Enclosure Design of Electronics Equipment
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Lecture - 09
Examples of product enclosures ID_PD

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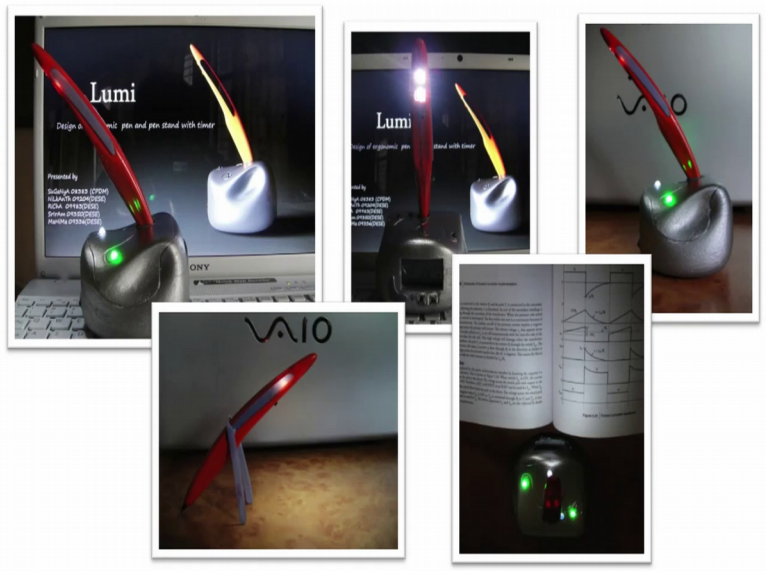

Various use case studies have been done, saying when somebody is trying to read something in the night without disturbing his neighbors he can actually point it on towards that. You pick it up the moment you pick it up the timer starts working. So, you will know how long it is for you to understand a concept and how well it is for you to face yourself, you need to face yourself all your thing if you whether you are in a marathon or you are in a sprint or you are in a I do not know various types of dashes coaches tell people how to have a strategy by which you can progress faster or farther and fastest farthest wins. So, we have this lumi timer which have at this point, this one shows how you can illuminate a table saying this is illuminating table.

So, you can see something there and then this one is illuminating the page at the back which you are need to what you call have a look at it, and then we have something you know these LEDs function of the LEDs and then so many interesting things and some of the details as I have already pointed out to you examples like this sockets, example like this and all that may or may not be at ready understood know this is still at a concept

level. So, this whole product eventually it was actually made and presented. So, we going back to my computer here, you will notice that this is starting with a sketch somebody finally, had a three d simulated object here, please have a look at it a little closer look very nice is not it the magic is this is done with a.

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3 D solid modeling of thing I do not know it is a solid edge at solid works probably that object was taken to my or some other illustrators they were an added, added all the highlights then they have added thing the concept being you take out the pen and the timer starts counting, and then you have various options here saying if you want to have cumulative time or you just want in case you want to take a break, you put it back into the ink pot like you would have an ordinary quill pen, and then you have flashing LEDs here they give an indication saying are you keeping track of the average time or it is longer or how it is and so on.

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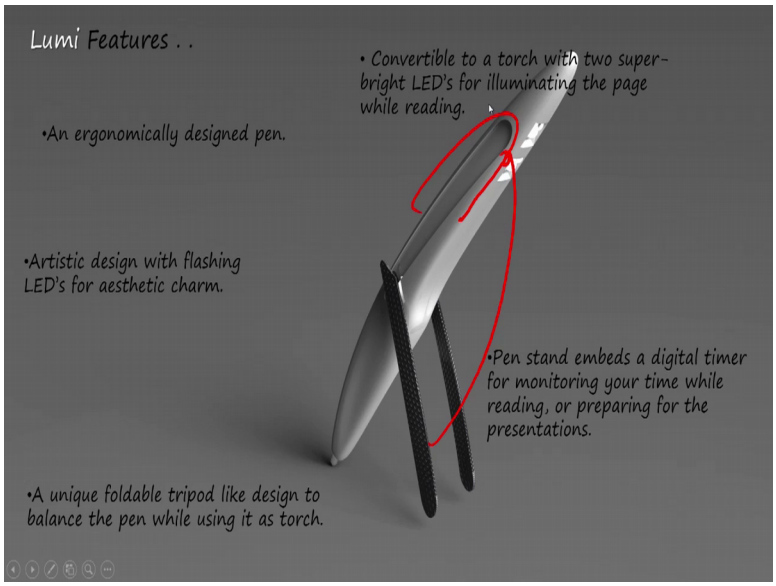

We can have them normally in seconds, then I do not know probably it is programmable coming back now maybe it makes sense to see how the stand looks like you see here you have a small depression here, a small depression this thing curls up you can fold it back and then it goes inside.

