Electronics Equipment Integration and Prototype Building

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Lecture – 07
Top Down, Outside To Internals

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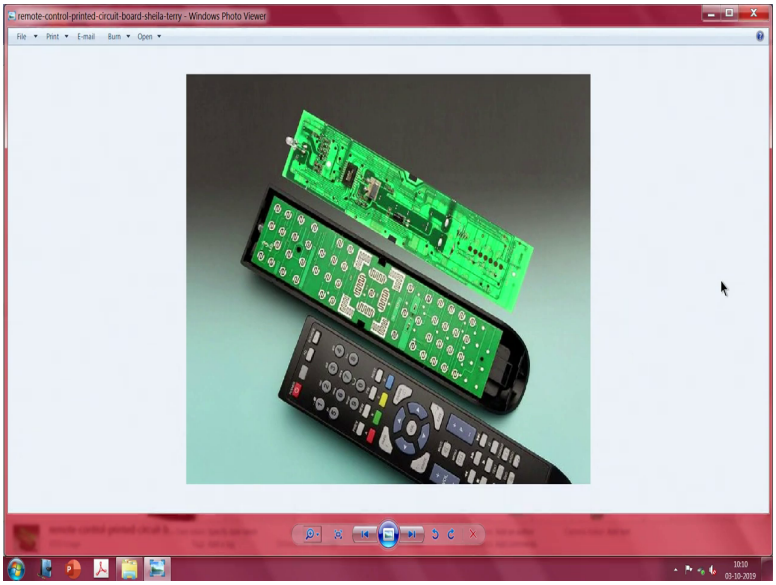

Hello, let me continue where I had left off last time. Please have a look at the monitor this was inside the one of the remote controls.

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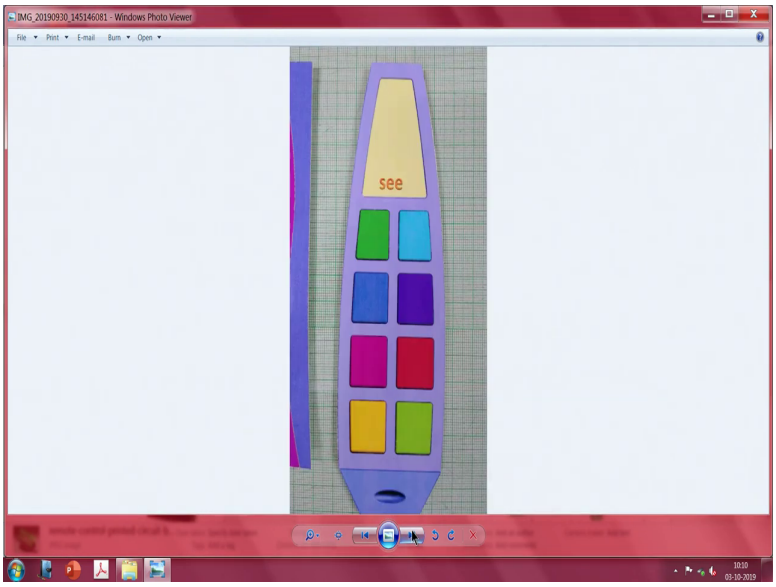

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Now, what I had told you then and what I continue to tell now is that, several of the extra features which the show here are not that much useful for us anymore. For example, this had something called some text option something and so on subtitle and all that they need to be supported by the channel who is what you call giving us the facilities.

And some of them are probably archaic; mean things like oracle tele text and all that which made sense when these remotes are being made are no longer that popular. At one time practically, but if your channels were there and total bandwidth available was very small; like we did not have that only small number of channels narrow bandwidth. At that time, it made sense to cover as much as you can using this text option using all these things right now because of the divergent standards and so on they are no longer as universal I would like to have.

So, in the end we will end up with a device which is just about having additional features, which cannot be directly appreciated or sometimes they will be quite irritating to have them.

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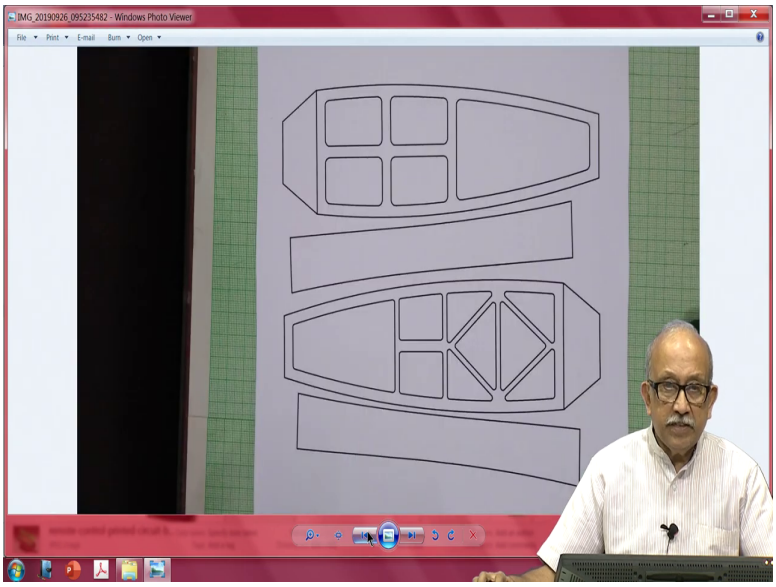

