Enclosure Design of Electronics Equipment
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Lecture - 52
EGPT Layout with CAD

So, here we talked about related to this export and import. We can export any of these features out and then import it from other places and life gets very very easy.

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So, what all can you do with it I have kept I just have to you know I just noted it down here - one of this is in fabricational sheet metal it is very very easy for us because in principle all fabrication of sheet metal is done in a flat condition when things are flat x and y, handling x and y is easy.

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Similarly when I have the necessary features when I showed you the small box done out of cardboard and later on done in the sheet metal shop I started with the cardboard with thickness being zero that is only nominal thickness. And finally, I showed you how my colleague converted into very convenient small box up to that point I could manage and then after that if you recollect know he has put some buttons and then he has put a display like thing and all that this is where cad comes to be of good use.

Second thing is in machine shop you end up with having to work with other hardware typically how to mount things like connectors and then you need to make some spacers you need make bosses and you need to make d shaped openings all these are best handled with cad. So, if you have a what you call EDM or a wire cut device any complicated shape can be easily be done later on in the lecture I will show you samples which you can do then we come to very interesting or I mean useful thing is making models. I am sure you too must have been impressed when you saw these architects nice architectural models which they make.

Architectural model looks it looks a little like a doll house, but little more detail; however, when they show you landscaping and they when they show you large buildings in a simple model they look fine and I am sure all of movie making shows you two things they will always be somebody trying to attend a music competition music and dance. And then our

protagonist invariably will be somehow related with the architectural models and all that it seems to be very good as a prop this apart they have a limitation at that point, but then using architectural software fantastic facets fantastic presentation of everything can easily be done while the presentation and the other part is very much useful. Working backwards same thing can be used in providing for all the utilities inside the building we do not take it seriously.

But really the way fire hazards plumbing and now recycling and things like know how you live comfortably in a house including ventilation including where the air circuits and all can easily be done here and models can be probably be sculpted at out of things which are created on the screen. Understood know directly from the mind earlier from the mind we use to wave hands and show people saying I wanted so big and so high and so deep and then somebody will make it and then you cut card boards and all and put it now it almost looks like it something which is useful for people in dealing with occupational therapy in reality that has sort of you know taking back bench. I have talked to you about standardization and normalization especially architecture people and then all other plumbing and electrical people they have their own method of representation of these objects. So, very complex 3D things about how pressure is built up in a system and in the case of hydraulics things like how whether a water hammer will happen and in case you have a basement in which there is a water spray is required and how do you ensure that spray comes at full pressure. So, I understand at some place there is a diaphragm and something collapses better walls are open and all that.

So, model making helps us to make very interesting simple models which will convey more both to the client or to the person and the other people who know how to work with these things. Now this other thing has come loosely we keep on calling about 3D printing know its slightly different printing is somehow still related to a two dimensional object this generic late is rapid prototyping - one variant of it is the fused filament depositing which we use whether otherwise many many more complicated things are there, then you have this laser cutting. So, these days online very easily you can get these software which will help you with these things and eventually make things which are possible.

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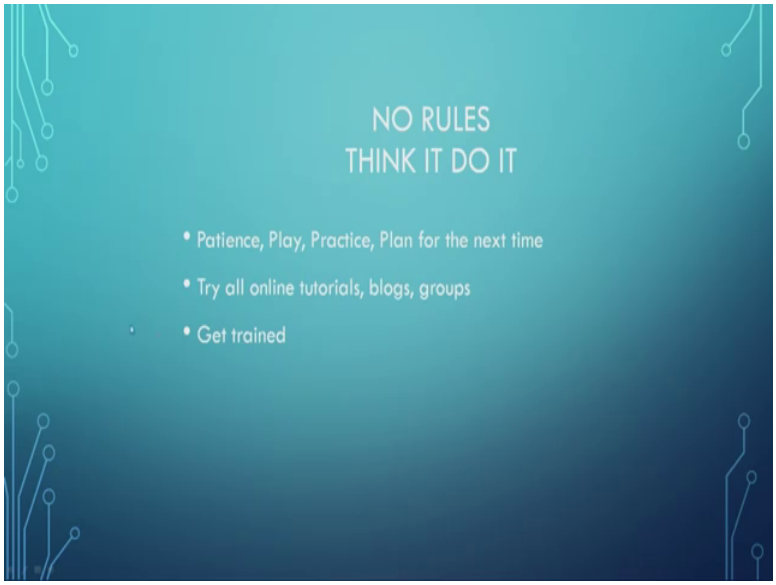

So, I cannot start with a set of rules all creativity has this problem if I give you a formula it is like saying no how to be a billionaire or a millionaire or something or anything if I somebody has become a billionaire do not think he wants to share it that easily with you, one of them is printing a book. So, in reality there no rules I about it first starting point is somewhere in your mind you have to think about it and then after that start doing.

