Physical Modelling for Electronics Enclosures Using Rapid Prototyping

Prof. N. V. Chalapathi Rao
Department of Electronics Systems Engineering
Indian Institute of Science - Bangalore

Lecture – 11
Components Integration in Models

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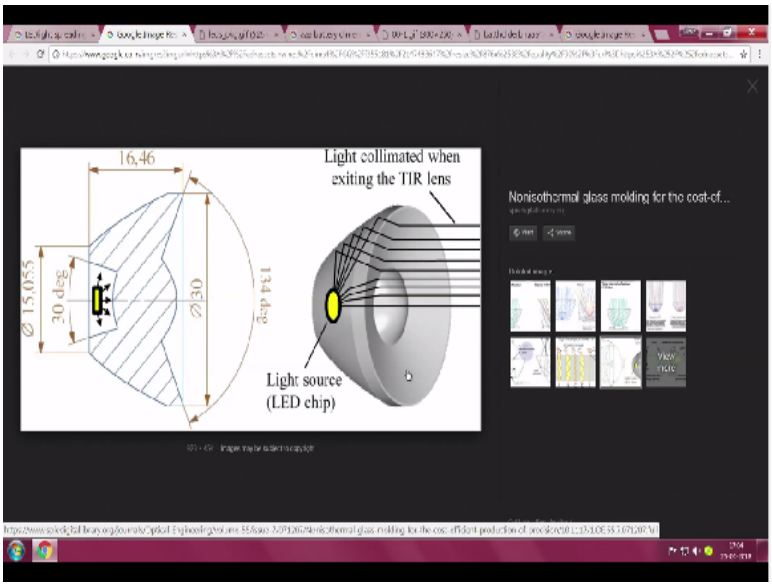

In case you have a chip LED, you now end up with having to design things which are a little like this. So we have the lens here. That lens will also ensure that the light can get collimated. This data from here we probably need to build up in all of our things as we move along. Now coming back to the, my other monitor, the, what you call, drawing I am making. You please look at the other monitor.

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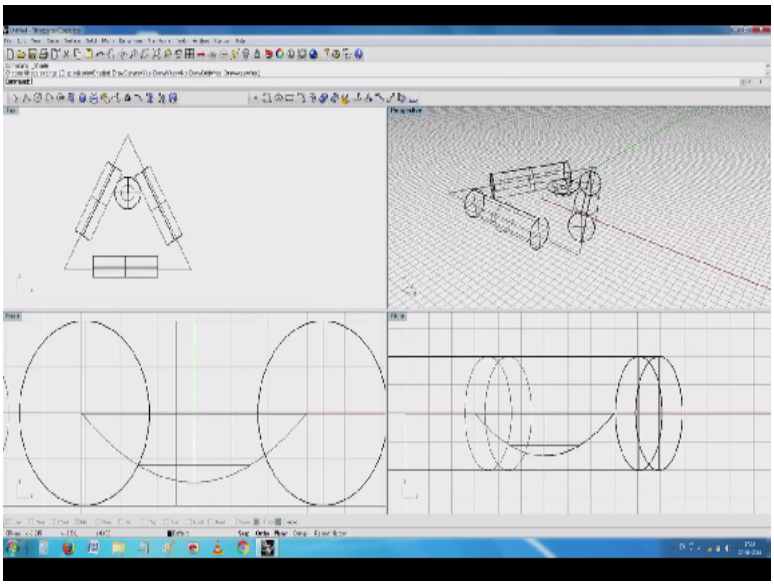

Yes, we are here. You see here, this reflecting the shade, I suspected that something is wrong. It is not, what do you call, it is not likely to be as useful as I wanted. So what do we do here? I now try to make a different shade which is a little deeper. Easiest way for me to make as before again go here and of course, this is very specific to this particular package. See suddenly, I now have a deeper object here. Seen it?

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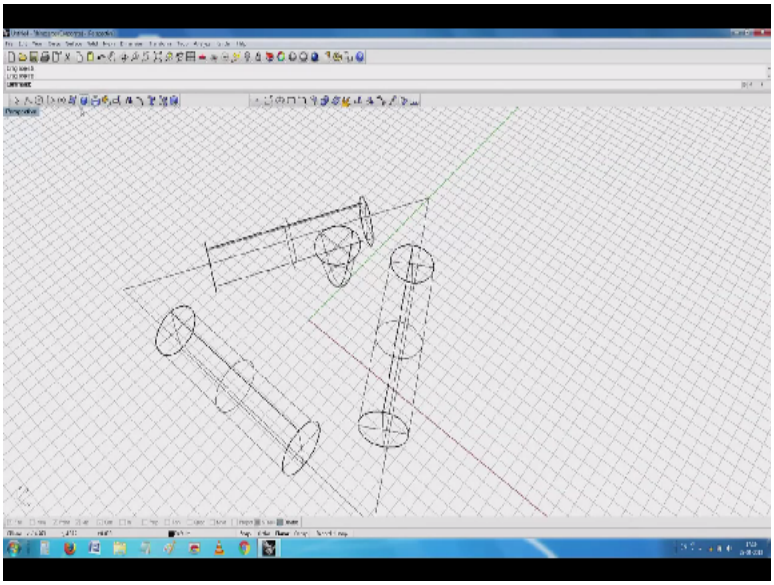

An object which looks deeper. I need to draw a small, what do you call, explode. Remove the cap. Now, can you see?