Now, if you look at this if you remember I had started about saying, let us have a what is called you know best a top down approach. The top down approach being can I make a remote which is current and useful and has functionality which is just about sufficient. And once again here because of the usability or experience issues one has to quickly make a prototype pass it along to your team. And make sure that it is very very quickly produced for which a prototype is required.

And now, even for a prototype where I had started with saying, how most of those things what you share there have got made was long ago using a standard graph sheet and various types of decals. This is our industrial design was maybe around 30 years back; a few places

that were other things that are straight up software and all that, but eventually what we had was good old way of managing things has best as we can.

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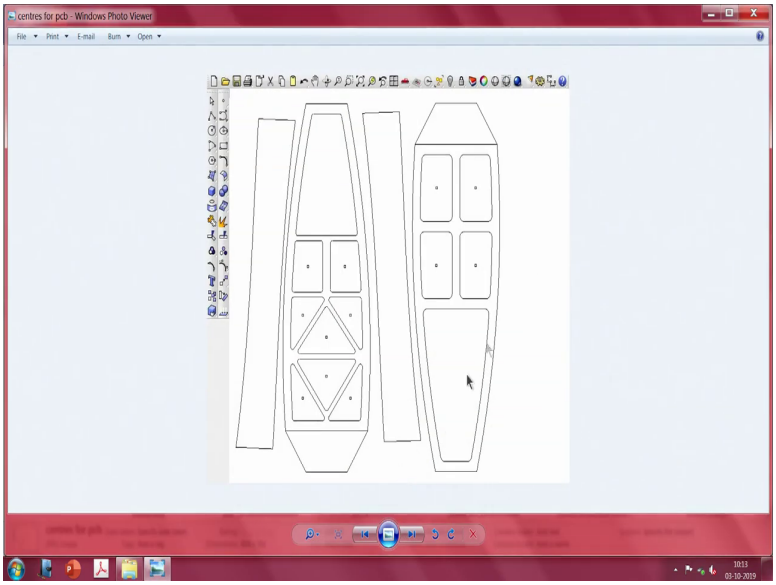

Now, if I take one of these have got layout basically done by any illustrated program illustrator program fortunately, we have trial versions of so many of these two d packages. And it was made by using one of them even today you can try on your own whichever is good.

So, I will not name any things on the other way. One of the things you will notice is there are buttons and buttons and buttons there; in fact, so many things to press, so many things to do and all that. So, if I go back here you see here there is something on one side there are this what looks like you know it could be you can treat it as a right button or a left to button there is a left and right; I mean up and down and then we have this.

Now, the point is trying to make all along is in the case of electronics equipment 2 realities exist; one of them is you must have a working circuit and from there you should be able to estimate what will be the size of the eventual equipment or small device you want to build that is.

I am not contesting it; because occasionally you know we end up with this question saying chicken or egg even nature no has lifted to us. Having done this, now we come across in the simple graphical way it is possible for us to add certain small mark centers of places what we have where we need to keep the switches.

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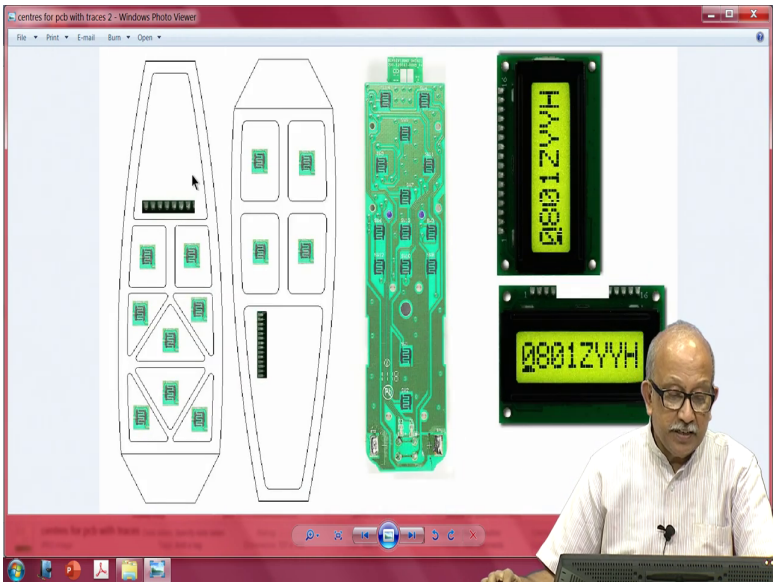

So, I will close it again I will try to open this ha things are interesting. What I have done is, I have taken a existing device and copied this pad directly here to a ordinary illustrated program. In this case the my competitor came with paint shop. So, MS paint is enough for us

to do these things. The critical thing is I am not laying a PCB; remember I am not making a layout in this.