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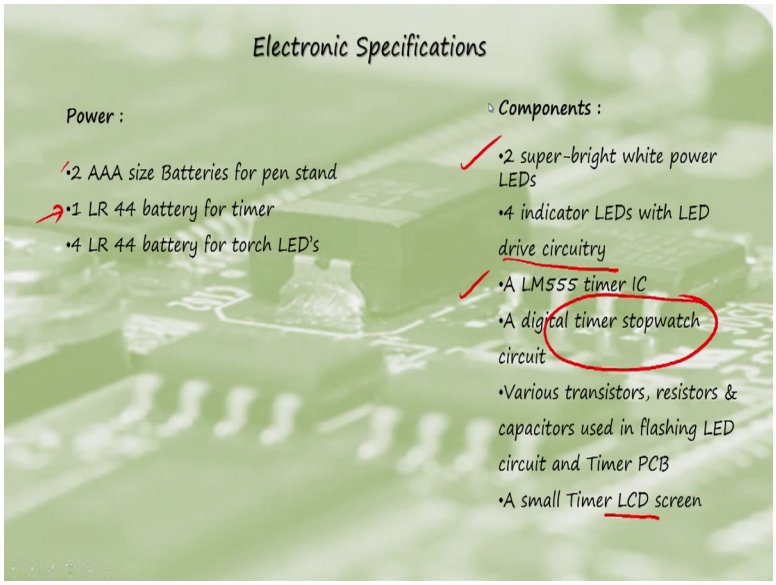

But still recurrently remember it is only a concept may or may not be implementable, this is where designers make sense you see here we have a nice.

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So, we have somebody who is trying to read various things and then probably it is one of the concepts I try to work around, saying can you have a tip my ink pot which goes and sits like this. Now coming back I have several examples I know I have several examples of projects like this the point I am trying to make is that of front before you start you need to have some concept of what should be the target user of the thing, that is has been the concept of what is called design thinking, and like earlier design which already tries to improve on an existing thing which is typically what an engineering designing. Now these days having passed such stage of a simple engineering design we have come to the stage of what is called design thinking.

Design thinking starts with the users experience. So, you do not noticed in this what I call very illuminating luminaire which will make a luminary, the concept is this a person who is preparing for an exam person who likes reading and a person who likes to keep track of time all of them have been incorporated to this as compared to what I feel is a very threatening thing.

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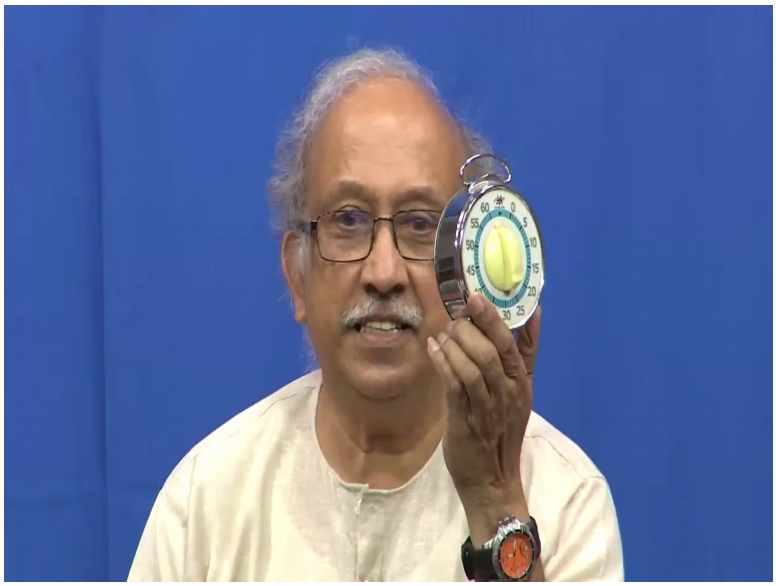

This timer is not useful for anybody, actually tomorrow I will try to show you what an egg timer is this actually I will say no I cannot say stole it I saved it from the dustbin from I would not that was being discarded because it was found that is not very useful and even if try wind it and then I try to keep it in 30 minutes by the time it completes it still jarring it, reminds me saying I want to hit it and go back to sleep it is a smart idea with that lumina.

So, I will now go through some more other slides which a my students have prepared this in that particular case, ignore that top what they have written on the top.