First of all is this you need to play around and keep on practicing what you want to do. So, in the screen here itself you will notice that some points here know can you see this at the bottom these lines have been started very conveniently at a specified angle because it seem convenient, but as the things get populated you cannot afford to have this. So, other way of branching out and all has done. So, you must play around a little and then practice a lot and patience unless you keep at it you will be able to do it and then in the case of a what you call failure you can avoid it next time, that just like an marketing four piece are there I believe in this, this is my opinion I am sure and you plan for the next time you know very well where to start.

Then we have this beautiful support groups support groups are also used for people in trouble, but then in this case now we have nice online tutorials blogs and groups and then you can go around and at least you can start and this is not like trying to take something and try to use it and you know illegally use it then is a good starting point and then finally,

if you are serious there is no option to training, but training will not give you canned answers all your feature problems training will give you all the problems or I mean what you call how to approach things at that point life time.

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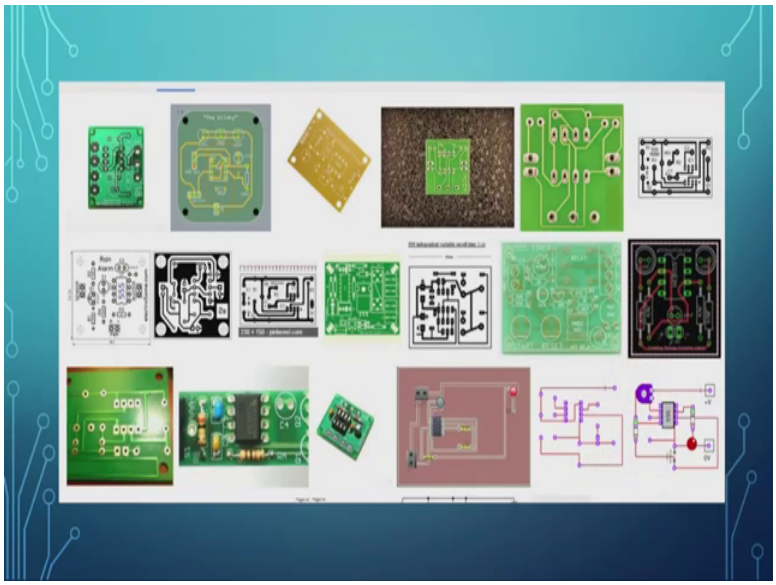

I think I have probably come to the end of this what you call power point presentation. Now just have a look at a very routine simple thing called a triple fight timer just randomly hit such and then ended up with this. So, we have at one point here can I have see here this right side corner picture we have a partly what you call layout and partly a component layout and so on and then partly just underneath this you have the place where you mount all the pads and so on. It is as a starting point it is a very good way to start with the things like this, but you see remember all this has to now go into an enclosure and then that enclosure has to work perfectly. When you talk about a timer we are not talking about a printed circuit board what we are talking about is this.

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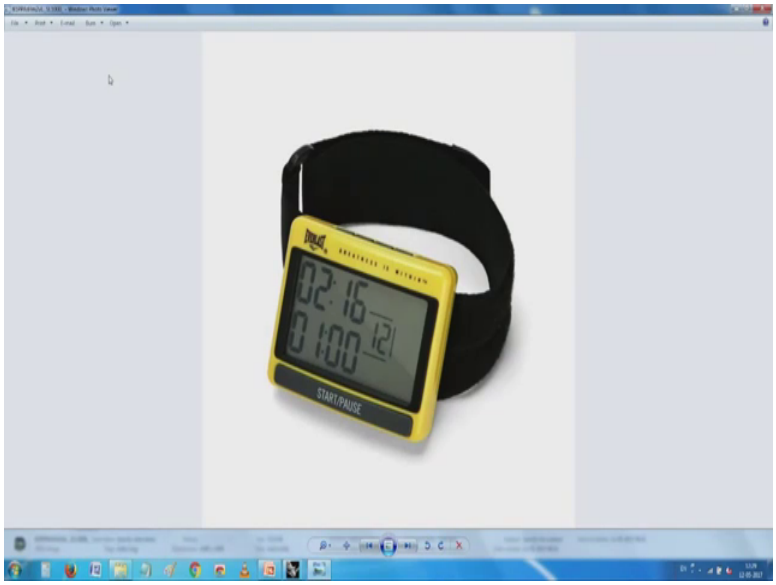

Because obviously, big jump rather you know what you call a big (Refer Time: 10:03) which you cannot easily cross just by making a printed circuit board and attaching a cable to it and expect people to wear it. Seen this know this is about a simple thing you can easily put it on your thing here.