For example, mind do not have in this connections and all that let us just said I am trying to place most important things; because from the users point of view what is or she or they are interested is how well the equipment works not how things are. Its a miracle in fact, if you say a mobile phone its not easy I cannot make one I am sure your kids can easily make one.

So, what I have done is, I have taken this small things I just copied at them copied them at various points. Seen this here looks fine is not it absolutely fine. However, we end up with two unknown; two unknowns. You have seen this great unknown here how did we get in a display here? We do have a problem about displays, for convenience sake we have beautiful rectangular things; because that is the best yield you can get during the manufacture of these devices you understand.

Now, when you try to make this LCD and then there is also a simple dot matrix display. You have to do something to make sure that this goes in here. So; obviously, you need progress the moment you make this; obviously, the first attempt it will not possible to accommodate these things here. However, if you examine these displays themselves, you will notice that all sorts of things are available.

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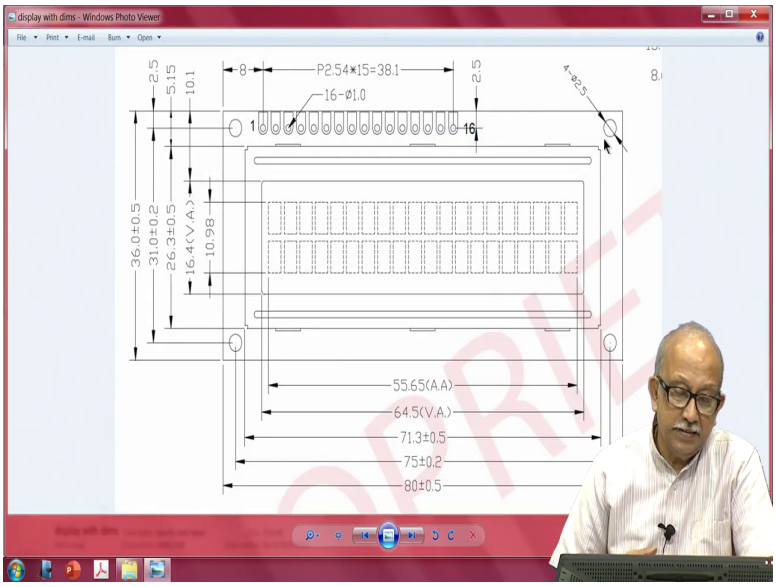

See here the actual window area is 16.4 by 64.15 millimeters this is the window area. Now, all around we have mechanical details; one of the first mechanical details is probably the mounting hole, now comes the thing. If these are made in large enough numbers it is possible for us to re position make these things as we require an order and if I search enough.

If you get it if you have a proper amount of generic demand for these things somebody is out there ready to help us. Now, you see here these are the contacts. Why I am showing is, from the manufacturers catalog probably you will need to take a scaled printout take a scaled print out.

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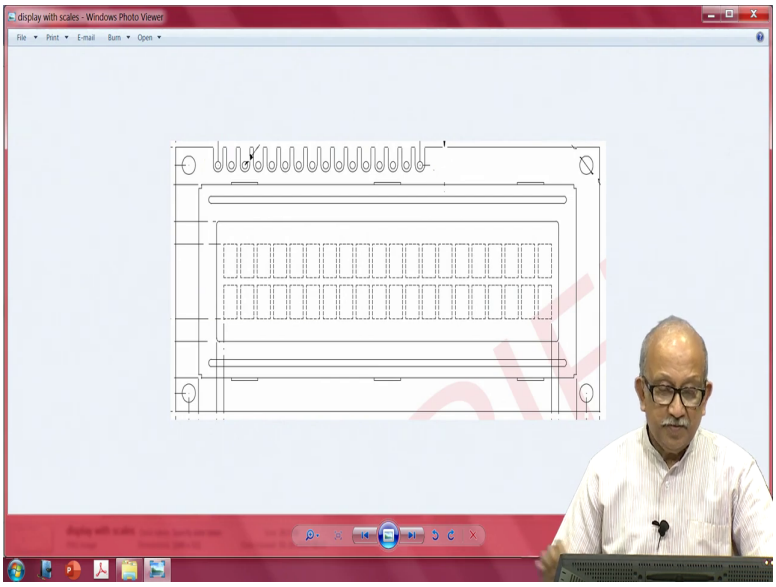

And after taking this scaled print out, cut it make sure it follows the dimensions that are mentioned in the datasheets. Now very conveniently, you can go around placing them wherever you like and see whether you can get it fitted into this tough is it not intentionally, I have taken something from a random size and try to attach it to a wiring board. And these are not the compatible ones absolutely there is something else. However, if you go down a little you will notice.