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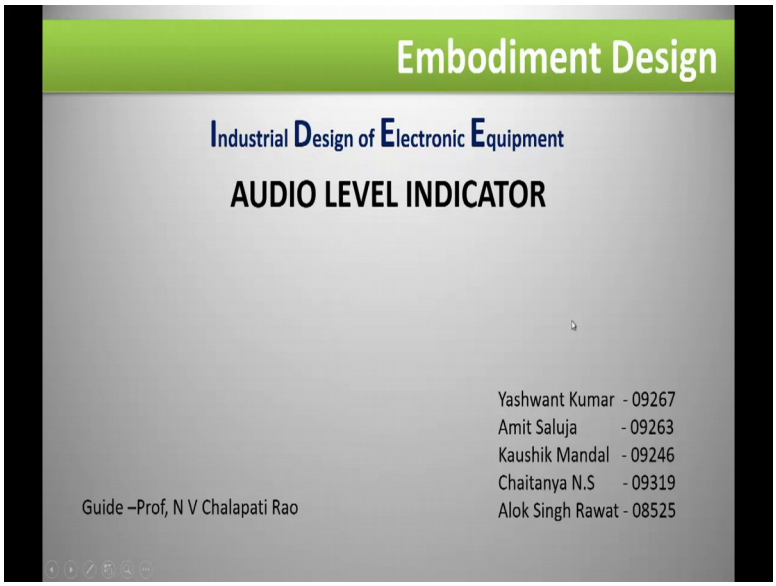

This is about an audio level indicator which is typically used by people here.

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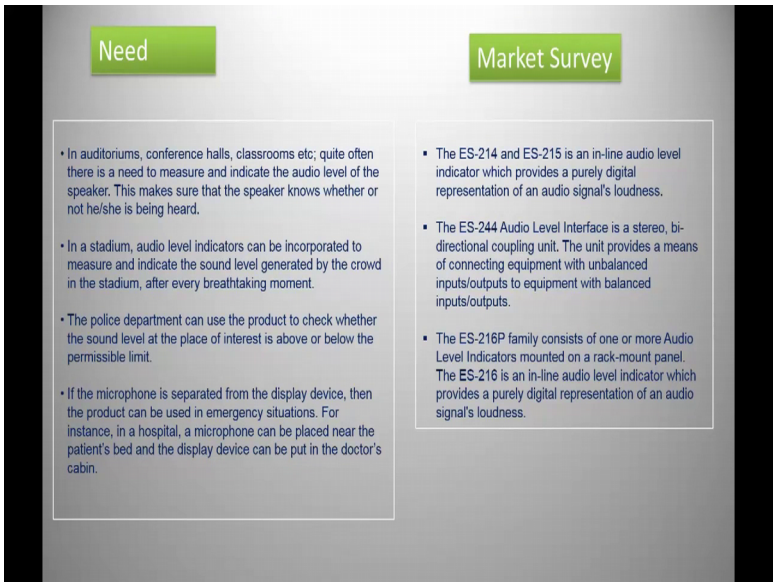

Auditoriums conference halls classrooms quite often time is I mean there is a need to measure in indicator audio level of the speaker is make sure that the speaker knows whether or not he is being heard you will notice that if you go to a class and you happen to be one of those front benchers there is no issue because the teacher already speaker keeps eye contact with you are just in the middle also there is no problem as you go towards the back two issues happen one is by definition you are a backbencher, and all

the successful people are probably back benches I am not very successful because I was a front bencher all the time. If I were a back bencher probably I will be teaching you how to may come a billion though I have started as you know this thing.

So, you see the moment the people go to the back of an auditorium or anything if the speaker were to ask them sir can you hear me, they cannot hear what is saying neither can he hear their response. So, there is a no genuinely no feedback it is going to a class you should have heard this joke a long time, all the children are not present can kindly lift their hands it does not make sense is not they are not present so; obviously, they cannot lift hands saying all the people who have not you know the other way also who are present lift their hands also does not show much about it, what the teacher wants is a proper you know attendants are taking thing.

Now, going back to the slide here make sure that the speaker knows whether or no not he or she is being heard which is a very very important thing seen that know. It is a burley important level saying the teacher has to increase or decreases level two issues come saying even in case you have an amplifier you should not saturate the amplifier, if you speak very loud it gets saturated if you lower your voice while in normal speech what we do all the time is to catch their attention depending on the ambient we lower or increase their increase our own voice and then we try to pay attention and our brain does the all the processing you are able to do a two way conversation. But in the case of a lecturer or a I mean is a very funny word called a diatribe it is one way difficult for anybody to understand what the other person wants, at this point as a lecturer I would like to see what is the level that is being heard at the back. Traditionally this audio level things we have the in line audio level indicator and then we have the audio level interface is a stereo by directional coupler and so on now and so on and so many of these speech or sound pressure level meters are available.