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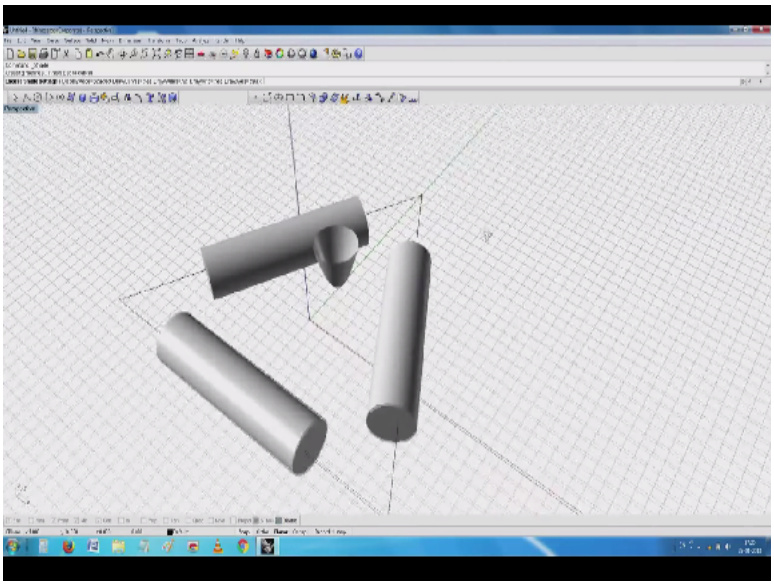

I can see inside the, what do you call, that dome like thing. It now looks a little like the dome which I have shown here.

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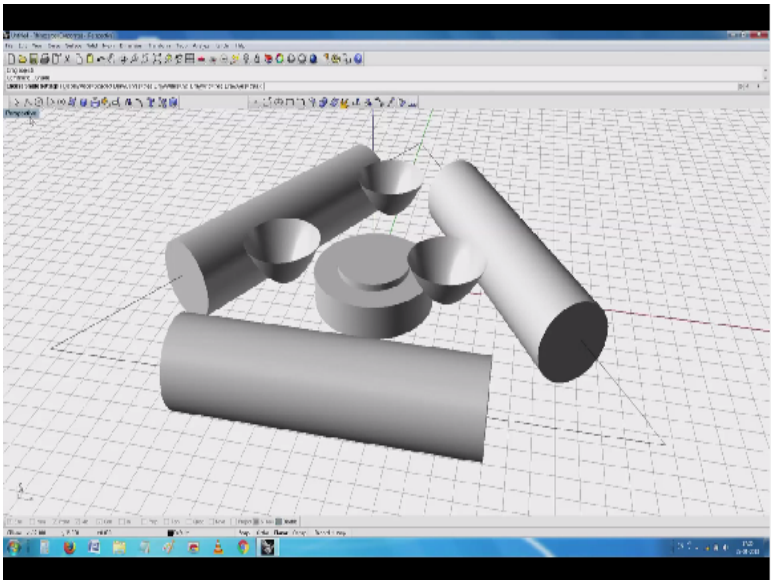

So I need to first time again coming back to what I had shown you earlier. We need to keep building these devices as we like. So it is very much possible for us to play around a little with these objects. You have seen this? Looks neat. And at the moment, I have not, what do you call, putting the LED element inside.

I will just switch on the other objects. Now you will see I have something which is a little more practical. Now I will try to array it I did before. Very very interesting thing have started. See. I

have something which looks, you know, little more elegant and can I now make an LED based on this? LED torch? Maybe, yes. Small interesting things are, I have, what do you call, 3, I mean, place for 3 LED lamps.

I have place for 3 batteries and right now, I have not taken much of proportion in this. Further I can go and say is it possible for me to put maybe a switch somewhere I need to switch it on and off. So just for the, what do you call, for the simplicity, I will create a small solid which is nothing but one more cylinder. What could it be? In my case, let me call it that it is a small switch.

So I will copy one on top of the other, maybe move it up a little and then try to transform it by scaling it up to make it look like a small LED, I mean, what do you call, a small switch. So I have a scale command here. I will full scale 3D command here. See I have some object which is getting made here. Except that it is there yet in my mind, not yet out there somewhere. So it is very much possible that it is a switch of some sort.

One of the things have you noticed, the base point can be here, can be like this and the top, we have this. This is almost the starting point for me to make my actual 3D printed product. The elements what I want are already there. They are the power sources. Then I have 3 reflectors here. Then I have a small switch in the middle. What can it be? I only have a, what do you call? a simple idea of what it can be.