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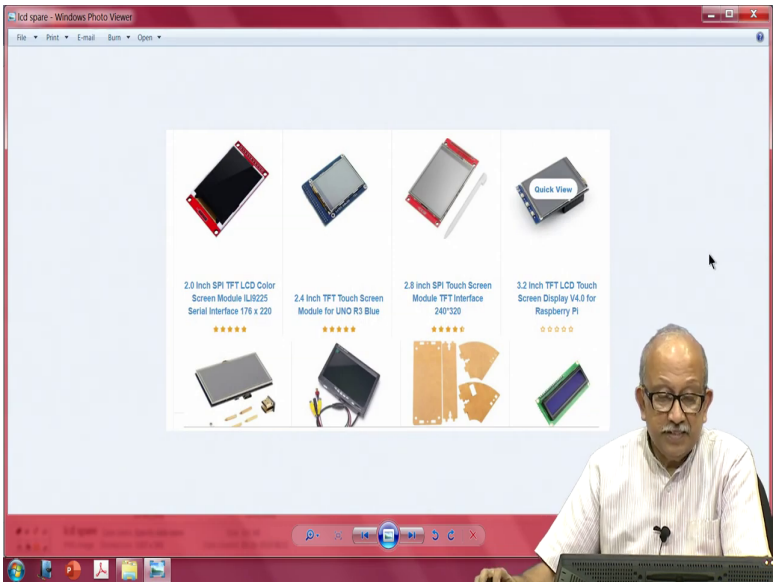

That see such a large number of devices are available here. You have 2 inch with serial interface then 2.4 inch , then we have 2.8 inches then we have 3.2 inches and so on and so on you know.

These small displays have been made available because of demands by designers like you. And for the first device most even if you are to scale something by say 1.5 times its not going to come to the end of the world, you can always have a working model based on all the position of all the components which I have shown you and show it to next team with whom you are working.

I am sure too many times they have heard the saying we work as a team and I know we do not have over the world design its partly true. But at least for the first time to see what it is, the designer of the device wants and what is it the electronic design people want. And finally,

what is it that the production people can make and what they go about depends a lot on all these things ok. I hope I hope made my point I thought I will just stop here.

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Now, if you go and examine one of these things a little closer, see here I do not even know what it is called it just says LCD module; there off keys here what looks like another header is there I still I actually do not know what this is. And then we have this beautiful module here. If you have the module its fine but the time where you are trying to start the design it is unlikely that you have even decided what module is required. At that point that is what I would like to say saying you can probably get a something like this.

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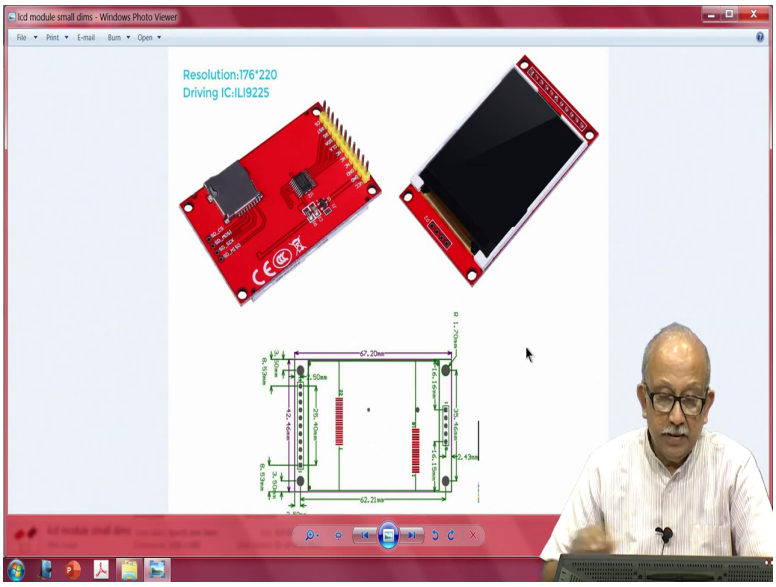

And now, you see that you know things like the overall dimension of 67 millimeters by 42 millimeters this is there.