Sound pressure level meter also looks a little like a that what you call a handheld portable device, and then you go somewhere and measure the thing. This is more used in a statutory atmosphere to see whether you are disturbing your neighbors or in the case of calibrating first time you calibrate an auditory or anything in the case. So, in our case this studio you probably use that meter this studio, has been calibrated to make sure that we do not have echoes we do not have dead spot, we also have what is called a small presence or a signature to make people feel that it they are not speaking to a what you

call dead full dead room like that unlike in a regular recording studio they want everything to be flat meaning as much as possible no reflection should be there, then the echo machine adds all the echoes similarly several usually you have maybe multiple sources including boundary mics, interesting close mics, and including instrument feeds and somebody does the mixing.

But in the case of an auditorium you cannot have all that during calar during the calibration or setup all this is required, but once the speaker wants to speak very rarely they even have a collar mic and then even collar mics have a small not all collar mics, but because fortunately it is done here the moment I turn around and then I would like to show something on the screen all ready, two things have happened one is I have lost contact with the audience, another is this may or may not pick up those things.

So, various things have been built including a two what you call microphone device and including something which is as a what you call mic up there, trying to pick it up and all that. So, now, getting back to my slide if the microphone is separated from the display then the product can be used in emergency situations, for instance in a hospital in a microphone can be placed near the patients bed display device can be put in the doctors cabin, this is a little like the baby alarms which we talked about.

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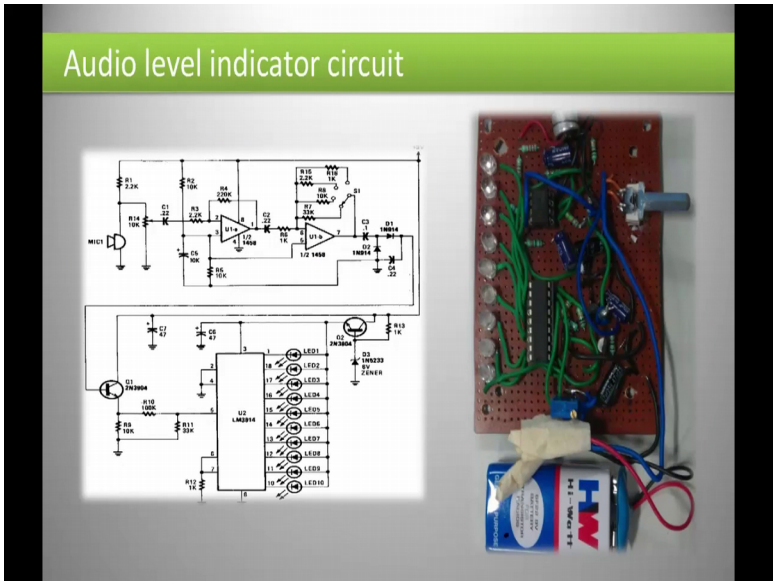

So, inside in this case because this particular presentation was made by them for the electronics class, they are trying to show how it show how it works here. So, we have

here some device here which has so many which have 10 LEDs and then all the 10 LEDs have been stuck here and in the case you see 3 LEDs are on here, and then the whole thing is run by a small battery and then you have an input you can do what you want with it.

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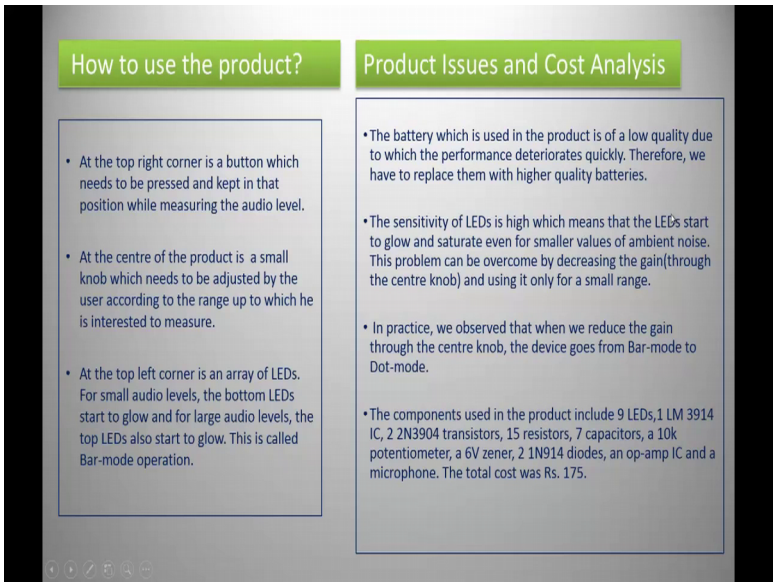

So, we have here before the product has been thought of they have talked about saying there is a button which needs to be pressed and kept in that position while measuring the audio level. So, you need to hold it in the hand and it will keep showing. The center of this a small norm which needs to be adjusted by the user reckon of the range up to which he is interested in measuring according to the range up to which he is interested in measuring. So, if it were an auditorium probably let us save it as around 20 seats very rarely the last one or two seats can be actually useful let us say I would like to say 80 percent of the depth. So, at 80 percent of the depth you need to probably increase this sense sensitivity a little or decrease the sensitivity.

