Electronic Systems for Cancer Diagnosis
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Lecture – 62
Data Acquisition System Continued

Welcome to the module. So now, we are going to introduce to to our another unit which is available in our lab which is C-DAC, which is called Compact DAC.

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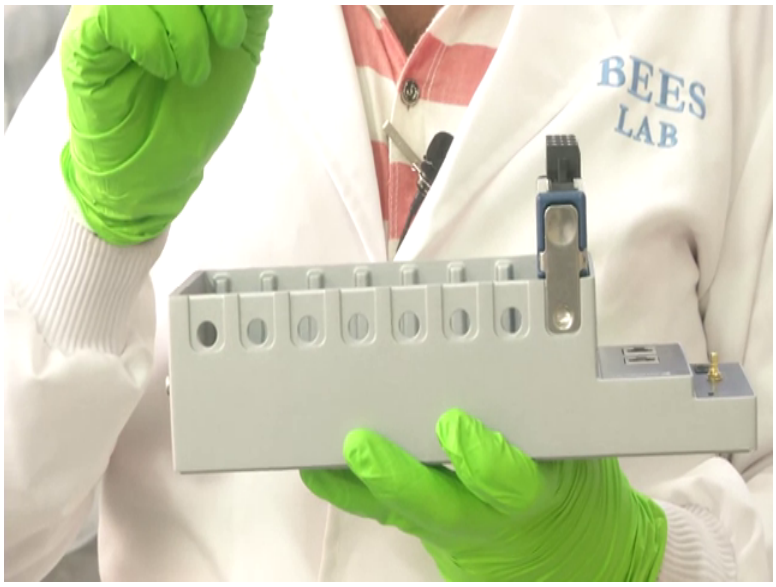

So, the advantage of this DAC when compared to that particular device is that, even it can perform the same, but much more advanced manner. It has better accuracy, better resolution and better sampling rate too, so that even a smaller signals that is required to be acquired can be acquired using this device. So, this I am going to place it on our anti vibration table.

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So, here we can see the both the devices, one is the previous device which I have explained you virtual bench and the compact DAC, I am going to play some my anti vibration table. So, this is an anti-vibration table you can see, so that even any vibration it cannot affect of the system that is being measured. And on top of it, you can see different channels modules those are called different varieties of modules which are available for the data acquisition unit itself.

So, we can see here one is analog input channel. So, where it can be used for input the current as well as input voltage too. And it has an onboard ADCs as well as amplifiers everything. And, this is for you know bridge kind of a circuit it can perform both half bridge and full bridge. So, in case when we are dealing with force sensors or strain gauge based force measurement units. So, since this is our these are resistive types of things as one way is you require to convert your resistance change to a voltage output.

So, one way to do is either a half bridge connection or full bridge connection. So, full bridge connection will always have very good sensitivity as well as very less linearity error when compared to that have your half bridge or something. So, in order to construct that, so if we have a precise, if we have a very sensitive signal conditioning unit, so it gives you more accuracy on your measured voltages. So, one way to do is if you have an onboard the data acquisition with a onboard signal conditioning unit, it helps very good. So, how to place in this, in the sense? So, if you see to the chassis it contains different a

number of channels, so simply select the required or required signal conditioning unit or they call it as a module, and place it on the appropriate channel.

So, the advantage is that it can be interchange, it need not be fixed only to that particular channel even it can be fixed to the last channel anywhere wherever it is required. So, we also have analog output say it can produce up to 20 milli amps of current, and it is a 16 bit analog output too. So, even this you can use it in the same chassis itself, and all units can be performed at the same time.

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And other one is a quarter bridge analog right the difference between the previous module which I showed to this module is by making use of the previous module, you can perform a quarter bridge, half bridge and a full bridge. But by using this module we cannot perform half bridge as well as you know full bridge. This is only meant for quarter bridge applications. So, even this I can place it on the module on the chassis. Just simply plug and play, very easy to connect it, and this is another one which I already told you its analog input either voltage As well as a current can be taken as an input to the system.