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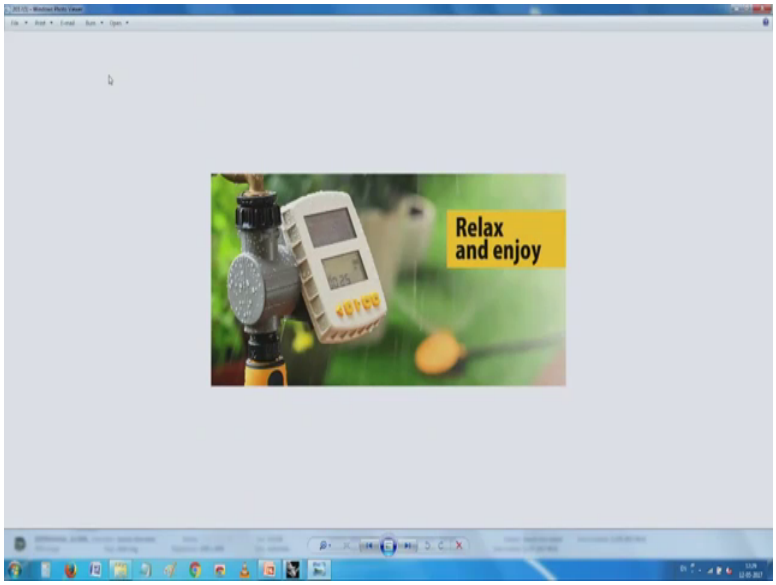

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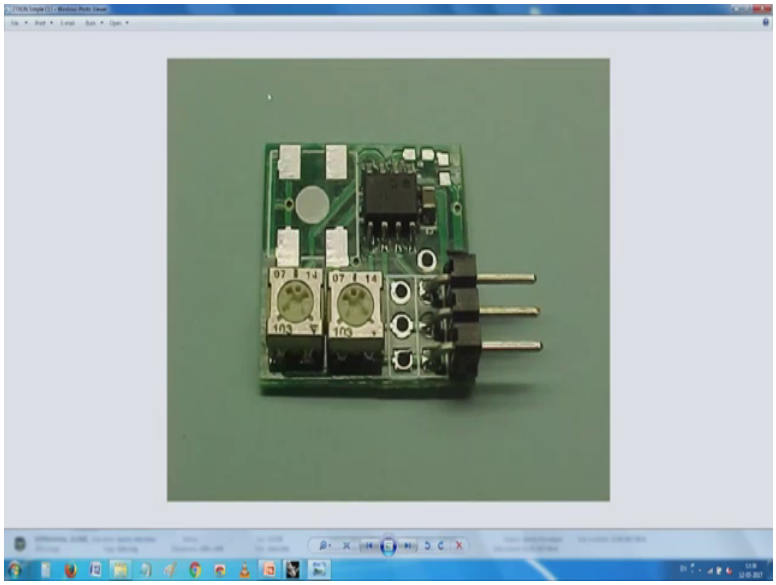

So, you see here so many variants of it, it looks a little like the timer we are talking about except that it has some other hardware attached to it then there are pins to this it is not happened must by a accident.

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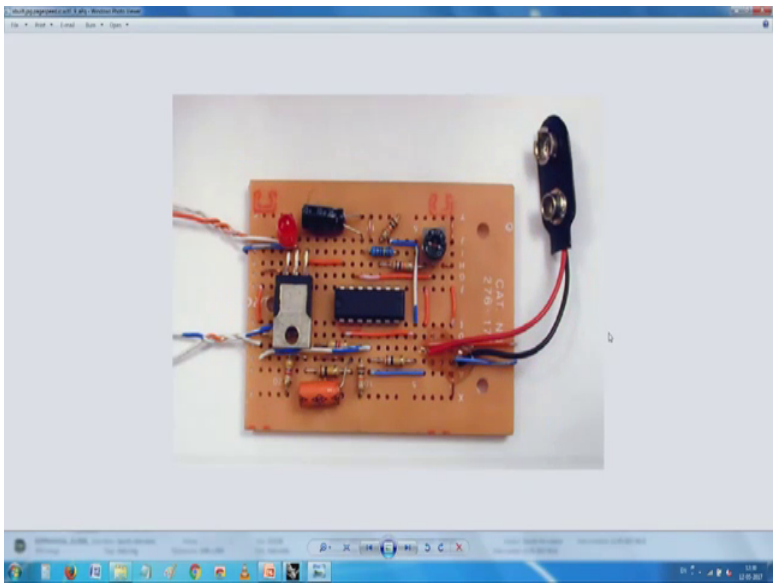

This is typically you know what is probably a good starting point you have notice that we

have a board with holes one trade name for it is called a wear a board. So, attach things on the wear o board and then you put a external power supply it seems to work most of the time it works, but then a timer is not just used something in isolation. So, you understand here know somebody has made a beauty of exports timer.

