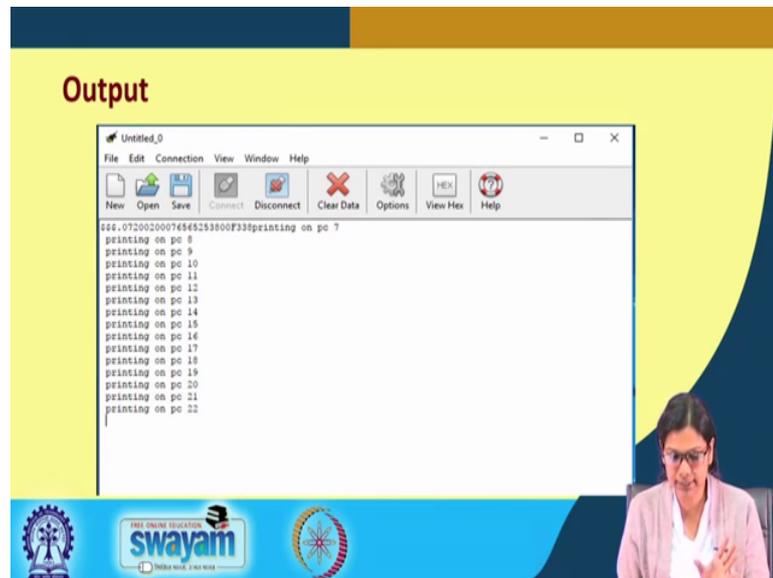
So, once you go to this option you will find this port com 11 here. So, it depends it is 11 for this example maybe, but it depends on to which port it is connected in your machine. So, please make sure you check that and accordingly connect to that particular com port and this is 9600 and press for the configuration please make sure to do this configuration prior to using CoolTerm.

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Now, this is an example that we will be printing. So instead of this example, I will be also showing you by connecting it with one of the sensor that we will be using in this week in the subsequent lecture in this particular week ok.

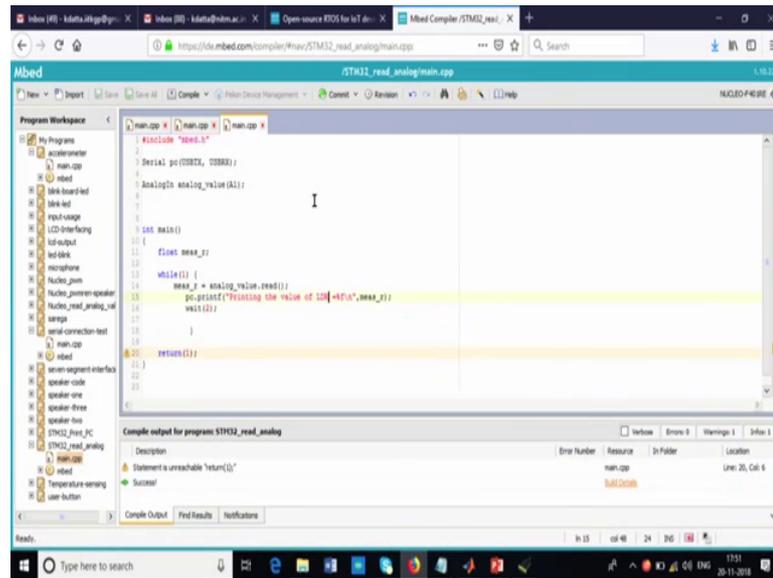
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So once, you write a code you make the serial communication the serial communication will be made using this object that is serial PC USBTX and USBRX and here in this case, we are just printing some value from the microcontroller, but in general case, what we will be doing? We will be printing the sensor value this is really very important that what value we need to print it. So, we will be printing the sensor value, this is how the output will be shown. In this case, the output is just it is getting incremented.