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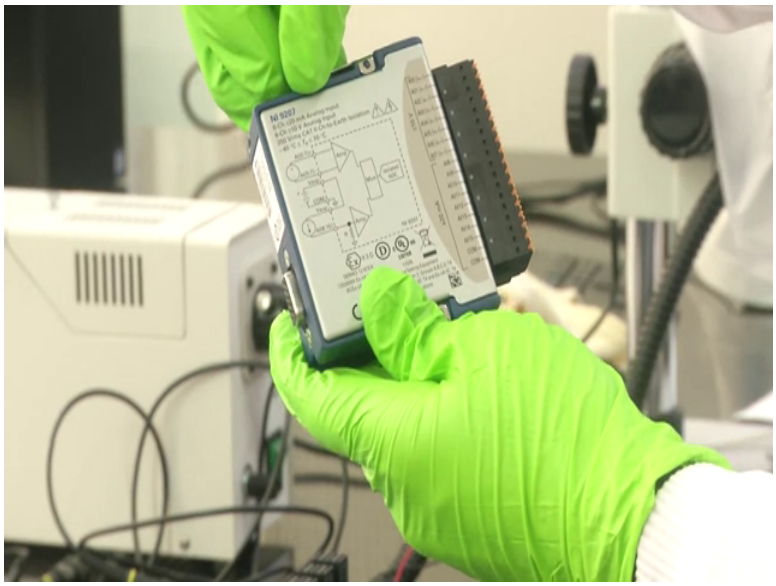

So, even this I am connecting it here. Now, once I plug in, so if I want to visualize, and if you want to acquire the data in a PC, so what we have to do is that. So, since it is a compact DAC. So, it should always be connected to a PC. One way of connection is either directly connecting the land connection to the PC or if it can connect to the same network. If it can connect to the same network, the purpose can be served. So, now, I am powering it up. So, we can see here, the power has been powered up. And it is connected using a LAN right. So, what I do is that, I will take a few wires by using this work virtual bench.

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I will connect to the dc power supply. And if I vary the signals from the dc power supply, we can observe the signals being generated being acquired using this C-DAC in our monitor. So, signals can be generated using PC from the virtual bench, and the same signals can be acquired using another compact DAC, and can be acquired into this data acquisition device to the PC using this data acquisition device. And even that we can visualize.

In between there is another software called LabView. So, what we can do is that whatever the data that is being acquired using this particular device that can be acquired using the device and can be done at further processing using that device. Or if I want to make use of the same device for controlling even we can do that. So, now what I will do is that in order to make understand our self, so I will connect power supply unit to this and this is the positive. So, what I am doing is I am unplugging this device. So, here if I see A I 0 plus and 0 minus.

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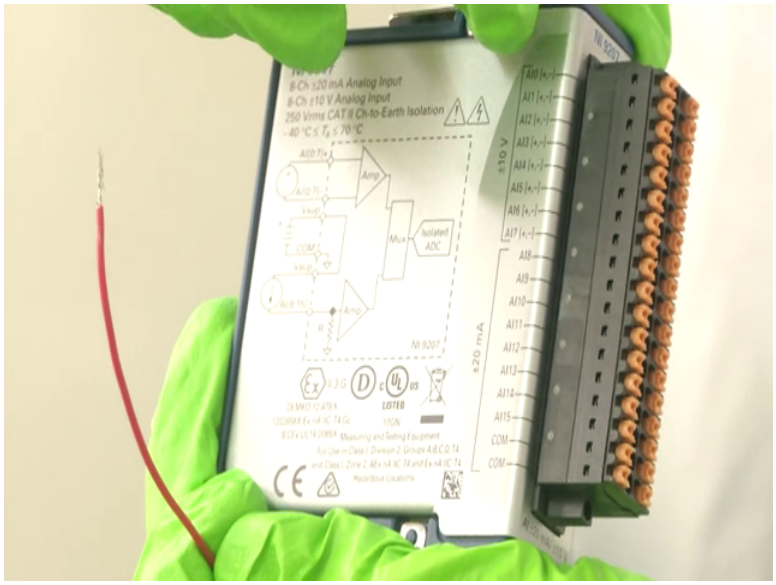

So, the first channel, so here if you see there is different number of channels starting from 0 to 7. So, total it has 8 channels for analog acquisition which can measure up to plus or minus 10 volts. So, it has both positive terminal and negative terminal. What it does is that it can measure a differential input, some cases where when you are using a quarter bridge or when you are using a half bridge or a full bridge, whatever the voltage

signal it is being generated from this grid signals are not a independent voltage. It is a differential output voltage.