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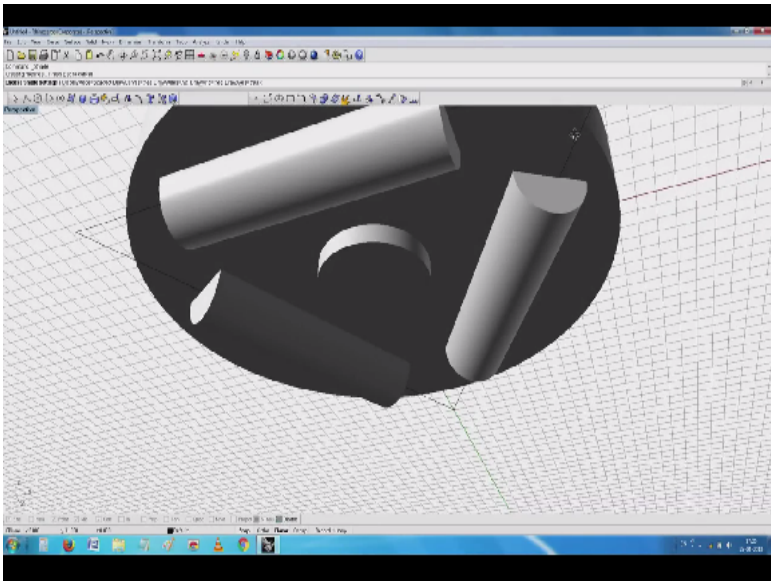

So what I will do here is just as before, I see whether I can start creating, looks good enough. Good enough, okay.

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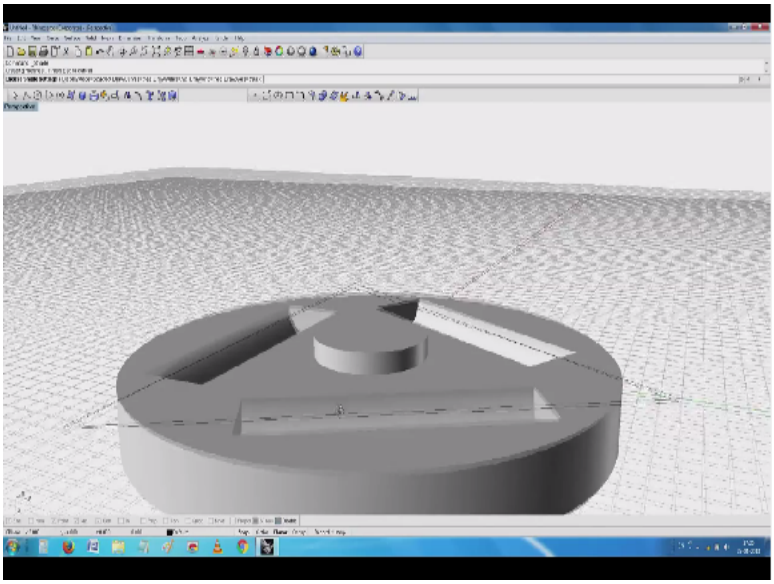

So now I will, what I will see is, I will try to make a simple, very interesting. You see here, I have a cavity which could be a battery holder. Straight away that is a battery holder. No issue about it at all.

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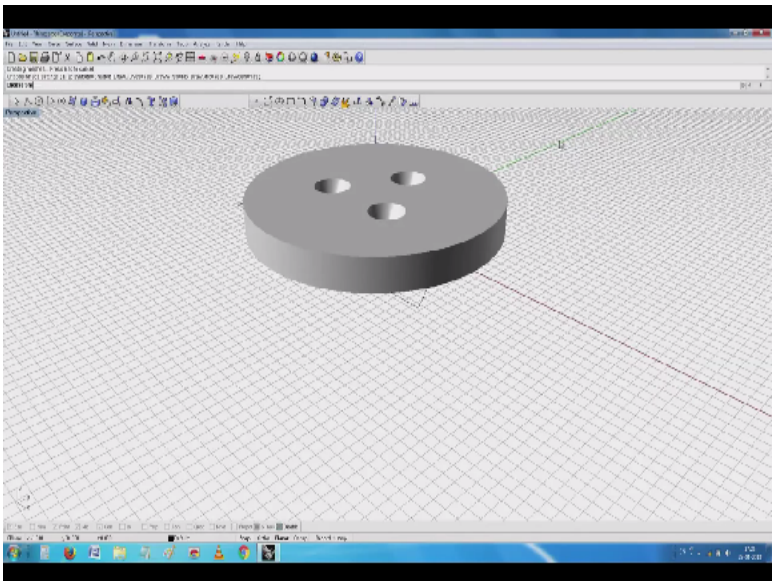

And now I go the other way and see what was taken to with these 3 reflectors here. If you remember originally, these reflectors were nicely born with a 3-dimensional thing. Right now I am only using it for a Boolean operation. So I got here a solid. Anything happened? No. Not yet. Something seems to have happened here. Can you see? Small opening for the light has come forth. Seen that? There is a small opening for the light. Can you do it with the other things?

Yes. Once again I will go for the solid, I go for the difference, one more opening, one more opening and I have got part of my light, something which I can print on the top. Seen this? Something which I can print on the top. So this is a box. It is very easy for me to fabricate such a box. Just like I made the top portion, it is possible for me now to make a bottom portion in this. Just to make it a little more interesting, right now from various, you know, purposes of speed, I will just try to restrict it here, give it a shot, this thing.