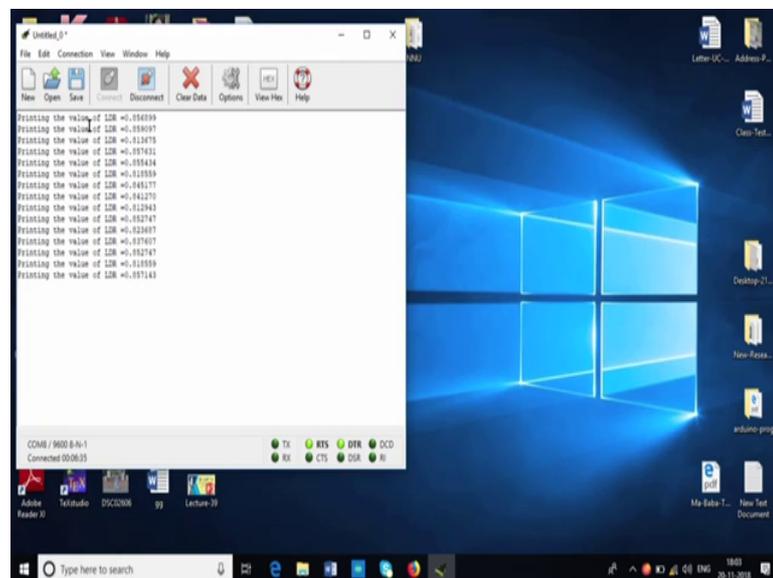
So 7, 8, 9, 10, 11, 12 and if you this is just a screen shot that we have shown, but if you want to print the sensor value accordingly it will go on printing and you can put a delay basically. So, such that the values will get printed one by one by one with certain delay ok. Now, I will be showing you the configuration ok. I have already installed a CoolTerm and this is how it goes ok. So, basically you have you can disconnect it and then again you can connect it ok. So, just a second I will just make the connection first.

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So, I will just compile it and then I have already told you, how you will dump the code. So, I am going to the download folder, where the code is available, which I will dump it in this and then I will it is not showing up actually.

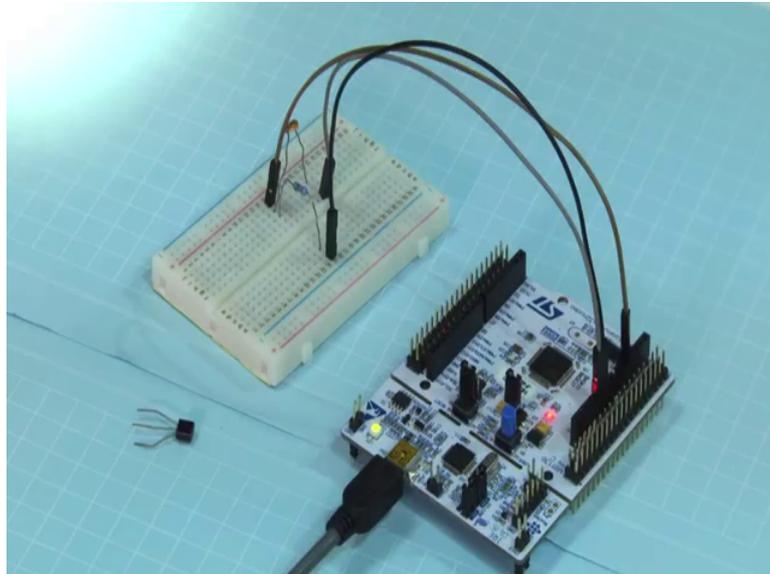
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So, I will disconnect and then again connect ok. So, this is where you can see that we are printing the value of LDR, I will show you the connection that I have made, I will clear the data such that. So, this is printing some value LDR is it is getting some value this value is received from the analog pin and after analog to digital conversion it is showing

this digital value. Now, I will just show you the connection diagram here ok. So now, you see this is the LDR ok.

