Virtual Reality
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Lecture - 1-2
Historical perspective

All right, I want to give some historical perspective. So, I guess by going by going on these kinds of questions, I am not sure where to put the boundary of the beginnings of virtual reality.

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Here is the oldest known cave painting it is about 40,000 years old in Spain el Castillo, they did hand stencils, I really have a hard time believing that was done 40,000 years ago, it looks like maybe some kids were playing, but they have done I guess the appropriate carbon dating and such. So, is that virtual reality, I am not really sure, but it is trying to communicate something.

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This one is from ancient India, all right. So, this is about 30,000 years old, Bhim Betka all right at least in this case you have some kind of display it looks like I see people on horses looks like some kind of battle those always seem important to record, we do the same thing recording, I do not know world war 2 in a textbook all right or on Wikipedia.

So, 30,000 years ago people were making experiences like this, I view this I imagine what the scene is like it is kind of like virtual reality, isn't it? people for a very long time got obsessed with rectangles right. So, make a rectangular drawing and you feel like you are there you somehow it captures your imagination. So, one thing I like to say is that people have been staring at rectangles for a long time, now all right maybe a thousand years or more of staring at rectangles it goes back to paintings, and then evolves into evolves or devolves into movie theatres, television sets, computer screens, Smartphone screens, we have staring at rectangles for a long time as a way to present visual information, and give you the feeling of being somewhere else perhaps.

This particular picture is from the European Middle Ages.

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It is around or maybe early renaissance it is from the year 1470, and I like this one because, I was particularly looking for pictures where the perspective is wrong right. So, this is a very funny kind of picture because, if you look this, this wall does not shrink appropriately as it goes backwards, these soldiers back here they just look kind of small rather than in the background. So, somehow it is not been drawn well, but I suppose that looked fine in it is time, and nobody had any idea how to make it look better right, and then not too much later around 1600, picked paintings like this started showing up.

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And this one's correctly taking into account perspective, and the lines are drawn you know very, very nicely to where if I stand up very close to this picture, I start to feel immersed all right this really feels amazing to me. So, that is wow I could draw a threshold here and say this looks like virtual reality that is pretty amazing, I really get the 3-dimensional information. So, that is so, that is quite impressive and an important step oh yeah, I want to then go to film a bit and show you a couple of things, which were considered in their time to be very immersive. So, let us see.

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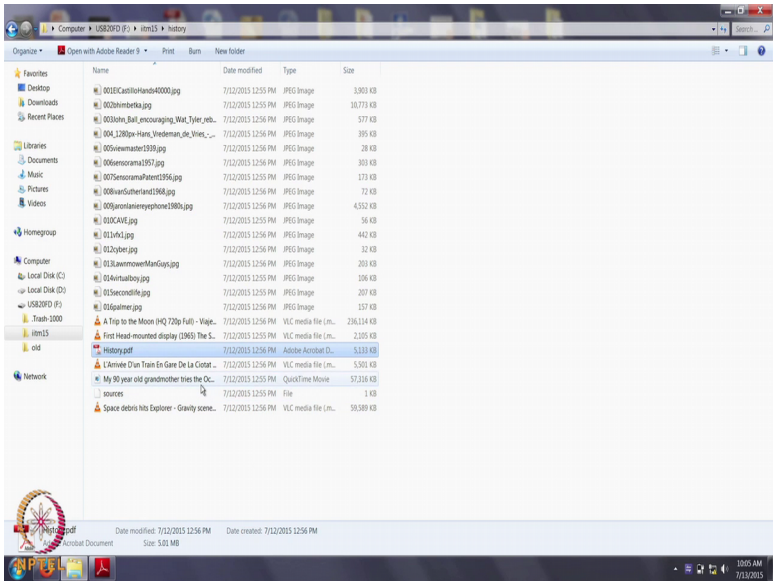

You might have seen this before the train arriving in the station.