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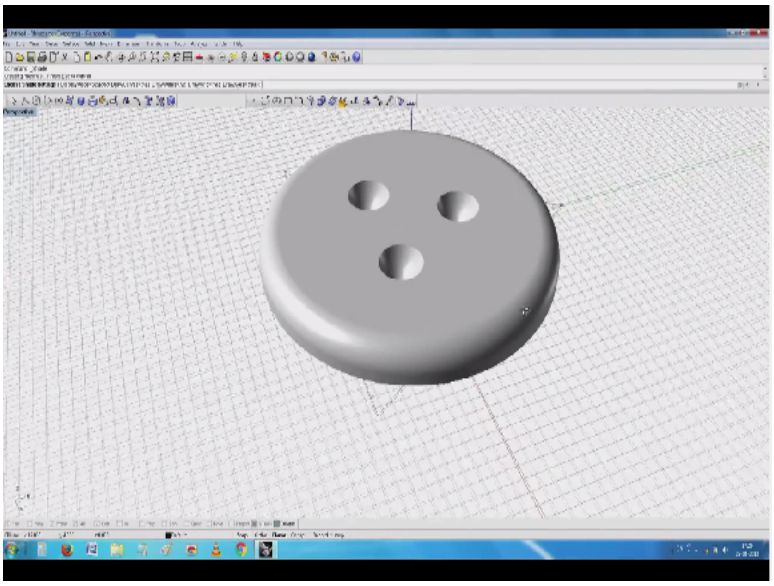

Now you see here, I will make. Seen this? I have reduced the harshness provided there is time, I am sorry, supposing enough material is there, I can keep playing with the fillet, that 1 mm was too small, I am sorry. I will give a 2 mm fillet and see what will happen? You have seen this? Much more presentable, a dice like object has started there. Seen this? I have all the elements that I want. I have a place for a switch.

Right now I have not yet, what do you call, created the place for the switch. That also I will try to do now.

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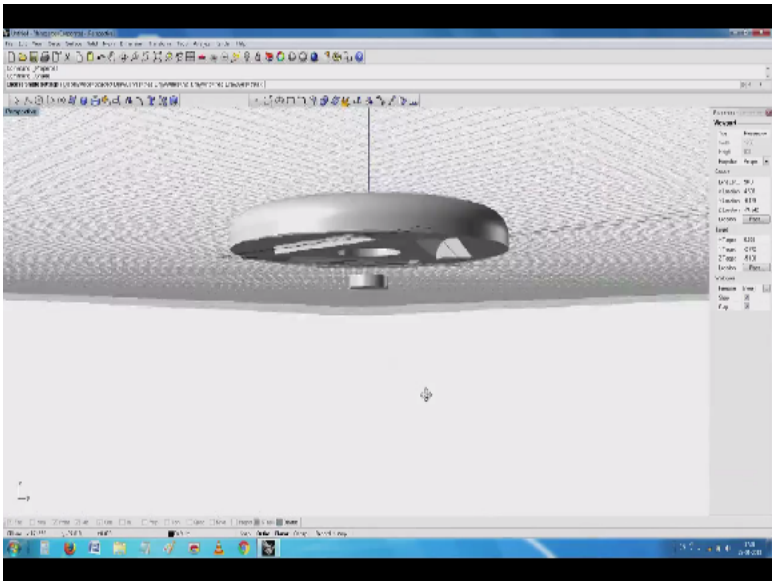

What I will do is, I will remove little bit of the material without talking, I will just go a little

faster. I am sure now you will understand what it is I was talking about. See. I create a small opening there so that part of my switch can sit there and I will come here and check whether I have. I have something else. You see?

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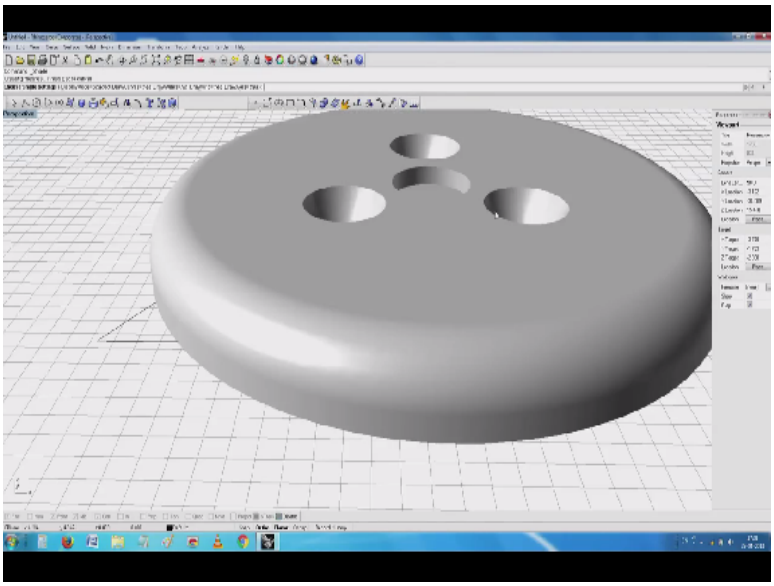

The top. That small top portion also is there. I will try to remove some more material from there. See, I have an opening for a switch there, okay. Then there is a place for it. As yet now I have not made the, that particular, what do you call, device with which we make things. Now what I think is I feel now it is, it is a reasonably, I mean, good way of starting. I will not yet come back to the materials and so on.