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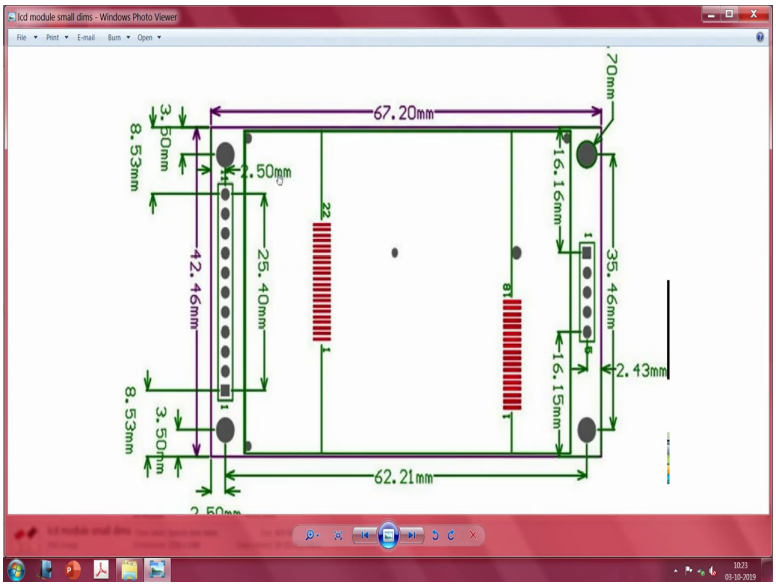

So, cut a small template and this is where they. So, far what I have been talking comes out. If you were to make a template like this and keep it and its very easy for you because its basically 2 dimensional take a cordion plated folder and then file all of these things. And you have all of these things forever because usually have to start by the time it comes into production and by the time it comes into production. And often, we end up with saying say the center distances are different saying the overall dimensions are bigger or smaller it will be useful for you. If you have it and your files can be updated seen that no the importance of having a scaled drawing is very very useful so, it comes here.

Now on the other side so many things are there. So, you have something I really do not know it is you know in common this thing it looks like a reset button then this looks like the power

supply and ground buttons and we have all this beautiful layout. And there are enough programs where you can take one of these things and straighten it Photoshop is one of them.

Otherwise, I am one of the reason of fan of Autodesk pixelab; I can put this in Autodesk and then rotate it and then what you call distort a few things so, that it looks exactly to scale. Now, once you get a device like this its very very easy for us to keep a template of it. So, we have a box of templates which show various things here.

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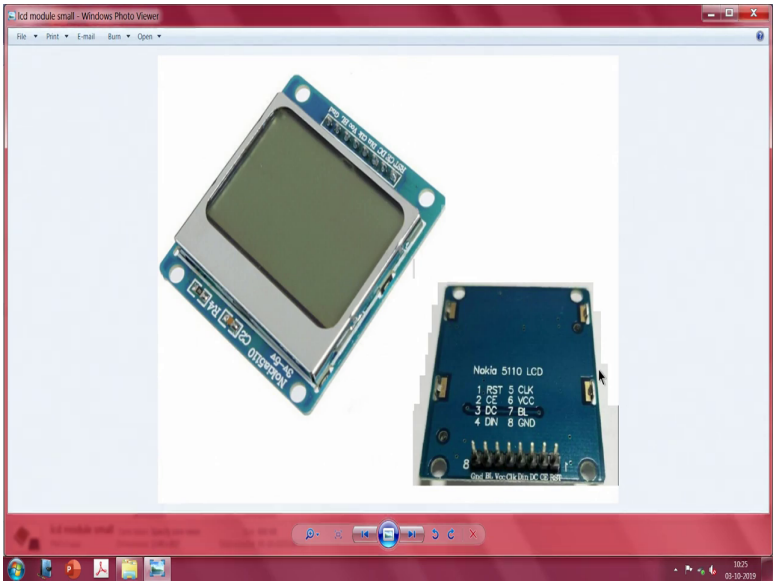

A smaller LCD model I do not know where I have got it. Once again just kindly remember things like these mounting holes and all that, as it is supplied it comes like this. However, if you have them in large enough numbers and there are people out there who will help you re engineer these devices such that you need not exceed this LCD size on one side.

So, probably you can get rid of this dimension this dimension and so on you have a neat compact device you can use wherever you want. And just reminding myself and reminding you that , most of these the devices which is around all started with simple handmade cardboard models which I am suggesting know that you can try.

Now, seen here in the illustrated program I have marked the centers after that, I have tried to add all these things. And finally, at this point we probably need to look around and see what best we can do things here, can you see this?