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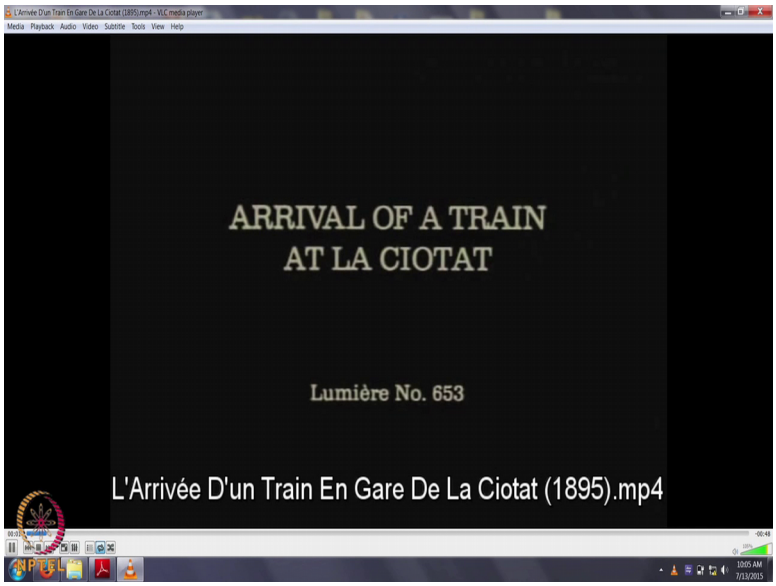

So, 1895; so, they showed this in a movie theatre in the 1890's.

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And rumour has it although it is hard to confirm this that people were jumping out of their seats, and screaming and running to the back of the theatre, when they saw this I do not see any of you jumping out of your seats and running to the back of the room, why is that?

Well if I made it really big and put it on a screen here right, the piano is playing with some music, and this is black and white kind of shaky, you do not get scared at all right.

So, somehow you have been perceptually trained to mostly ignore stuff like this, and in fact, criticize it this is ridiculous how can anybody find this entertaining right, but in 1895 this was very impressive this was 3 d fully immersive all right.

So, just something to think about how we have evolved, to give you something a little more recent (Refer Time 04:35).

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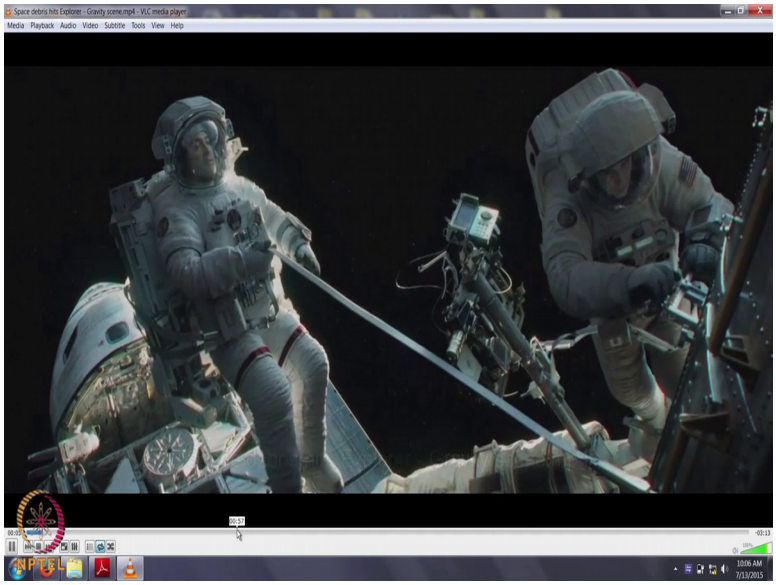

So, it is just a small clip from the from the movie gravity, and you can see when you watch that in the movie theatre especially if you put on your 3 d glasses, but even if you are just looking at a 2-d screen the amount of realism and immersion is absolutely incredible all right, I cannot imagine what would have happened to that audience in 1895.

If they had a chance to see this all right and already in your generation, most of you who are students here this is like fine you know it will be better and better things coming right. So, the threshold keeps getting higher and higher, when I was a child the I was about 10 years old or so, I came across the movie 2001 by Arthur C Clarke and it was done in 1968 and it was like the late 70's when I kind of founded it and I loved that movie the special effects were amazing, but then star wars got even further in the special effects, gravity goes even further the standards keep getting higher and higher, for these things the same thing happened for video games. So, our expectations keep getting higher and higher, but it is interesting when you get the first wave of these new

technologies, it does not take very much to really motivate to really inspire people all right they seem quite fine with what looked like very simple visualizations.