So is it possible for me to attach various things which are part of this here. Now I go back again to this, look for various types of switches and all which I can find.

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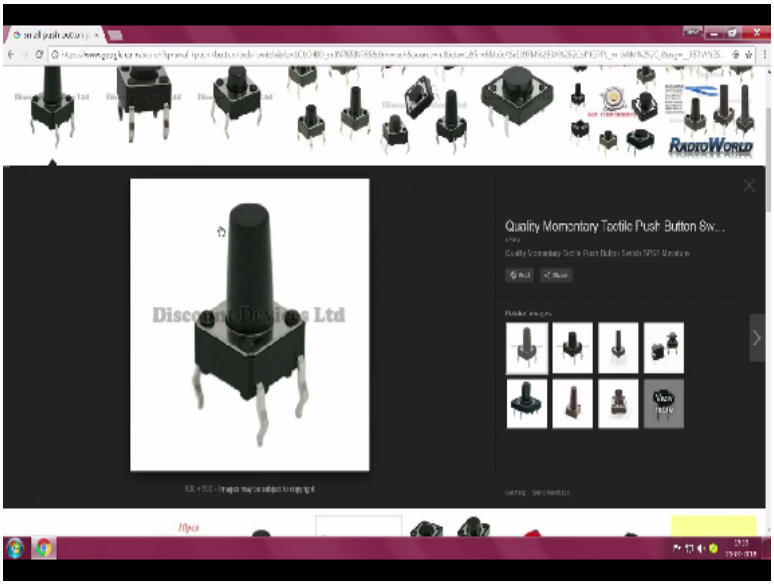

Go back here, you see here I have huge number of these small items which can sit there and some of them are right now luckily very good for me. So if I can just go up a little.

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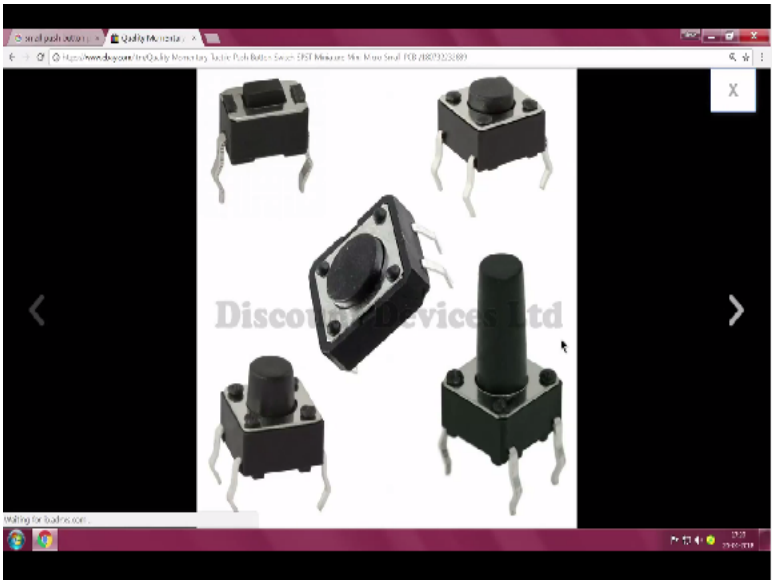

Same here, momentary tactile push button switch single pole single throw miniature mini micro and small. So from here if you go down, all the details, everything I want are already available here. So I make a provision there for that switch to sit inside. Two options are there. All these have, you have seen here, this seems to have something to mount the device and you have an activating, what do you call, a push button here.

Longer push button, a square push button on top and then slightly recessed. This one has a

tapered push button. So you can go on trying whichever one is suitable for you and this we need to incorporate into the other drawing which I was talking about. So if you keep continuing like this, one of the things you will notice in due course is that, please put me back on to this other computer. Yes.

That is easy for me. All I need to do now, do something and then incorporate all the, that various things which I have shown there and then try to make a device here. In general, you have got the idea how it is going on. So it is a convenient way of starting a product. Where is it going to take us all? I think I will go back to the, this monitor.

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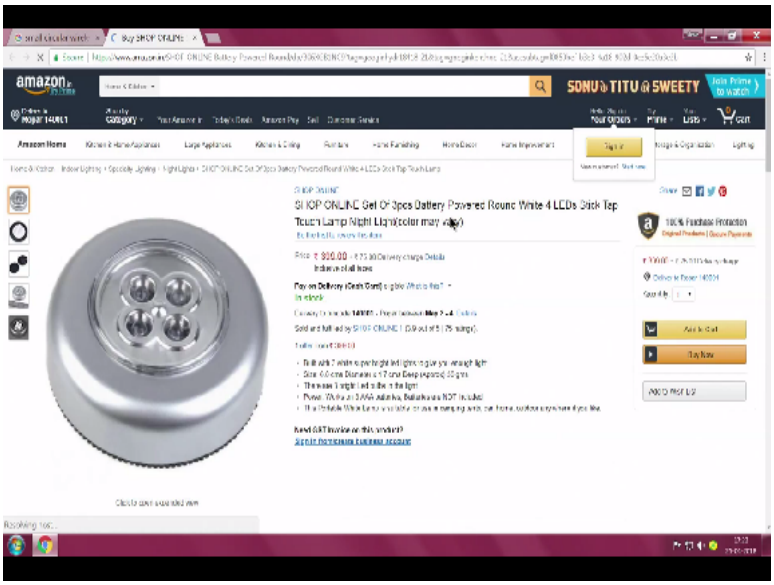

Is that what we are looking for? Very much possible. Now thing is, if it already exists, do we need to do it again. Battery-powered round wide 4 LED stick something, something, you know, tap, touch things, okay.