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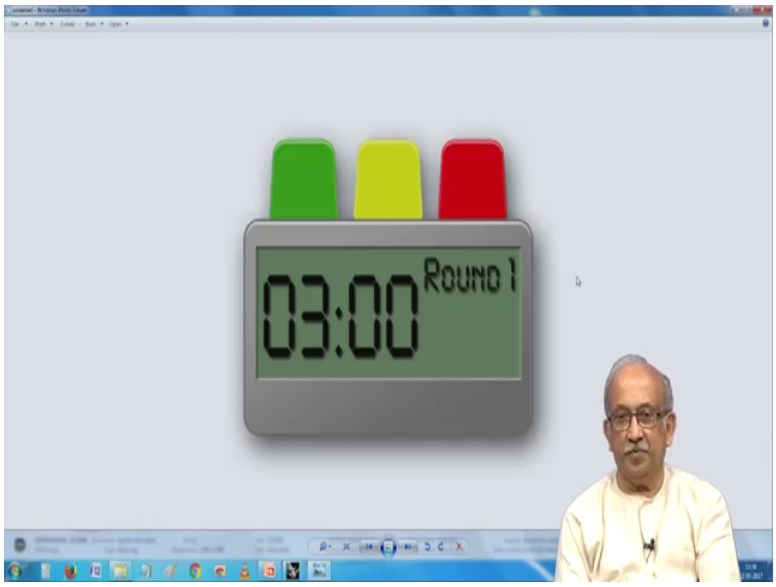

So, I do not know what the all the keys are, but then even it is other keys and then there is a display, display and keys are one thing and then I am sure some of you have seen this wish bread board.

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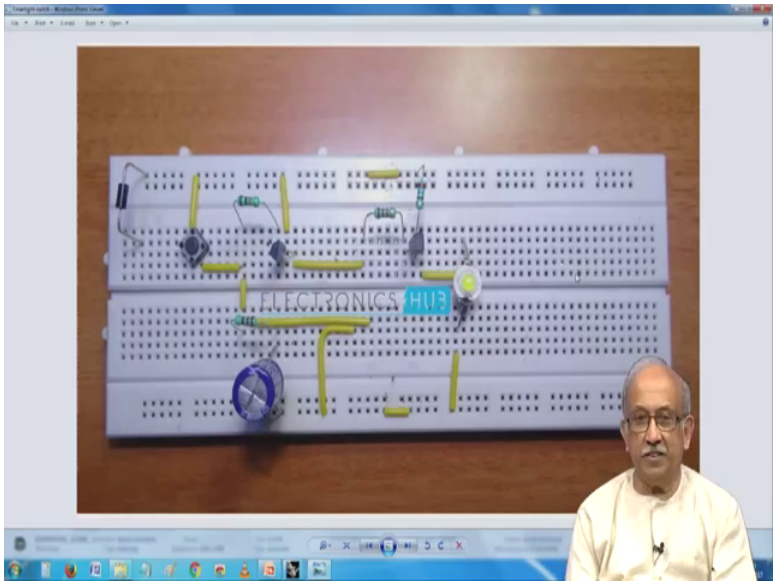

So, after you finish this schematic we need to put everything into this wish board make interconnections and then if possible try to make something transfer it to that other perforated board and stop. At that point after the circuit is tried and nothings are easy you next move on to how to make it work.

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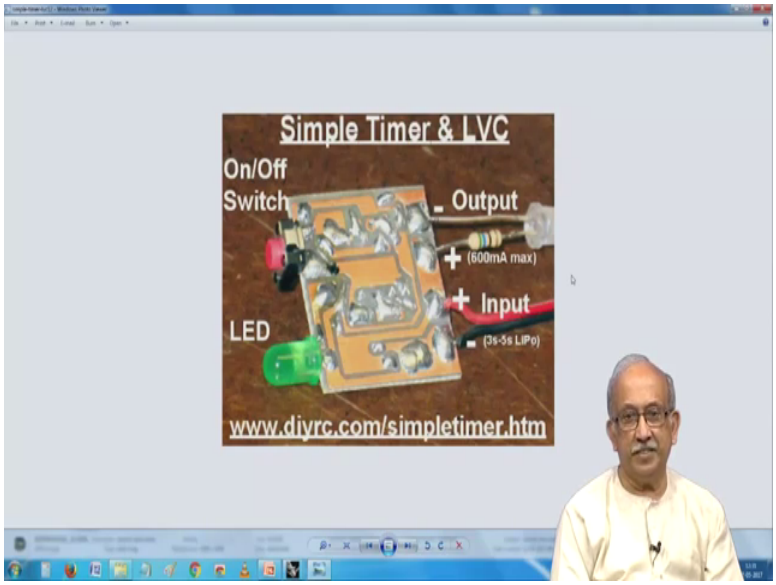