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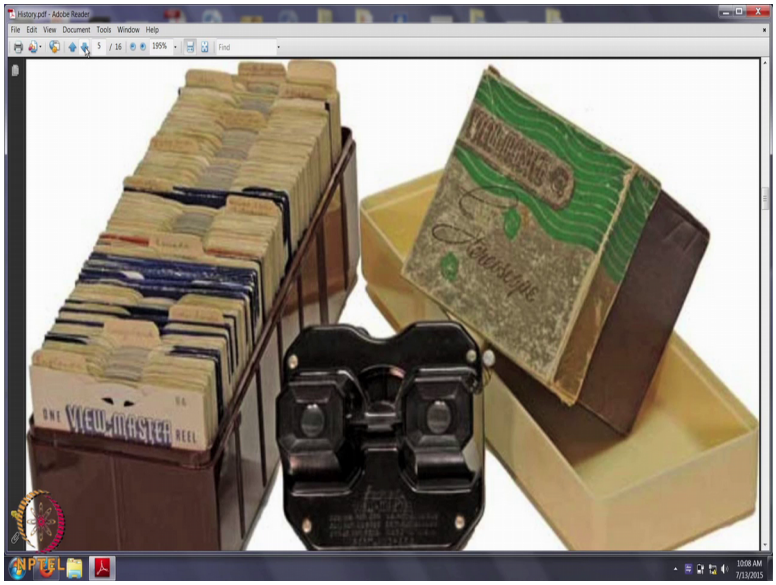

What about 3 d? So, this thing called the view master is everyone heard of this, right and you can you can grab these view master slides and put them into this device, and you get stereo viewing right looks a lot like a virtual reality headset, you can even tracks your head right, you hold it up to your eyes and you move your head back and forth, but you do not completely feel like you are there, but it is 3 d all right, 3 d colour very sharp images looked very nice, this came out in the late 1930's and it is still around today. In fact, I just read recently that I believe Google is partnering with the current owner of this um technology, view master technology and they are um working on some kind of virtual reality extension, they are using Google cardboard for example, so, this idea is still around sensorama from the late 1950's.

So, they built a few of these there is a patent for this and they built some of these where you get a full 3 d wide vision experience.

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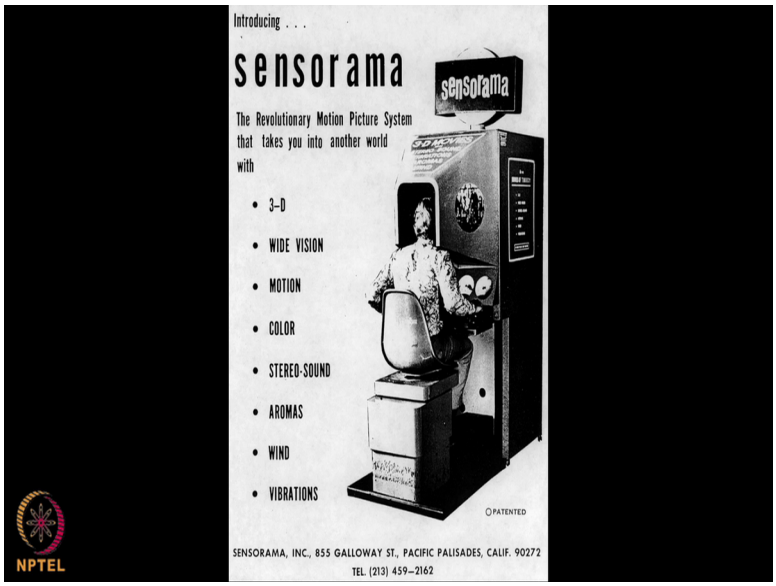

You have a vibrating seat wind, smells stereo sound. So, that was what virtual reality looked like in the late 1950's getting a little closer to things we are familiar with, there is a picture from the patent for that us patent for that, many people consider this to be the first virtuality headset the first fully functioning virtuality reality headset built by, Ivan Sutherland in the 1960's. In fact, I have a have a short clip from that let me see here.

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Not there either all right, oh yeah USB.