So, that we can here at the top is an area of leds, if you look at the LEDs we can see the position battery which is uses of a low quality due to which the performance deteriorates therefore, we have to replace it with higher quality batteries, in the case what they said is that usual small 9 volts cell which is used in projects did not measure it this is the after making the thing. Sensitivity is high which means LEDs start to glow in saturate for small values.

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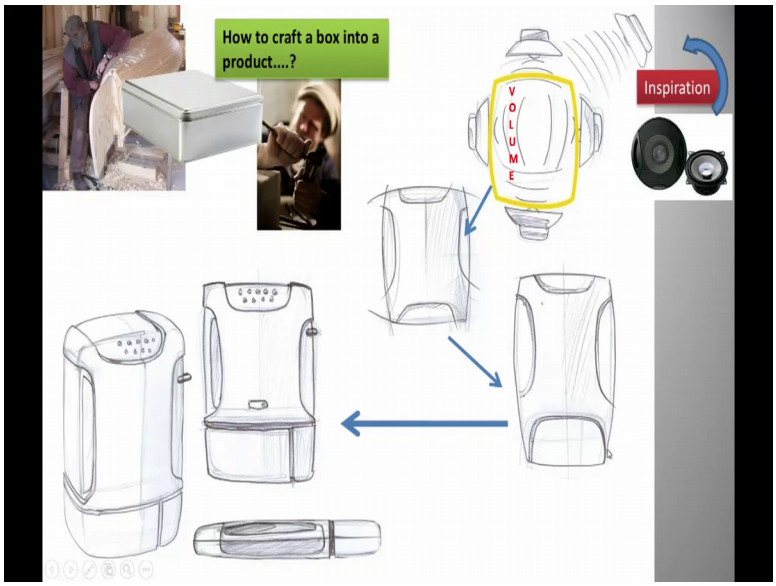

When we reduce the gain through the norm the device goes from bar mode to dot mode the components used they have included and finally, you see lot of they worked a lot at the lot and lot and a lot and then came out with saying can we have a device which probably has elements from various other things they see around we have an inspiration which is I do not know maybe a carving somewhere a carving is going on.

The other extreme we have these very rectangular or you know a box a box harsh box a box is harsh the advantage of a box a container like this know or a rectangular container is things are flat it can be stacked, and you have some control on the total volume by increasing only one of the places. If we increase the height; obviously, we can stack more or if we increase the increase the width you can add another display board here or in that case you know increase the PCB size and so on and then you probably need to have only one point where you can add the battery separately battery can be separate or in this case now you can probably carry some 5 volt supply like this plug it in and then try to use it. So, these elements mind you know this particular device was made in 2005 that is a long time back 12 years back when another project was active.

Now, coming back to my presentation, the students start about I do not know what it wanted probably they wanted to say there is a what you call control which comes in the moll sides and then there is an auditorium here, and then there is a volume and then you have these sound from all the sides because this lecture does not talk about any of these

these particular queues what they use all the time eventually the whole thing has been made into a product like this.

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So, here it is real it is really real it is not a virtual real it is real real, this says the original virtual real concept slightly modified this is the reality real thing which is done by wrap at prototyping. In this case we have only an additive what they call fused filament depositing machine, in which the colors are not possible and there is no not sufficient time to finish the product they have ended up in this beautiful thing now going back to my product you will notice that you see here we have a range of what do you call LEDs and then there is a color also saying, somebody holds up this at the back of the auditorium and the lecturer tries to talk louder and softer until he gets into this area this orange to green area, only this orange to green area is understood by all.

Now, we come to the next thing what about the people in the front is it not screaming at them so; obviously, that is not how it is. So, the auditorium is made such that it can be heard at the back. Again you see here in the actual implemented thing a majority of them have been implemented including the way the this thing can be split. So, that you can change the battery and then there is a receiver here, if in this case what they mean a receiver is it could be a simple microphone it could be an Omni directional microphone, a little like a simulation of what the human ear can perceive.