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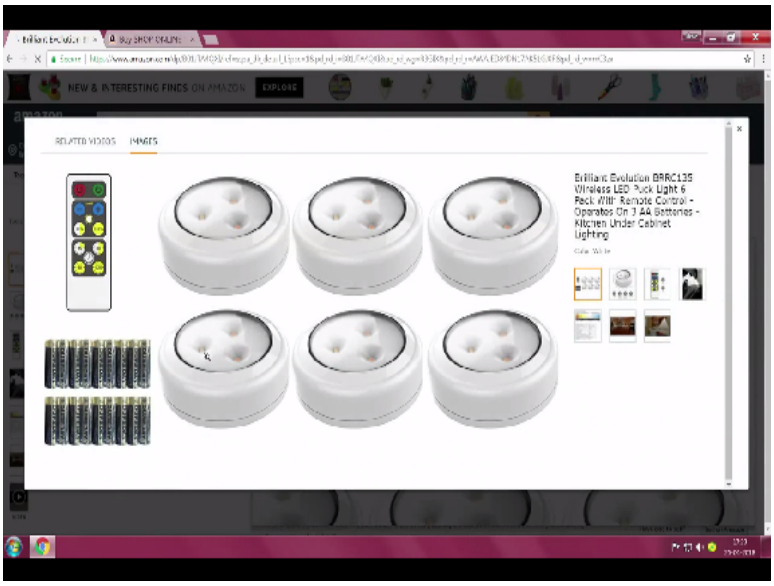

And then why not, see here we have a large number of these brilliant evolution something something things here. It is not as if they do not exist already. In fact, I have got my inspiration from this unit if you kindly see.

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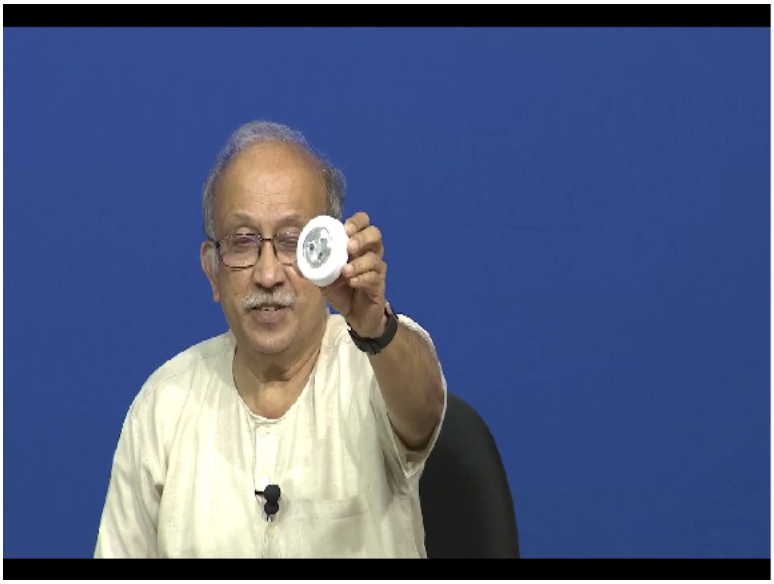

Please see this unit here. This is exactly what I had in mind. Now you see, it is not as if no, there is nothing appreciating about it. There is nothing like reverse generation or anything like. Each of these elements are available. This particular device has the advantage that, you know, you can, they have a put a peeler, then you can push it up and then stick it in your wardrobe and then the novelty is in how will you open the whole thing.

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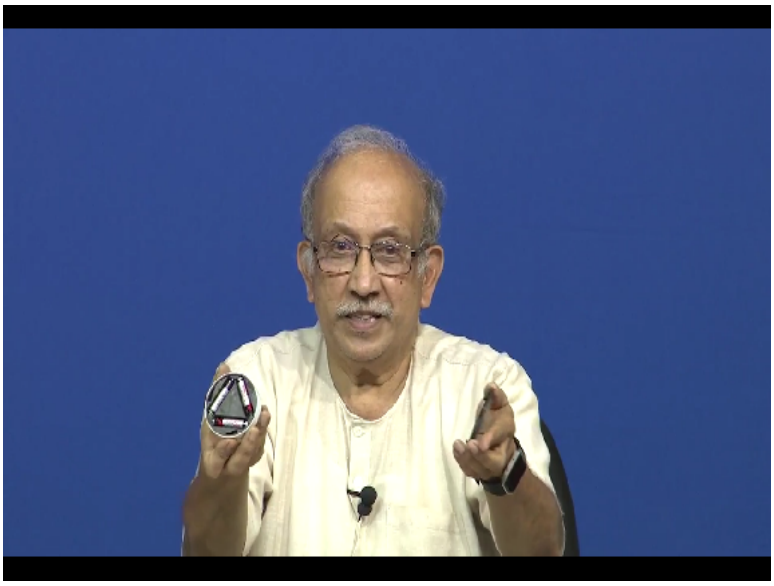

You see here, this is, does this look a little like what I have tried to make there? Yes. Now how do we make all these connections? Do we have metallic parts? Do you need to solder them outside and can you 3D print the whole industry, I mean, what do you call this device, that is where probably, you know, our future is going to be. Right now, this has been made such that there is a small catch here.