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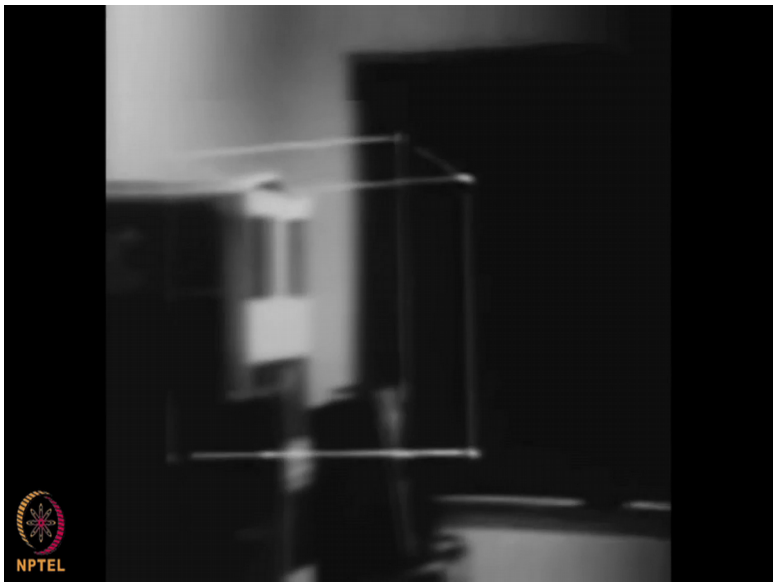

Sorry I have to get that back again, just a short film here, maybe it looks like augmented reality right. So, you are getting some information superimpose there is 3 d geometry there.

So, very impressive. So, that is quite an old headset. So, Ivan Sutherlands considered across the 1980's.

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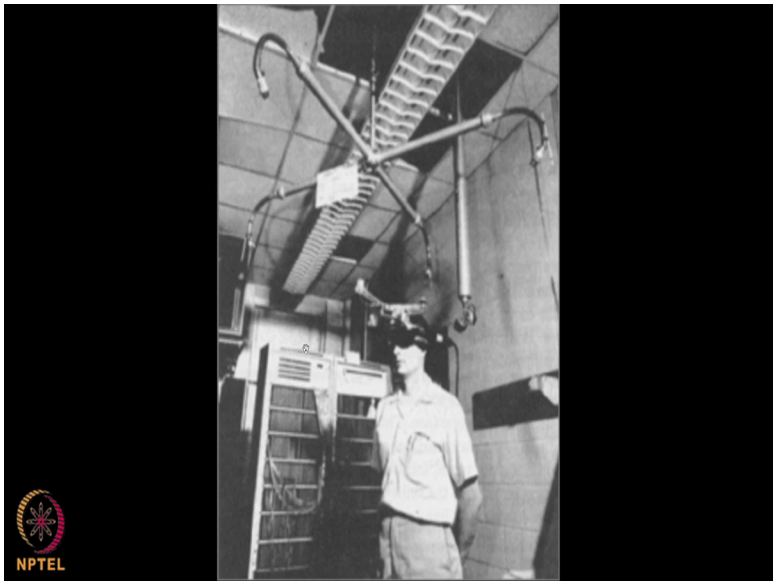

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Jaron Lanier who coined the phrase virtual reality started a company, and popularized this idea of having virtual reality headsets or goggles and then gloves or data gloves. So, people have been obsessed with this idea of headsets and gloves head mounted displays and gloves, for quite a while this is a picture from around like 1989, that shows that technology around 1992 or so, at the university of Illinois the first cave system was introduced. So, this is done by using projectors, from behind and projecting video on 2 screens, you could do it on 3 screens to surround you or you could do a full 6, there was a 6-sided cave made, believe the first one was done in Iowa state university around 2 thousand, the neurobiology experiments that I showed you where essentially cave systems, anybody know why think about.

How small the headset would have to be for a rodent, or a fruit fly right. So, the with these cave systems you do not worry about headsets, unless you care about changing the perspective and using a stereo, in which case you may have some 3 d glasses, to use the same tricks that are used in a say a 3 d movie theatre right using polarization, and alternating frames to be able to give you a 3 d experience, but if you do not care about the 3 d part so much, and you just want the full surround part, then pretty much it is just a surround kind of cinema, but they do head tracking in these systems and did in these early systems.

