Virtual Reality
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Lecture - 18-3
Interfaces (overview)

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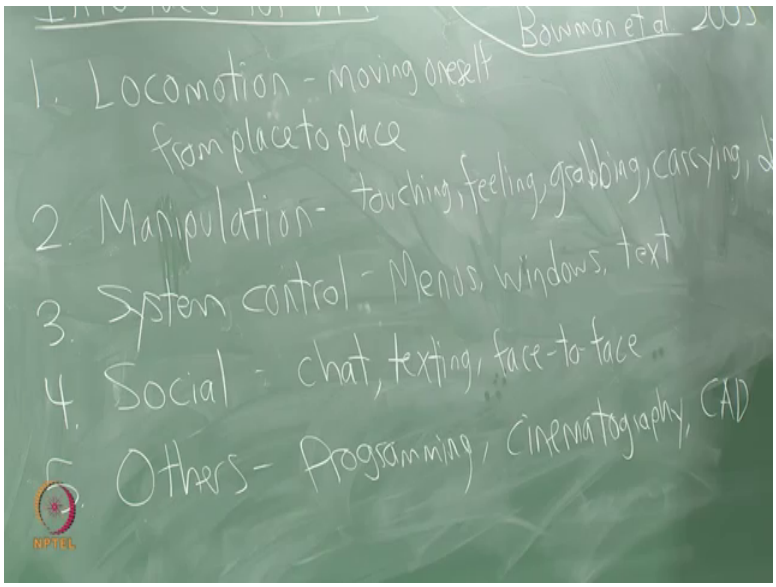

And let me now give just a high level overview of interfaces for VR which will be the main subject for the final lectures interfaces for virtual reality. So, I like to give some high level categories. There is a nice book called 3D User Interfaces by a Bowman et al which you might find interesting reading.

So, I just want to give some general categories and we will talk about these in more detail next time. So, locomotion very important virtual reality, which is moving oneself from place to place right and we have talked about the issues here of this vestibular mismatch with vision. So, you had like to move around you had like to move in a much larger world in virtual reality, then you are moving in the physical space right. Because if you have to match them perfectly one to one then you need an enormous physical space to hold and preserve entirely for your virtual reality experience which is not feasible in many cases most cases.

Also in locomotion is it are you walking in virtual reality or you riding a cycle in virtual reality, or are you riding in a vehicle flying in a in an aircraft or spacecraft, so there could

be vehicles involved in some way or you could be perceiving that your locomoding using your own natural walking even though you are not actually walking in the physical world. So, these are possibilities for locomotion.

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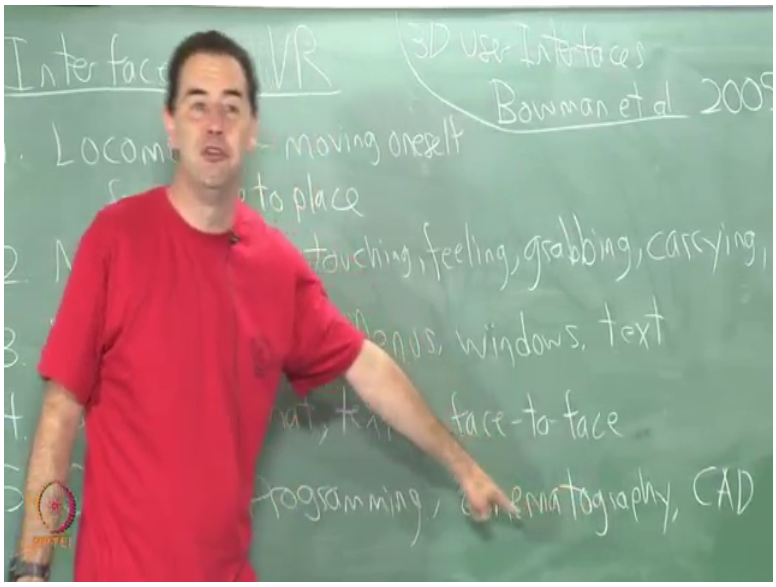

Another general category is manipulation right. So, it is a correspond to all kinds of things. You are reaching into the world, touching, feeling, grabbing maybe grabbing an object, perhaps carrying an object, discarding or dropping an object right. So, all of this interaction with objects in the world, I will put objects here. So, what happens how do we select objects in the world right, and what kind of feedback to we need if we want to be able to grab them? And manipulate them in some way that is comfortable. I would be willing to bet that depth perception becomes important right how far away is that object that I want to grab. So, these are interesting kinds of questions.