So, we have a beautiful object luckily it is just a student exercise, but anybody wants can always go ahead and try to think on these lines the more you think on these lines, the chances are you will also come out with it there is a small except a small thing here know this switch because of the physical limitations, they could not implement a switch which we want and then plus we needed the tactile feedback also. So, they have found out this switch which is actually it was implemented, and it was measured and I feel we have use the these thing now I will go on to the next.

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There is a beautiful concept which I liked because where asked the children I am sorry the participants or coach saying you come out with the situation which probably needs an urgent service one of them was.

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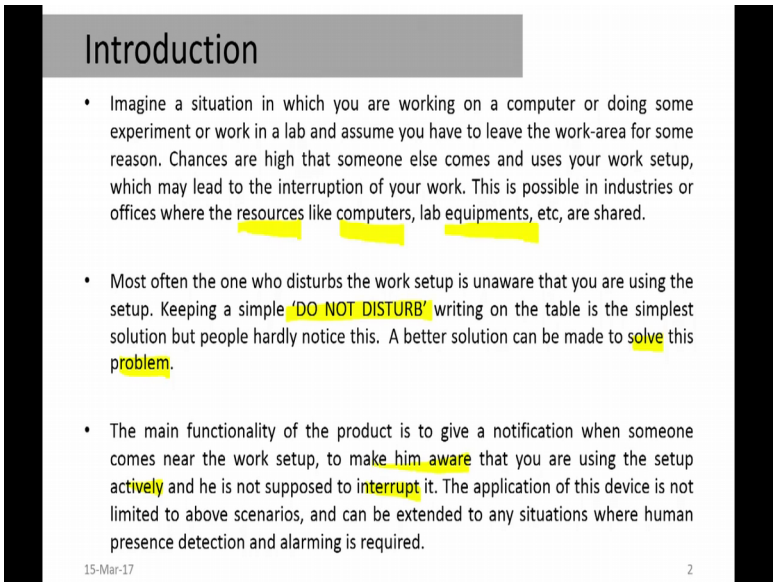

You are working in a computer doing some experiment in a lab and assume you have to leave the work area for some reason, that someone else comes along and starts using your work set up. So, let the interruption of your work two things can happen is possible in industries or offices where resources like computers and other equipment are shared, the so called personal computer is not that as pers as personal as we thin006B.

So, in case you have some simulation running or anything you need to go somewhere and run your program. So, chances are it will get often the one or disturb the work is unaware that they are using the thing and then do not disturb warning is simplest, but people hardly notice it you have an issue with it a better solution can be made to be there is a problem here which needs to be solved. Here when somebody comes near the work setup to make him aware that that setup is being actively used and not to be interrupted see our important thing. So, eventually most of us now in the new office situation we end up with cubicles, even if you carry your own laptop to the even if you carry your own laptop to your work, we all work in a cubicle. Cubicle has some very positive thing one of them is saying that you are reasonably isolated from the disturbances around.

Similarly, you do not disturb others, but the thing is one small problem about it is when you are not in the cubicle and something is running there always know see people around and like to see what is going on there, not intentionally it is not that they are looking at n

s f w content on they think because that the you know you can stop people from doing it and somebody else is monitoring, it just people are just curious like this.

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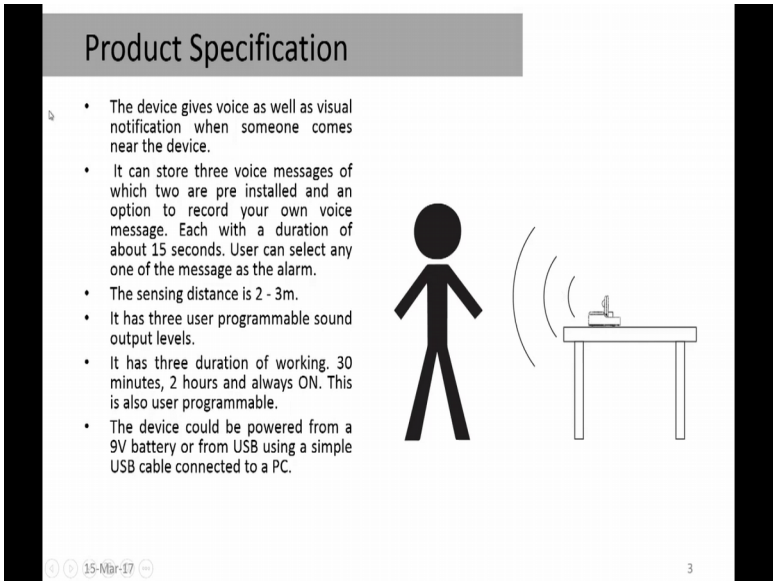

the other thing is this particular this thing was made due to exactly give an indication of in case this is left around on a table, voice as well as visual notification somebody comes near it can store three voice messages of which two are pre installed each of a duration of 50 seconds sensing is a two to three meters, user has three programmable output levels duration of working you have 30 minutes 2 hours and working on this also is programmable be powered from a 9 volt battery or from the USB using a simple connected to a pc thus you have seen here all the elements which were highlighted in the problem one of a is the proximity, other is given indication to the person saying inadvertently he is looking at his.