So, cave systems are the let us say the biggest competitor to a head mounted displace, and they offer some advantages, but there is also many disadvantages, non-portability, being one of the obvious ones.

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Vfx one this is a headset that you know visually it looks very similar to the kinds of things, that we have today although maybe it looks quite bulky, but when you try these things varial resolution very small field of view there were video games.

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Showing up in arcades in the 90's as well. So, I was able to try some of these recently who might they hurt my head, you really have to kind of screw these headsets on and I found them very uncomfortable, and again very narrow field of view a lot of lag in the tracking, it wasn't really anyone's fault of the time. it is just the technology components were not far enough along then things really got out of hand.

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With this movie lawnmower man has anyone heard of that, go check it out I am not saying it is a great movie.

But it does indicate how crazy and excited how wild and excited people were about virtual reality, in the 1990's shortly before virtual reality enthusiasm came crashing down, right in across the 90's in the mainstream let us say among mainstream consumers this was one of the main reasons why it came crashing down, came crashing down in a lot of ways because, the hype was too high too many people were too excited about it they had very high expectations, it looks like virtual reality from the outside, but when you go inside and try it wasn't very comfortable.

It didn't have these basic standards of comfort and adequate for the task. So, an intend do virtual boy has anyone had a chance to try that before. So, basically it just sits on a table, there is no head tracking. So, it is very much like the view master, you put your face up to it and you get a black background with red lines, and it is stereo and you can play things like a immersive tennis, and other kinds of games. So, it was an absolute disaster

and that caused all the game companies to stay away from video, to stay away from virtual reality for many years.

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This is very closely related to virtual reality, especially if you believe some of these things we talked about in terms of like, what does VR include second life.

So, that became available around I think 2002 or so, 2002, 2003 and in this case, you have a bunch of avatars these are people who could be anywhere in the world, and they are all interacting in a virtual space it looks a lot like virtual reality, but it was not immersive with some fully immersive in the sense that people were not wearing virtual reality headsets it was all done on a screen. So, this focused more on the social interaction part, and there is even an entire real economy forming, where people were exchanging money linden dollars which were exchangeable to us dollars and other currencies and this is a precursor to bit coin you know. So, actual real currency was going on in this environment. So, I found that really interesting and the founders of second life, the key people who were who started that company and built that up are working now on virtual reality extensions of it of course.

So, they always wanted to do virtual reality they have said it is just in that day they had to do it all on a screen, and that was not very long ago right that is about it a little over a decade ago. And finally, you know in 2012 a 19-year-old palmer luckey from California started this company and I think about it you know palmer was born about the time of the

great virtual reality crash, let us say right when people were tired of the hype, and it wasn't really working. So, well. And so, it was time for a new generation of people to come along, and in this case this prototype headset that that we did at oculus, and distributed widely that helped to give a rebirth to virtual reality, was made possible because of advances in the video game industry, in terms of the software and graphics power. And so, hardware and software, and some game engines I should say for the software side, and for the hardware side GPU's graphics processing units. And so, that made that possible the other part that made it possible was the Smartphone industry.

Because we had very high-resolution displays, that were very low cost and the sensors inside could give us enough data to do good tracking. And so, these were the key things that came together. So, palmer or many other people on the forums realized this, some people at universities as well were working on these things, like in Mark Boal's lab at the university of southern California and many other places, they realize that low cost virtual reality is possible in a portable lightweight form. And so, people started rushing into it, and as you know Facebook acquired oculus for a 2 billion dollars last year, and many other giant companies are jumping into the mix, they are all racing to make virtual reality headsets now, and still people are not completely sure what these headsets are going to be good for right.

What are we going to do with these, we always like to say what is the killer app, it is easy to imagine maybe it is going to be video games or some other thing that is very successful right now, but it is really not clear at all. So, so I hope you get some perspective from this class and get the idea of what might be possible on this platform we carry smartphones around with us, but we usually do not use them too much for making phone calls right. In fact, they are not really very good at phone calls, they are good at other things like, keeping up with your friend's right or texting other kinds of things that we do with them. So, again I think virtual reality is going to be some new platform, for doing all kinds of things it is up to you to figure out, what is going to define the next generation? So, so that is my historical perspective part any questions on that.