Another category is a system control. So, just standard how should menus look, and how to select in menus, do we want some kind of windows. In other words, what is the replacement for the desktop right we have a desktop with windows and icons and we we do our work our smartphones have some sort of version of that with a touchscreen. Again we have icons and we open them up and we do various things.

So, what should the system control look like exactly, how do we interact, and just do our work in a virtual reality environment, it took us a long time to get to the type of desktop environments that we have now or smartphone type environments that we have now

what should that look like for virtual reality remains to be seen even just text editing right. So, how should the text appear, readability, comfort, speed things like that so if I have you know fonts all these kind of things and how do I interact with the system in some comfortable way.

For social interaction interfaces social interfaces so chatting, texting, interacting with people, we end up with some difficult let me put face to face, we end up with some difficult challenges, because if you and your friend want to interact in virtual reality, and you are each wearing a black objects in front of your face, you cannot see each other's eyes right

So, if I want to transport you both to a virtual world I can give you some cartoon character faces let us say, but what happens to your facial expressions, well we could try to track them that ends up being expensive what if there is inaccuracies on that. We can put eye trackers inside and try to track how your eyes are looking is that good, does it work, does it work well or is it kind of creepy and uncanny all right. So, how does it look? So, these are difficult issues and making some kind of social interface.

How real does it need to be, what aspects, do I need to capture from a human to communicate their emotional state in some reasonable way for social interaction all right. So, that maybe a week later when you are done using the interface did you really feel like you were with that person face to face or did it feel like some kind of strange cartoon like interface that was not quite right, I mean how do how does it feel.

Well it is not a perfect categorization. So, I just put others down here what else would you like to do like for example, what should the interface look like for our programming environment right. So, I want to have an integrated development environment, I want to write code while sitting in VR would that be better than doing it on a screen. I bet it would be one day that could be really amazing, but how should it look, how should it be, I do not know.

What if I want to make a tool for a next generation of cinematographers cinematography right or CAD design or CAD computer aided design right. So, just different kinds of applications what should these interfaces look like right. If I want to be able to edit panoramic movies in some kind of new generation cinematography, what should the tools look like for that, what should the interface be like.

If I want to build stuff design things right most of engineering has gone for a very long time dealing with design from two-dimensional drawings right, you start off by drafting on with pencil and paper and then we make three-dimensional models, but we are still doing all of that while looking at it on a 2D screen.

So, what if you feel immersed in the design in the object that you are making, how should that tool be made, you know how should we how should we interact and make that happen. And do you want to be reaching your arms out, and grabbing things, and spinning them around, your arms they will get tired after a couple of minutes I would bet I bet its cool first a little bit and after that I bet you do not want to sit there all day designing objects reaching your arms out in space.

So, so what are the issues in there so a lot of different possibilities. And of course, for entertainment there are all kinds of interfaces we might imagine right what if I want to do street fighting right and that is that is my application. So, what should the interface be like for that right. So, maybe you want to capture full body motion, you may want some force feedback, but maybe not too much otherwise you will get injured and you might not like that it depends on what level of realism you like.

In one general principle here, but before we before we finish for today, one interesting thing to think about is that if we are constructing some alternate reality, then I should be able to take any interface that exists in the real world and make a simulated version of it in virtual reality right. So, for example, maybe I have a candy machine that is some kind of interface I put money in it, and candy comes out of it. So, I guess I should be able to make that interface and virtual reality right, I have an interface for opening doors, it is called a doorknob, I grab onto a doorknob and maybe I turn it and I open the door all right, so that is an interface.

So, I should be able to make simulated versions of interfaces that we have in the physical world in virtual reality. And many times that will be very natural and that might be the thing you want to do because you are trying to maintain the illusion that you are in some new world that is very similar to the physical world has some differences, but you are trying to maintain that illusion and so the interface that is natural for the real world may become natural in this alternate world that you are generating. In some cases, maybe it just becomes too physically tiring to simulate that interface all the time and make it in a

perfect one-to-one correspondence, there may be no reason to do that you may come up with something much simpler. So, these are the kinds of things to think about. And we will get more into that in the next lecture any questions?