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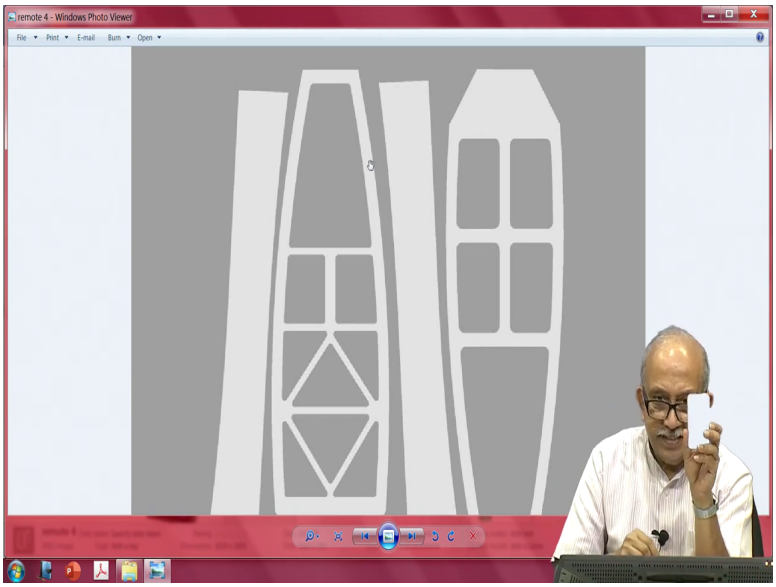

Why I am showing it is that, two important points which I need to point out. Here one of them is these are its just a I will say cardboard sheet or whatever I can say it. And this is the external display which the user will be seeing it.

So, I will make this a little smaller seen this no this is the display user will see it. In fact, probably you can make a cutout and place a transparent shape like those polyester sheets, we were using earlier for overhead projectors. It has two important things; makes it meaning saying you are trying to make it look like a display and the other thing is you can mask things at the back you have seen it no you can happily mask things at the back.

So, the actual display maybe an odd display probably sticking out like this rectangular thing. And in fact, I can probably move it out also then this is only a thing which is visible on the outside, but the actual you know display can probably be you know coming all the way here you understand. And you need a mask of the shape and size which will make the display what do you call very very useful. Now, kindly look at this sir can you switch on that this thing ha right.

I am sure oh its falling through its a blue chroma; this is nothing but a small device from well known Mentos packet it looks cute looks clean and one side if you see here this one is a transparent blue color transparent sheet. And all you need to do is make a sticker when you put it next one I will show you finally, I will come back once again back to this

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I am not suggesting that you know you do this the only way just one way of just pointing out that its possible for you. Because these are all standard sizes this typically 50 mm that is 2 inches and these are all 100 mm that is around 4 inches and the thickness is half an inch that is approximately little less than 15 millimeters. So, this looks very much like various types of remotes and things which we can use.

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Now, you see this is what I was telling you this is intentional I have a cabin fan here on top, which I wanted to control then I have a what you call air conditioner cooler warmer and so on. And I have this Mentos box have you noticed something here this part of the case transparent ah. I am sorry this part of the box is transparent.

So, in case I need to do anything I can just make a small cutout here and mount a display as I like and at this point I can go and add keys to make it a little more meaningful. But this is exactly what a very simplistic view of product design is. Saying I take a available some device and then try to stick things around and make it look like a product, which is actually not the correct way things are. But instead earlier if you remember I had shown you something else.

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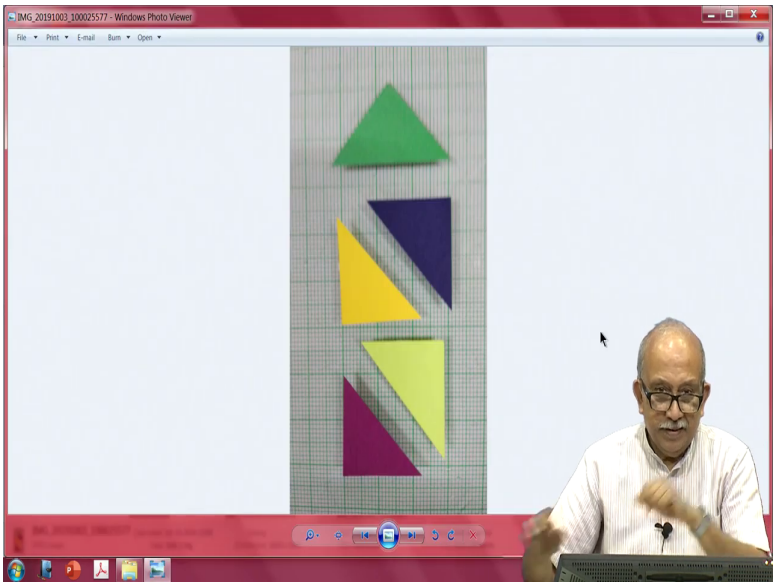

So, my colleague helped me make this what could be called keys; they are all just been made with cardboard of different colors. And you see here when you put it on a graph sheet typically this is about just a little less than a what you call 2 centimeters. So, this thing sit well in a 1 inch by 1 inch matrix. So, if we can just take a 1 inch by 1 inch matrix things sit here and eventually they even place there.