So, it looks easy here know you have some voltage and then you have some where your things know you are talking about.

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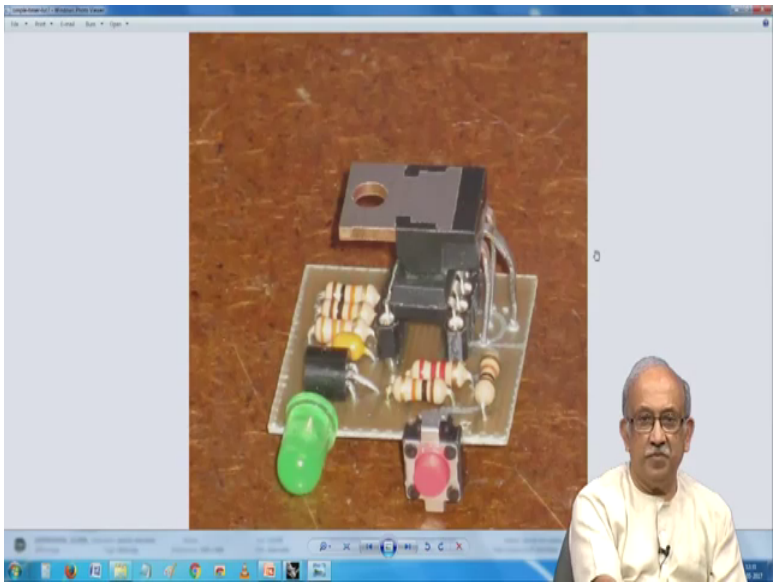

Seen this, already what looked a little like a 2D object know as suddenly ended up into a 3D sort of thing.

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So, this is where I expect now cad timers will help at one extreme level and then built as a one of our what you call small things put it into a rectangular box and adding a some things you know saying you have something got start stop all this. I do not know actually it is a game or actually it is a timer meant for boxing.

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This is one of the things I am sure now several of you must have seen it. So, we have a beautiful stop clock. So, earlier stop clock is not you know that easy to get the advantage of this is just what you call buy one and move around which will come to the next question saying sir, but I already have it on my mobile exactly may be that is a reason why small cameras are out and mp 3 players as we know are out and also mobile seems to take care of everything. A good point of it is that you can call anybody the bad point of it is you lose earlier contacts because we have forgotten even the numbers of our collars what do we do just take it and see their face or recent list or favorite list you type and then I mean you just select it and you are online. So, things like in digital dairies and all are still popular because they even if you remove the battery nothing will happen you do not lose anything and it is still possible for you to get the information. So, things like the small enclosures and all now will never go out of fashion it has still a place for one more thing.

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So, we have even interesting things which can be used for other purposes you have a solid state relay and then outputs are given here and whatever you want this is the picture of the previous thing which I tried to show you.

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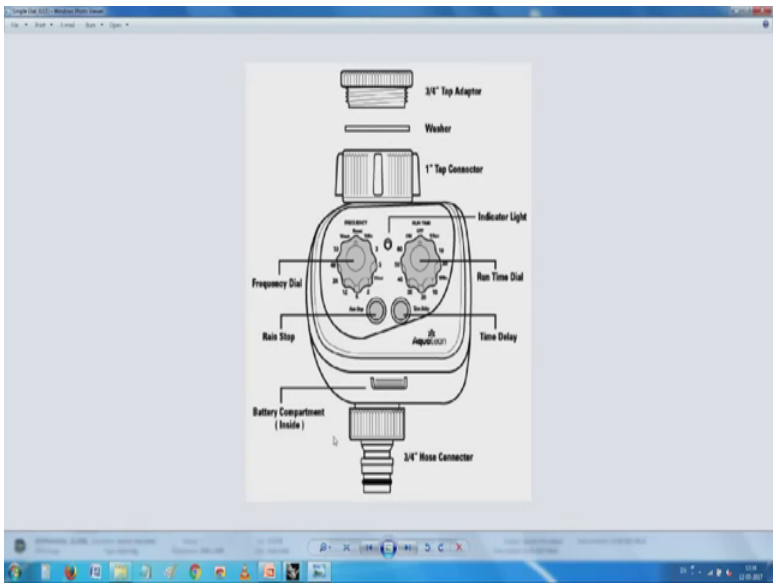

I did not know that there will be a demand for it and people who would like to buy a

timer and use it for watering their garden and so on. Obviously some point of it is about keeping your grass greener than your neighbors, but the reality is in more serious things like you know kitchen gardens and grow your own food and all that timers which it control water flow have become real. So, I mean that it is not organized properly pardon me with this.