You see this? You see this carefully, there are 3 catchers here. This catcher sit here and it closes here and that switch component and all, this again is another whole assembly is a separate thing. I just try to create that on the other thing here and the most important is, they have made an acrylic. It is not actually acrylic. It is a poor quality, sorry, an expensive polystyrene and the way things have been made, see nicely.

Now this is a product. If I now point it towards you, you see here you can see the Bokeh effect a little. There is a switch in the middle and it is off. So this is how you start with, what do you call, a little bit of product design and now have I copied it? Yes, so that you will understand that what this product is. Well I do not, what do you call, I mean, rather allow me to apologize. I am not claiming that I made it the first time. You will need to work on these things, continuously.

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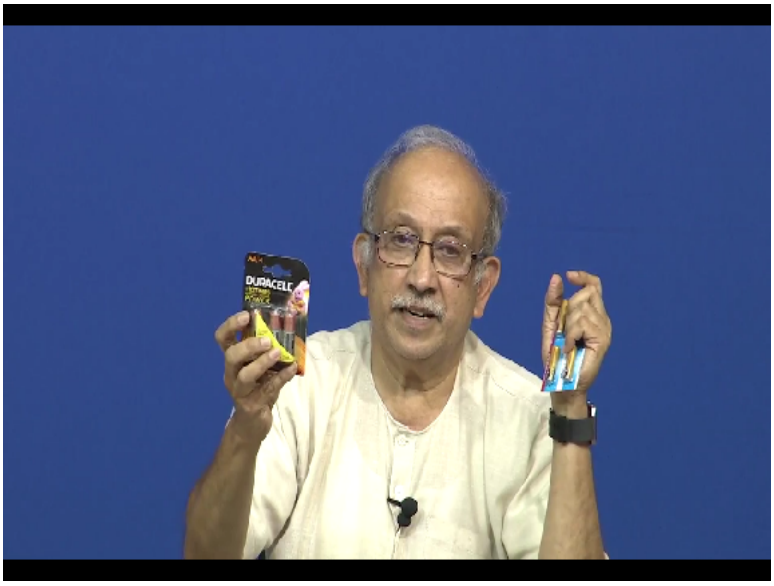

So over the years if you have data for all these, what do you call, cells. In this case, you know, I have a normal carbon-zinc triple A cell and then I have here an alkaline cell. In this case, yes, there is a simple alkaline. You also can have nickel-metal hydride. Then we can have all sorts of chemistry which is available and if you build all these things over a time, making a new product like this is relatively easy.

Next comes to how do I make it? How do I print it? How do I make it suitable for this thing that is where the issue starts with? So you please, my suggestion is, you download one of these, what do you call, 3D solid modelling software. Otherwise, if you are a student, little higher end, especially both Solid Edge and Solidworks and so many, may be Catia, all of them will be available parked on your places.

You can sit and you can make it. Do not, right now, initially, you know, start making for organic shapes. Organic shapes while they are interesting, they are a challenge, that will not form the same, what do you call, sequence by which I started with the basic elements that are there inside. Then I started with somethings like these, you know.

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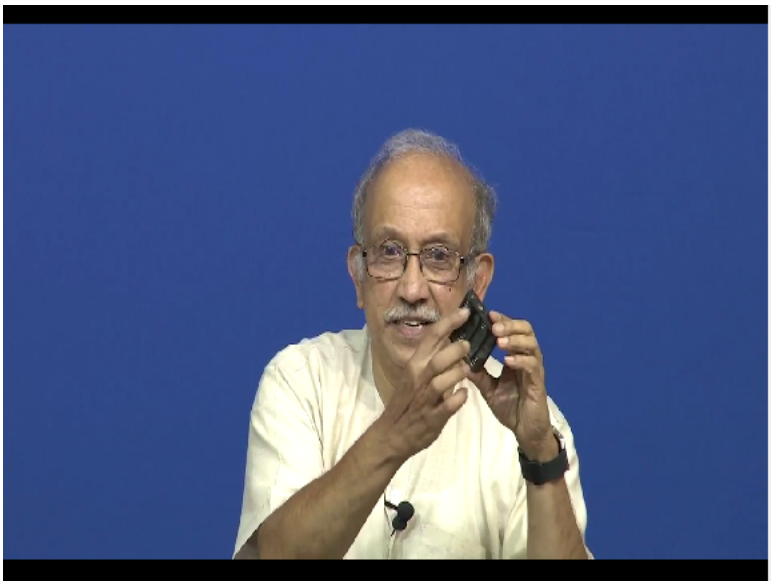

Like this, saying what do we have connectors. You have seen here? We have to really search a lot. Before we ordered it, we had the data there and then something which I will come next time is, this one is a little springy here. If I press it, it will go inside and all that. How do I adjust all these thicknesses?