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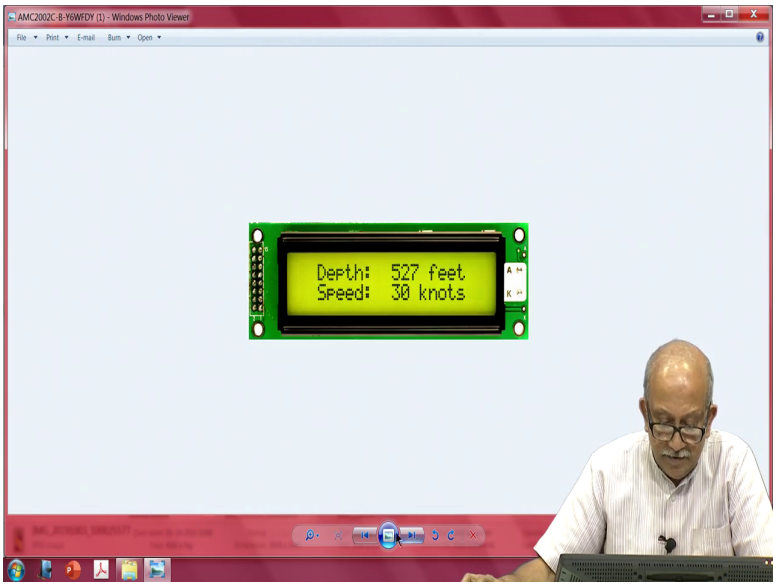

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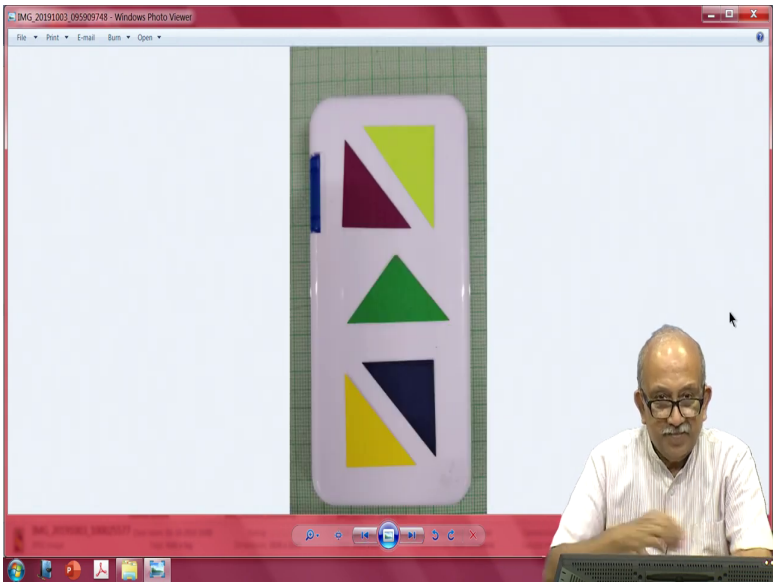

Slowly my concept is getting ready seen that what started has just a box of those mints; slowly its taking shape and looks a little like this. Again do not be distracted by what I was just showing it I thought is one way because I have not yet started a proper thing.

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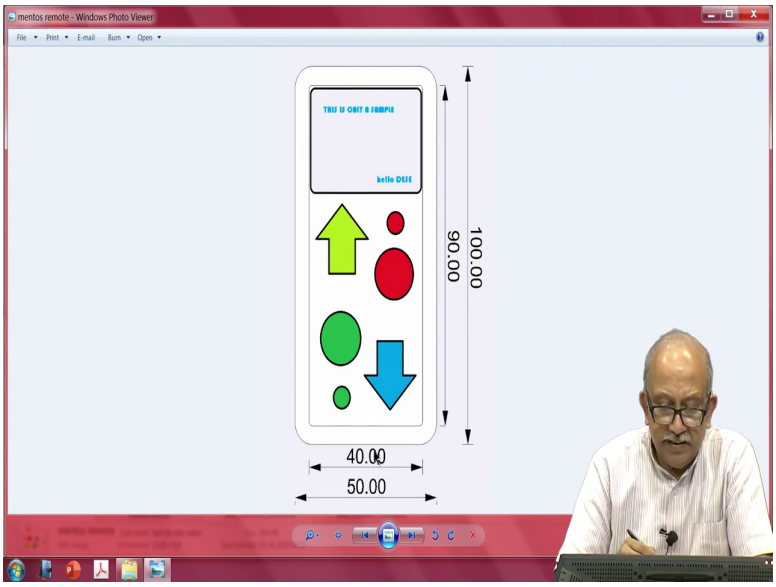

And now you see here what I have done is after measuring the dimensions of the available small enclosure. I have now put all of these things into a illustrator typically, Microsoft paint white has been put is, these are perfectly to scale. All I need to do is take a one is to one printout cut it and transfer this onto a box which I have. So, you see here a 100 by 50 after leaving 5 mm all around and you see the beautiful corner for letting a radius. I have something which is quite ready to be actually use.