So, if I want to make use of a differential input, one way to do is that we have to make use of this device. So, what I do is that, I will connect this is some kind of a spring connection. So, to the first channel, it need not be only to the first channel, it can be connected to any channel. So, right now I am connecting to the first channel. So, since it is a spring device, I have to press it and the places.

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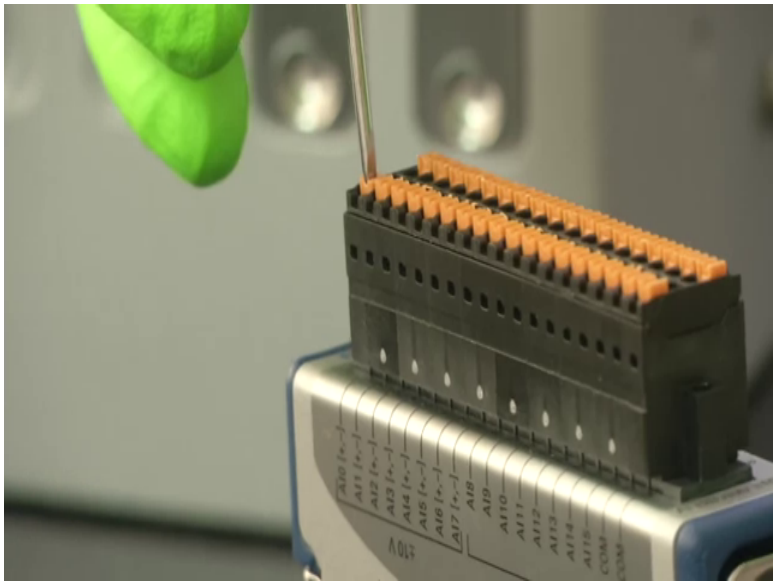

Connect it then to the negative. So, while pressing it, I will connect it. So, now we see how do we connect our negative. So, since it is also spring, so I am pressing it, and placing it into the hole (Refer Time: 08:24). So, now, it is connected. Once it is connected, I am placing it into the chassis. So, the number is this 9 to 0 7. So, whatever I am using is 9 to 0 7 right. So, from the hardware point of view, we have done all the connection, necessary connections required to acquire the data using the C-DAC. And to generate a data using voltage signals using this voltage source from the wire bench.

Now, how do we acquire, how do we visualize the signal in the software that we will see them. So, last time we have already seen how to generate a data using national instruments workbench. Now, we will see the generation in the software and acquisition using this level. So, once we finish our hardware connection, so now, we will look into the software. So, first step is generation of voltage signal. So, to generate that first I have

to open the virtual been software which we have seen in the last time. So, right now it is being connected using Wi-Fi device that we can see here and I am going to virtual bench software start NI max this is for C-DAC just to test the device has been connected and whether it is working or not.

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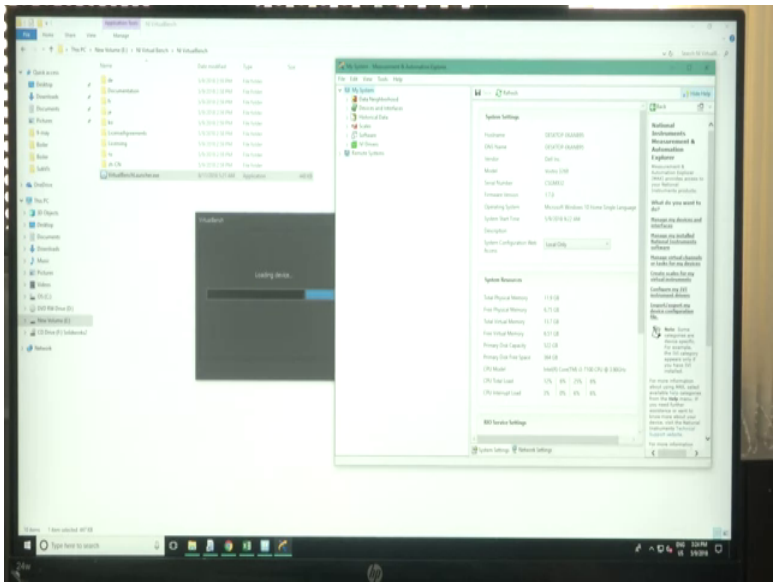

So, here we can see since it is connected using a LAN in a server. Here we can see what are all devices is being NI devices being connected in a max. And here if I click on to the network devices we can see the device name which is connected NI DAC 9189. So, on top of it, if I refresh it, what are all the channels is being connected can be tested here. It can be seen here. So, here we can see that device under the network devices we can see what are all devices being connected on the same chassis what are all different modules are being connected.