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Some, I do not know what this milli second timer is for what purpose it is probably it is for a demonstration, but you will notice is this whole thing has been built out of a standard enclosure.

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So, there still place for all of these things this you have seen already. So, we have this again know whether it is a I am not sure whether it is a video game or it is meant for a timing device.

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You have so many of these things. So, we have our I thought the last thing know relax

and enjoy will be more appropriate you see here that this is a full fledged it looks like an IP 66 enclosure which attached to a some solenoid or something, and all this is possible with cad. I will just take a what you call break from showing is pictures to actually show, it tried to make somewhat general purpose educational kit for teaching embedded systems with one of the professors.

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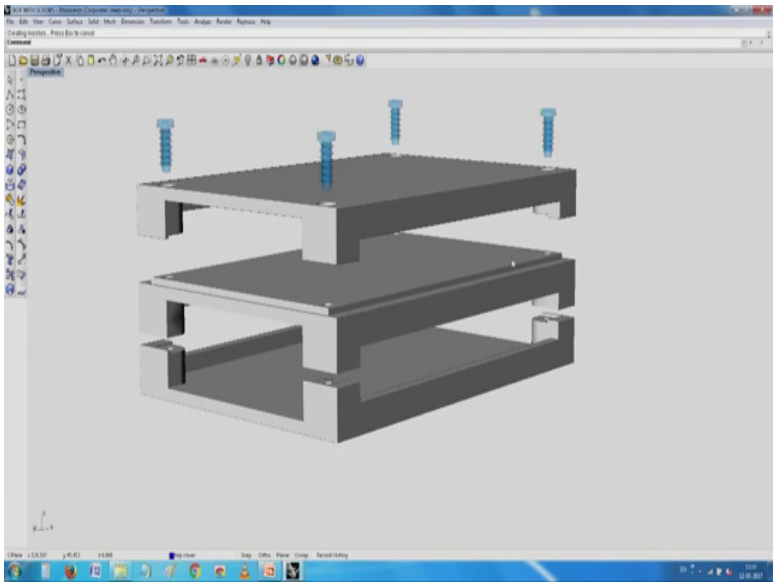

So, you see here things like the center portion or this one is the printed circuit board. For convenience I have put for you know holes in the corners advantages of being it is it has been made intentionally stack able you can stack them one over the other and is what when I was talking to you about building a library of components.

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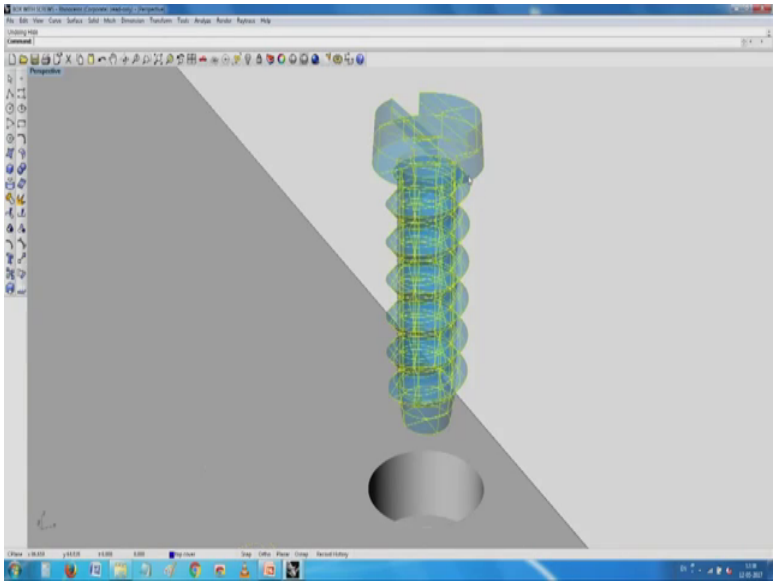

You see this here, I have spent a lot of time on making this fastener. It is a type of a what you call self tapping screw for plastic what you call manufacturing. Why we had to know this is said I can scale it up now, now anytime I want I can go to a plan view all the dimensions are accurately represented here, can you see.