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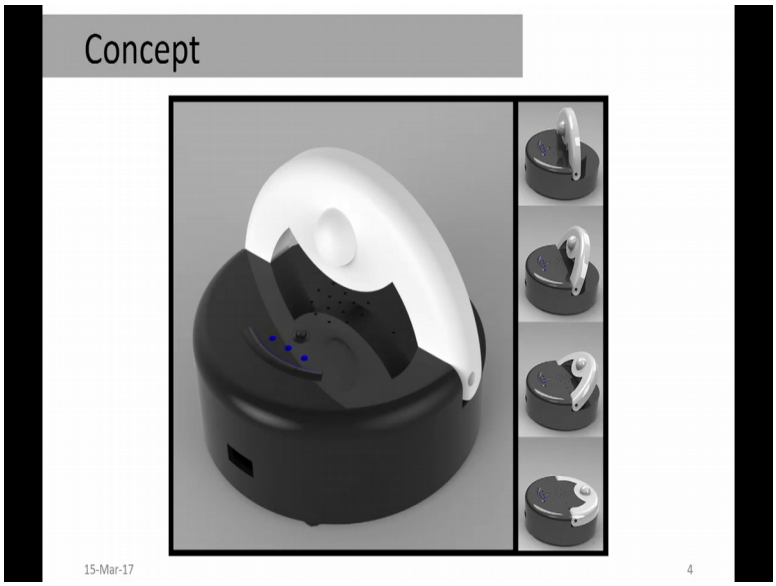

And nothing which he was not supposed to and then never operate it at all and thirdly also create a racket all around. So, others will be able to make over it.

So, we have the beautiful concept here, have a look at it I will just what you call time myself for the next 30 seconds. Somewhat clear I will just remove the distracting strokes I have made. You will see here this particular thing has a very peculiarly round shape. So, overall it is very compact and it is easier to carry wherever you want, and some other elements what we have here the some input here I do not know what it is probably a battery charging circuit and then we have several LEDs and most important here is we have the proximity sensor here. The pyro technique infrared sensor loosely called the passive infrared the advantage of this sensor is we can any moving warm object it will be able to sense.

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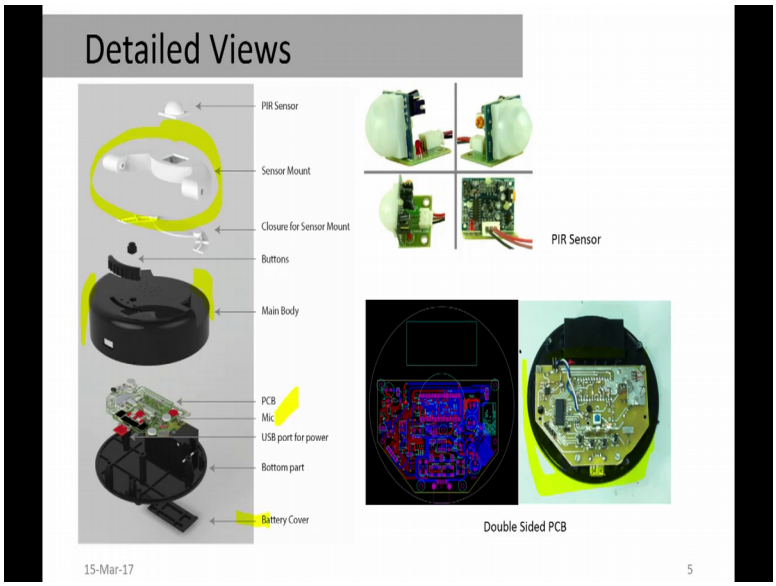

So, you just need to lift it up and keep it in case you want the entrance at cubicle to be done or keep it flat. So, that if somebody bends over and tries to read your monitor, we will know that they are up to no good or this makes it very very very very interesting compared to the earlier pictures which I have shown, which are taken from sources which you can also locate on the net have made use of all those things and finally, made this is our what you call my own students work, and then I think need not to say it that we would like to keep the copyright with us. So, kindly do not copy it in the unlikely case you can maybe read it and acknowledge it, but may kindly do not try to make it into a product there is nothing very great about it if you think about it yourself you will probably come out with a better thing. The core of it is at the bottom we have a battery cover you seen this then the whole shell has been divided into two parts.