So, after take a printout probably I need to make sure measure one more time that it measures whatever it shows here and here comes the next thing. I can add things as I like haha. I am feeling thrilled because I am able to do something and I am sure all of you can do. This again kindly remember I am trying to fit things into the thing which is available. And this seems to

very nicely after living five millimeters all around. I have a usable area of 92 or 90 by 40 millimeters and I can probably make a cut out here.

And in this case, I have added all these things do not ask me what they are just random there right now at the moment this is these are not likely to make any sense at all except this arrow we all know what it is. And then instead of saying increase and decrease I am sure you have seen in some of those devices if you press one larger icon things will go big. If you press the smaller icon they will get smaller. While population stereotype is that this will move things up and down, this probably a small learning experience.

Saying if we keep pressing the button something becomes enlarged with the existing thing done. When I go out again started here transferred onto this. So, that to see how it looks like and there is a concept the only difference between this and this and this is since this is a made in a package where depending on if it can be stored as a raster as a some other way of storing these things.

We can change the sizes easily, understand know? If it is raster not much we can do but then even then we can cut and paste it maybe we can cut it here and then move it up a little and then patch it up. But then a lot of cad packages do not work in cad type especially solid modulers have nubs that is non uniform rational b splines. Those splines are actually lines which are defined by starting an endpoint and probably a middle point.

So, the database contains things about these entities which can be easily modified; that is solid modeling is a separate thing. What I wanted to tell is, for you to start your thing it just enough for you start with a simple raster package.

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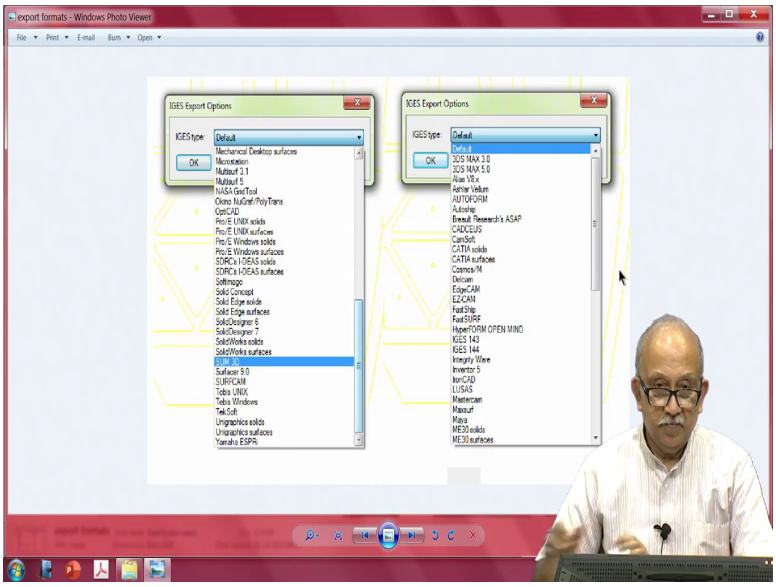

Now, comes the equally important thing with which you, after making a layout in a slightly better higher level of things where they can be stored as splines or lines that are way of graphic exchange programs are possible its called initial graphic exchange.

So, in this initial graphic exchange you see this so many of them are there. For example, Pro E is a very common thing ok. Then you have solid edges are there and if you go down now the good old 2DS max is there and then you have CATIA and the very very original of course, it has then Maya is there. And auto CADs dx off end dw formats are there.

The moment you make this concept its possible to take these outlines and export them to a regular package; which understands ig as dxf or dwg are a very large number of formats which are vector based understand no; by the word vector somehow has other meanings in physics.

But in this case lines which are stored as you know that splines are all called vectors advantage of vector is you can move it around pick anything. And then you know you can stretch it you can scale it you can make it non uniform and all that which a simple two d illustrator may not be able to make. After you export these things using any of these formats now we know very well the data is there. And these formats are the ones which are also used by the printed circuit board packages.

They readily accept a few of the parameters one of them is location; I just for fun I have shown this, but the location of this snow can easily be taken. Another is outline, loosely called form factor I will avoid the word form factor I probably it makes sense in some places but in this case.

And once you have what you want to place where at least the game has started followed no. The game has not what you call have not won the game at least we know what the rules are. So, thank you let me continue in the next session.

Thank you.