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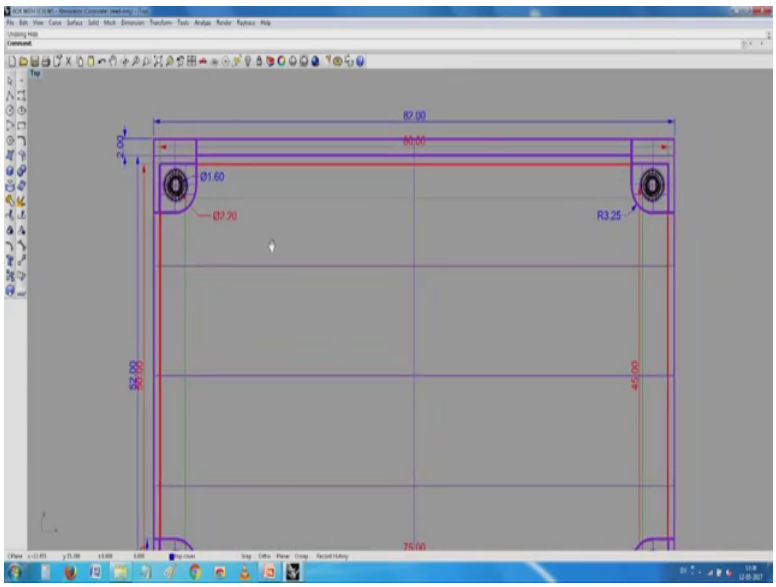

I have an 82 oh I need to make it a little closer, you can see nicely I have 82 mm edge of the box and then one of the edges is 20 mm and then I have all these dimension, some of these other things seem to be in a different color this is intentionally made such that I can go about end I have if I keep the layers come and on selectively I can switch off the pcb. You have seen here some of these things have gone away here the pcb has been switched off or you can switch back the pcb and I switched off the top cover one of the cover similarly I have switched off one of the other covers.

Having done this you notice that it is now giving me tremendous flexibility in now playing around it I will just show it here this is not the ultimate.

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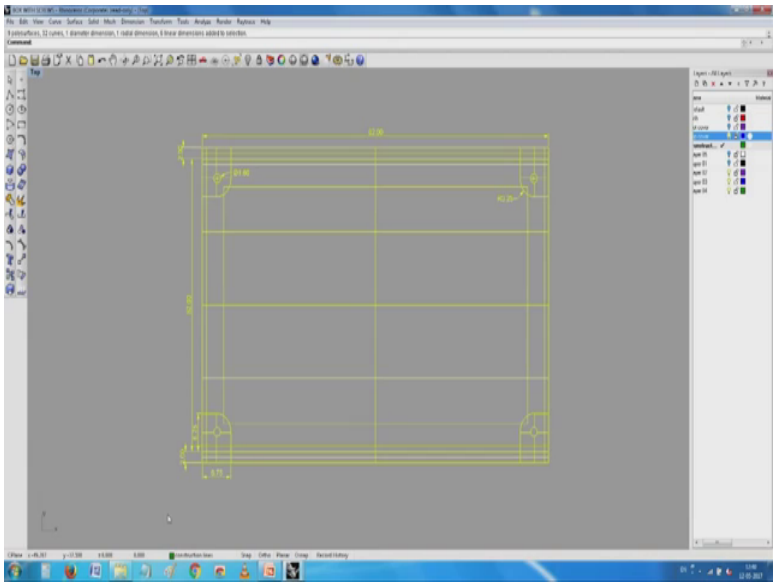

See here I have some construction lines and all built on to this. So, just show you or maybe it will make sense only after I push this the top cover. So, I have 82 millimeters here let say I am playing around and decide that this thing is not very what you call, it appears little bigger than what I need all I need to do is select the whole lot and his being a somewhat primitive package, it is not in an editable state it is been locked and not editable. Easy for me to adjust all the dimensions, I think separately when I make the exercise I will just show you about it. What I just wanted to tell you was that very easy for us to play around with these things.