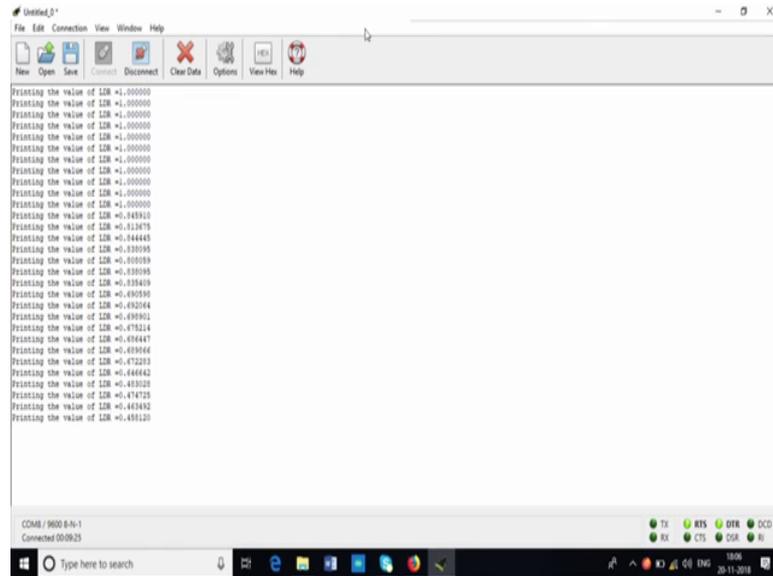
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So, this is the LDR ok. So, this is the LDR, how I have made the connection, later when I discussed about LDR in detail, I will discuss the connection, but here the straight forward thing one part one point of the LDR is connected to bcc another point of the LDR through a resistance is connected to ground ok. This is what we have done and we have seen that what value we are receiving.

Now, what I will do you see that from this point, we have got the analog input into this A1 pin ok. So, we have got the analog input from here to A1 pin, what I will do basically, now is that I will put this bright light in this LDR I puts put some bright light and slowly slowly. I will take away the light and I will show you the screen, where the value changes now you see. So, I will first clear out.

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```
Printing the value of LDR =1.000000
Printing the value of LDR =0.948910
Printing the value of LDR =0.812675
Printing the value of LDR =0.644445
Printing the value of LDR =0.530595
Printing the value of LDR =0.400000
Printing the value of LDR =0.330000
Printing the value of LDR =0.336439
Printing the value of LDR =0.480590
Printing the value of LDR =0.492044
Printing the value of LDR =0.600001
Printing the value of LDR =0.478214
Printing the value of LDR =0.494447
Printing the value of LDR =0.490044
Printing the value of LDR =0.472533
Printing the value of LDR =0.444442
Printing the value of LDR =0.470000
Printing the value of LDR =0.443492
Printing the value of LDR =0.489120
```

So, you so now, I will show you the screen, I have cleared out the data. Now see, it is printing 1, if you can see it is printing 1 ok. The maximum value the range of the digital output is 0 to 1. So, it is printing 1 now slowly slowly, I will take away the light ok. Now see what value it is printing? Now it is printing 0.8. So, the value from 1 has been reduced to 0.8. Now I will put my hand there once, I put my hand there you see what value it is getting printed. Now it is getting printing 0.6 ok. So, slowly slowly the value is getting decreased, now I am putting little more hand. So now, it is coming to 0.4 and finally, I have put my hand here and now you see that it has been reduced to 0.2 ok. So, I will just clear out the data once more such that it is visible to you.

So, you can see that how various levels of LDR, I mean depending on the ambient light, how the value of this LDR changes I will I will explain you in detail when I show with multi-meter in the experiment in the later week layer in this week later lectures in this week, but you can see this. Now again, I will remove my hand and you see it is now showing 0.8 and if I put again this light this bright light it will become the maximum that is 1 ok. So, this the showing this experiment. So, this is all about the experiment.

So, we have used CoolTerm to connect with the microcontroller and to display the some value some any value that we are receiving from the microcontroller into this PC. So, prior to that I will just show you the code that that is there for this one, you already come

across with the codes, how you have to download the code, how you have to put the code into the STM board.

Now here, first you see we have to make this connection serial PC USBTX and USBRX this is the first thing, you have to do and here we are reading an analog value will see in the subsequent weeks that we will be using or reading many analog values with various sensor, when we connect with temperature sensor with LDR. Here, we have connected with one of the, with one of the analog pin that is A1 the LDR and we are receiving the value using analog underscore value, this is the object that we have created corresponding to A1 pin dot read it will read the value.

And we are simply printing it using the object that we created using the serial connection pc dot print f the value of LDR mes underscore r. This is the variable where we are storing the analog value. We are waiting for 2 seconds and again we were printing it that is what we have shown you in the code. So, this is how you have to use a hyper terminal using STM board again, I am saying for Arduino it is straightforward, you can directly see it in the serial monitor, but here as it is not available, you have to use 1 on this serial monitor that I have discussed just now.

Thank you.