So, right now we are making use of the module 4 which is connected at the fourth channel which is NI 9207 which is being connected to that. So, if I go to the test panels here to just test whether the module is working or not, so we can make use of the test panels and we can work through. So, I will go through the continuous acquisition and the channel whatever I been connected is was AI 0.So, I am selecting AI 0 channel. And the samples to read is 10 samples, and the sampling rate is 28 if I say what value is that from the virtual bench software which we have seen last time.

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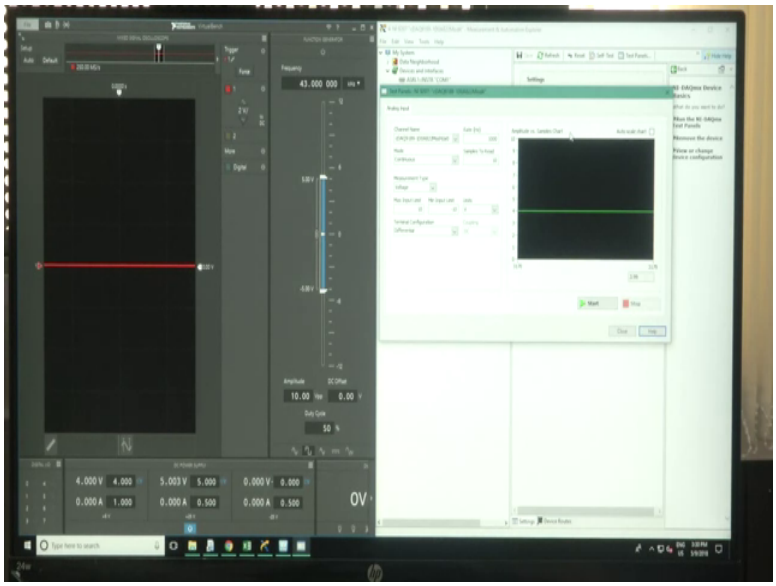

Since I have connected at dc power supply of 0 to 6 volts to an input to this particular module nine 9207. So, here I will be switching on this module. So, right now I am playing 0 to 1 volt in the test panels in the test panels. If I start it, so in V c here; so, the input voltage is being applied in 1 volt, we can easily see in the test panels. I changed to 2 volts, changed 3 volts, but why it is slow because the sampling rate whatever I used is of 2 volts. If suppose if I make it as some 1 kilo So, I can see very fast change in the input voltage 2. So, the maximum is 6 volts, 6 volts. So, this is the one way to check whether the tester panels or whether to check whether the particular device is being acquired or whether the device is working or not by using the test panels.

But if I want to do some further processing, we cannot do any further processing using this particular test panels. So, how to do in the sense, we have to write a program or write an algorithm in a LabView software. So, I can open LabView. So, once we open it. So, this is how the LabView one looks like. So, new va. So, here we can acquire the data using measurement IO or we can go to express and I can make use of single input data assist.

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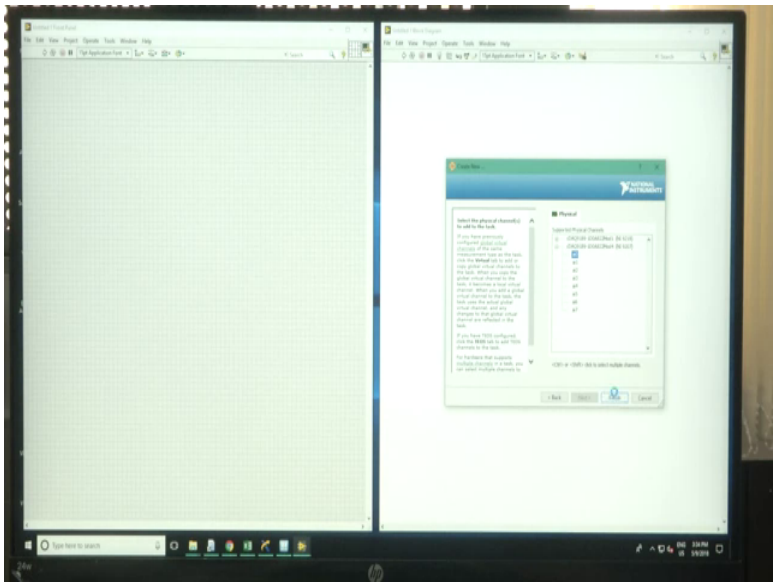

Acquire signals analog input voltage by using module 4 AI 0, this where we have connected to 9207, just finish it.