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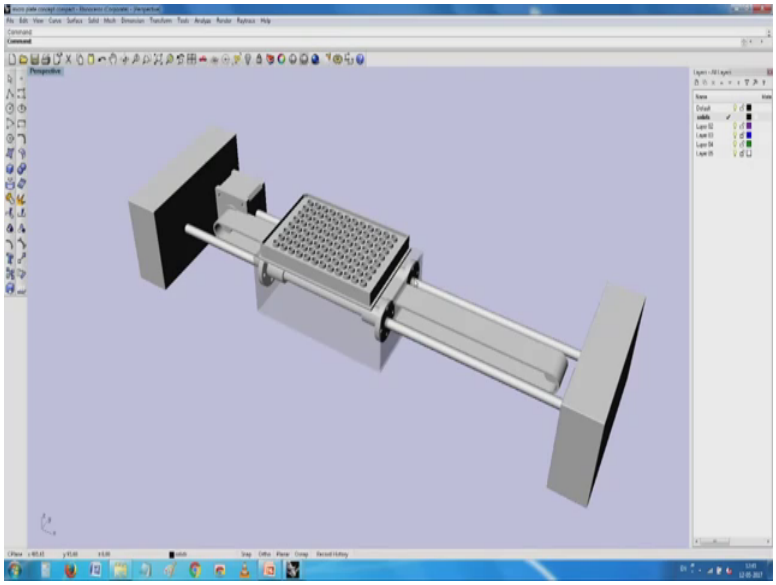

This is little more complex object which was made for a biological health care system these are what you see in the middle these are all micro wells in which we carry some samples and at the bottom we have this very cute guides and then at the other end you will see here we have a step motor there then there is a pulley and then this is attached to this and then a lot of details. If you want to make say two plates into one it is very easy for me to make it. I can add one more plate I can cover part of it and finally, after the whole construction is over oh I hope it is not wait into crash, it is taking longer than the time.

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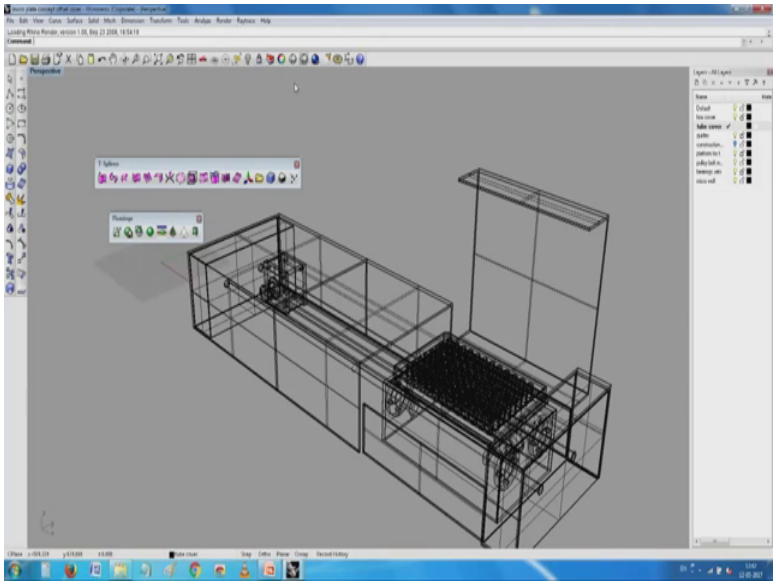

In this case I need to now make provision about where I mount the cover where I mount the electronics where they go underneath and then where are all the various guide bushes and all that. I think it is a little slow because of the very complex object.

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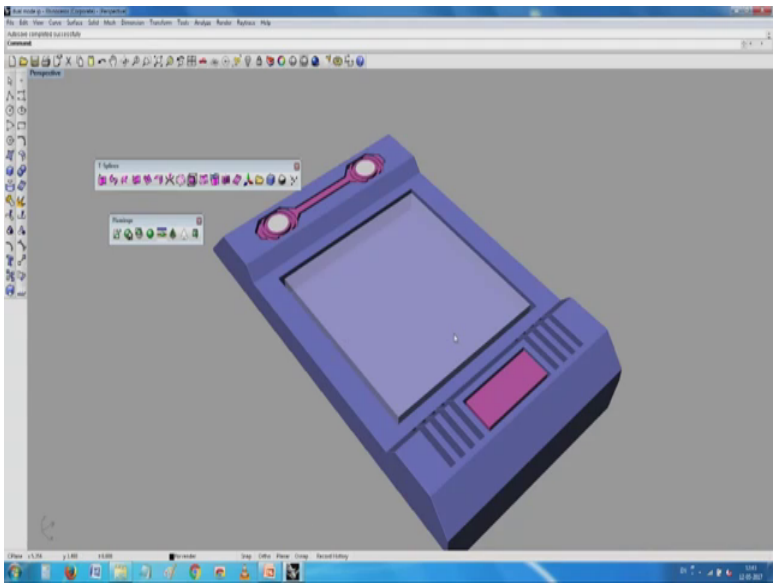

So, its typically long ago this is made 25 years back when we wanted to make a dual

mode some device where both of Wi-Fi as well as GSM can be connected together and this is the demonstration piece for the what you call or the technology and how to include them together.