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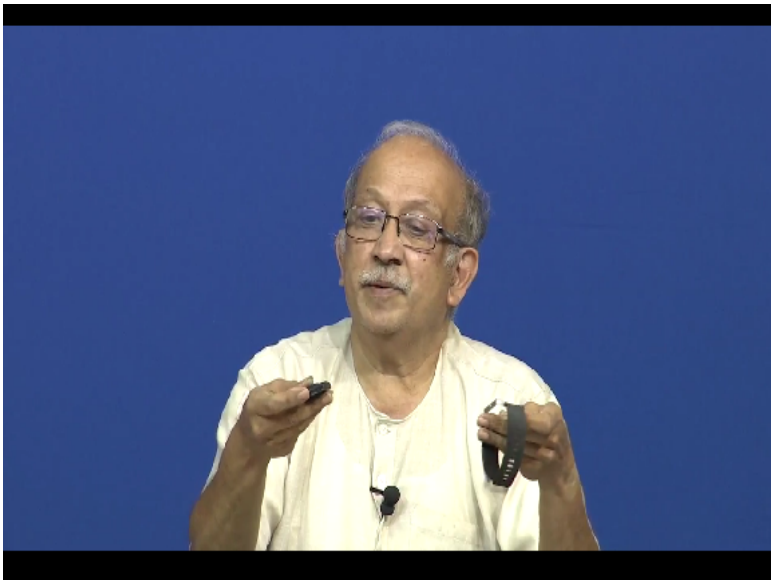

And in case I have a little more complicated thing like this, what do you call, activity tracker. This activity tracker even has a heart sensor and I think we can take it out. You see here the activity tracker comes out. It is to me, it is still, it is a wonder. I do not know how people have been able to package this tremendous amount of intelligence and, okay. And thinks that a small, oh, I do not know how to put it back.

Maybe I will go back to the owner of this. It went in. And you see the strap and it fits magically and the advantage of this is, probably this one of course is a very peculiarly moulded attempt where they have kept everything and to make it hyper success, meaning, can I have a shower? Yes. Can I wash my face? Yes. Can I swim? Maybe. Can I go for scuba diving? Not really sure.

Thing is to make it water tight, those elements which have been used earlier including, imagine there are, let us say there is a bottom case and a top case. You need to do something such that one sits over the other or now if you see this. Now maybe there are 2 or 3 interlocking things and often they have a silicon grease type of material which goes and snaps inside which you would have found out in case you wanted to open any of your mobiles, especially apple.

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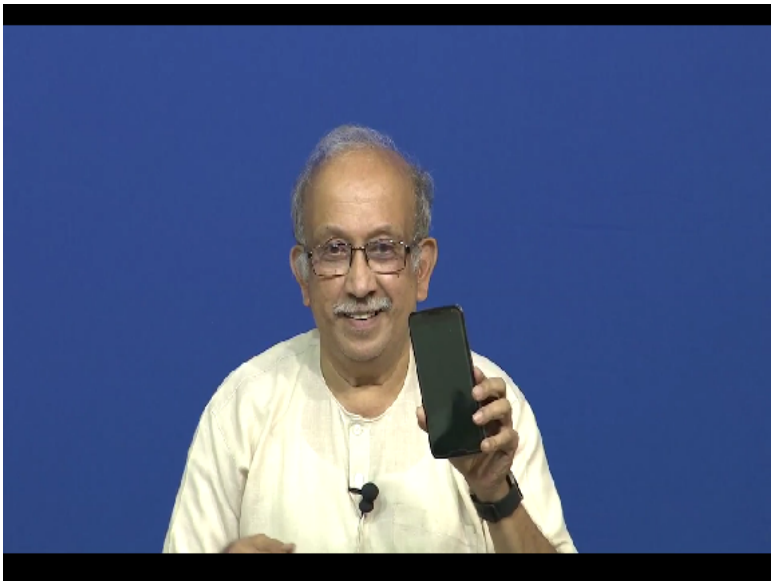

So there are some people waiting out there in the queue whole night. After they buy the next apple, I do not know 7, 8, 9, 10. They do something and try to open it. Things like this are these days now relatively easy to print. So I will stop here. I will continue again in the next lecture. I have started with a very simple day to day object saying how to make a LED, what do you call, it is a closet light.

The idea being, we can put it up here. Now we can use it for other things. Can we use it for magnets? Yes. And have you noticed in case of our refrigerators, it appears that main container

where you keep all your normal food stuffs and all that, those things you can store them and there is a light but when you come to the freezer on top, there is no light for the freezer. I cannot say why there is not light for the freezer.

So maybe you can put one for your house. A light for the freezer and now does it, can it be make it magnetic? And can we make a small switch in this itself by way so when you open the door, the light comes on. I have no clue what it is. Means likely with most of them are minus 15 degrees and all that. Right now, the chemistry and the electronics is not yet ready for it. So they do not use it but when there is no issue about it, you can always put a light pipe. So thank you.