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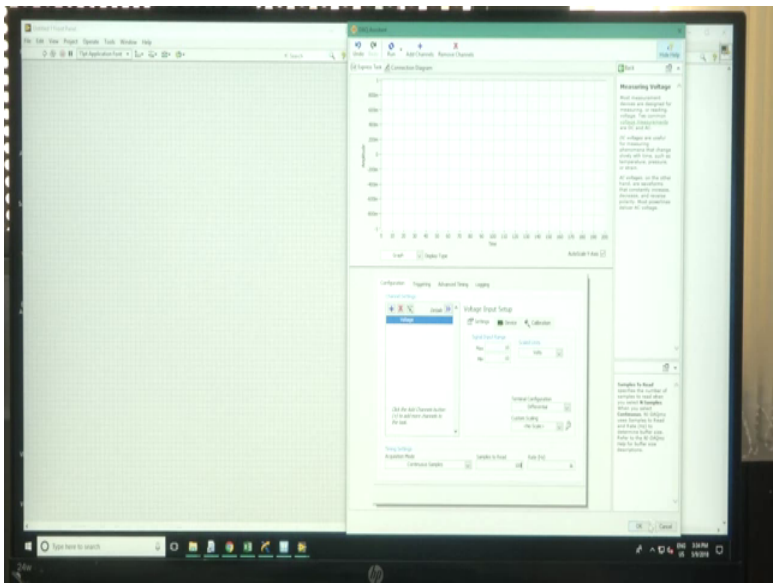

After this, so how many number of samples that we need or I can make it as continuous samples. Then samples to read rate at these have 10 k or 1 k we can keep. And the samples to read I am making it as hundred samples history yes.

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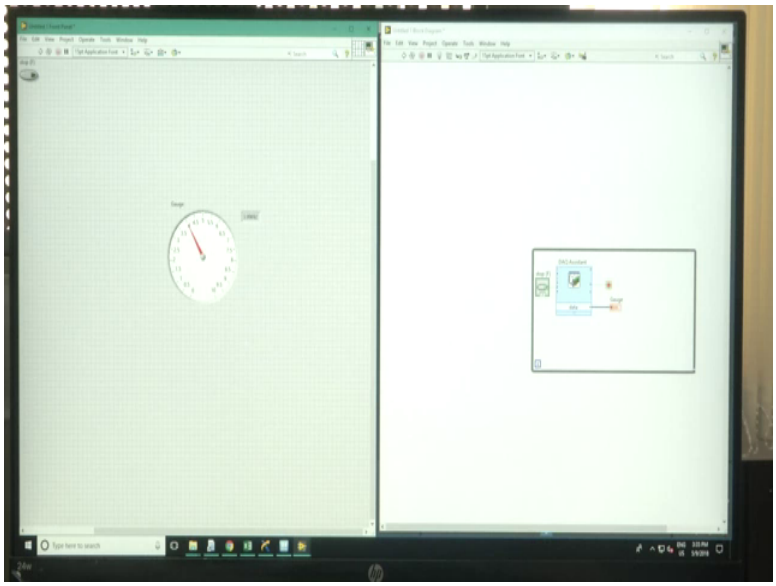

So, the data whichever is being acquired, I will be displaying it on the front panel by using a meter or some gauges. So, I am connecting it to the gauge this is a case and connecting it to the data. So, if I run the PC system, so let me switch off, I will enable digital display to this too, digital display, so that easy to visualize the digital data. And I am switching it on. Once the switch is on, we can see 3 volts, 3 volts, 2, 1 right.

So, whatever the data that is required, we can acquire using this particular software. And using the software with the different functionalities that are available with the software like different loopings that we want to do, array functionalities, numeric, any other applications like control, logical, and activation of something everything can be implemented here. And again we can give it back to any plant. So, this is how this can be useful for acquiring as well as a monitoring our acquisition of the signals from a sensor and to do the processing using that.

Thank you.