Now, if you take a little closer look you will notice that the main body has nice smooth it just switches are you know normally spill proof imagine you have my USB coffee cup and the other thing and then you also have this and then you spill coffee you take coffee and then spill it on your timer that is a problem is it not. Beside you are also having your what you call that lumi timer also on your table because you are trying to prepare something you are preparing for an online exam. So, you have all that and then if the whole thing falls on this you are in a sop. So, we have here a beautiful smooth surface here instead of making it very exotic like the other things, they have made such that this is easily you can maintain it easily you just need to take a cloth and wipe it.

And then very important thing is the sensor itself now is mounted on a hinged mobile part. So, we have a beautiful device by which you know something comes there is a pin here, and then this is a what you call PIR sensor goes inside, PIR sensor itself is a PCB and then one beautiful nobody call nicely almost rectangular PCB with a corner shipped off. In the end whatever you say it is relatively easy to make then you have a place for various things we have a beautiful thing here including a microphone wonder what a microphone is doing there probably it here sounds and then you have a speaker also.

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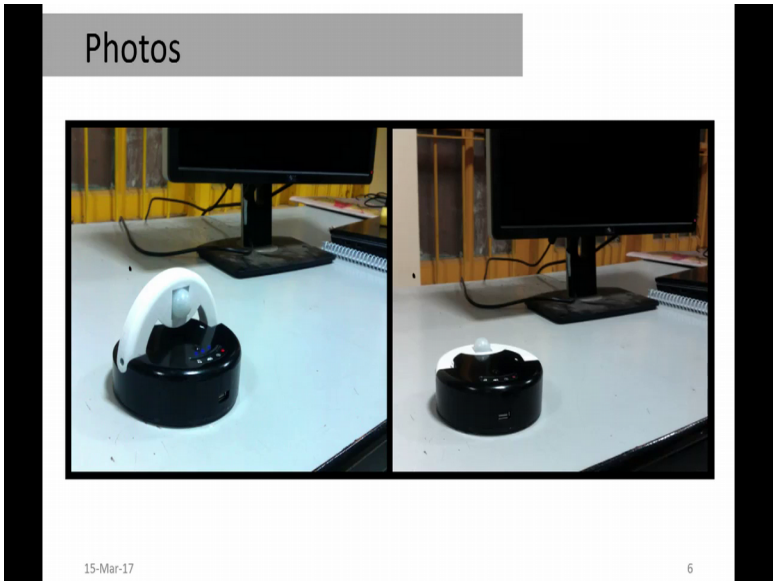

That speaker gives that horrible noises to make sure that others you call of course, that a video is not stream able. So, I am not able to hear, but actually you can hear if you come close to it and do everything it will start making a very loud sound.

So, this I feel a beautiful product you have a monitor, then you are inside a cubicle and then you just leave it, and then on the desktop you already have your lumi device which a allows you to time yourself, I have beautiful why not that lumi was a standalone device in this case this is a normal pen you have seen this know the thing why cannot we have now these days now that Bluetooth and stuff has come, we can have this probably attached to showing they now pick it up and then the timer starts have allocated timer similarly we can do something such that in case you having an online exam is online it will also keep the time. If for power point you have small routines that are available which will show you how to go through these things. Next time probably I think this is

enough for a day there you will get saturated next time I will show you lot of these other things I have so many I have a multi LED thing I have a what is called a lazy switch then I have a gas meter and so on.

So, I will stop here thank you for the interest you have shown and then I suggest it is about time you start working on a concept first thing first exercise was trying learn a little bit of sketching how you will learn sketching, second exercise is make a cardboard model take anything it is like a cake box, and then for making a cardboard model I suggested that you take a multimeter which is there in your on your lab or what you can get and then usually the front can be probably downloaded from the internet from another multimeter, you just need to cut it and then stick it on top, but the issue is in the end that the multimeter should look a little like a multimeter it shouldnt look like a somewhat you call stickers put on top of a some box we have.

In this for you to gave confidence see the pictures I have shown were already students have gone through these exercises were around three months towards the end of it they have produce, it not the first day that they have produced it, but it is for you to get inspired saying I take as many views of this as possible. So, thank you for today I will stop I will get back to an equally important thing next time which is about little bit about fabrication and how do you go about in case your electronics is somewhat ready or you are going to buy a few PCBs how to put them all into an enclosure and make it more reliable. So,

Thank you.