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Lecture - 20 Contemporary Interface Design Technology

Welcome students to the online NPTEL course, User Interface Design. This is the final lecture. In this lecture we will discuss about what are the other kind of paradigms where UI UX and user interface are going to. So what are the future domains of UI UX and till now we have finished all the methodologies and what is the existing paradigm of design process and how we can deliver the design within the existing paradigm of design.

And human computer interaction design domains and also we have discussed about the elevator pitch and how we can interact with the client after the designing. So within this paradigm what existingly we have is we see mostly laptop, PCs personal computers and tablet and mobiles. This is the main interaction devices. So there can be other human computer interface devices for different equipments which has a UI interface within that.

It can be ATM vending machine, it can be other equipments which we see in our day-to-day life. But UI UX and the interface design and human computer interaction this is going in a very, this is changing, the paradigms are shifting in a very rapid manner. So in next few decades the type of interface what we are seeing right now might be totally changed. So right now the way we perceive a interface between human and computer that might totally differ in next few years.

So few of the directions which we can already see the researchers are going on in few directions and few of the ways we are trying to perceive human computer interface in a different way. So we will discuss today some futuristic approach of human computer interaction design. These are not exactly the futuristic approach. So these few of the examples which we will talk today are already existing but these technologies did not percolate to the users as much as the other devices for example mobile tab and laptops. So these are some devices which are coming into picture nowadays and these are few devices where the interaction design will be totally different, the way of interactions are absolutely different in those devices. So if we understand those devices and what are their potentiality and how they differ in terms of user interface design then we can at least perceive what can be in the next few years.

And in this class we did not discuss about how to design on these futuristic devices what already and what are the some of the devices are already existing because the scope of work within that devices are limited and those devices are not very popular among the user till now. So they are there but few of the users use that but those are the equipments which are not as market invasive as the other existing devices on which we have already discussed.

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So this is the mode of if we look at the user, so this is user connects to the world through this human computer interaction devices. So HCI is there, would there is a human and computer interaction is going on within this facade. So there is a, the way computers are talking to human is the human computer interaction and through that we are connected with the world. Now existing devices, these are few existing devices we can relate to.

It can be desktop, it can be laptop, it can be tab or mobile. So these are the most commonly used devices today. So definitely there are other devices which are there, which also has a human

computer interface. Even some digital camera and other digital, if there is a digital display in front of a refrigerator or washing machine or any other devices those are also machine interface design.

So there also the same principles of UI UX and visual communication comes into picture, similar principle. But there are few other devices which are totally different in nature. So we will have some idea on that.



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So today, the mode of input through which we communicate with the human computer interface basically is by typing or clicking UI buttons in case of mobile, tab, or PC, or laptop. But there are some emerging paradigms of input devices. The way we give the information to the human computer interface, it is not just limited to typing or clicking the buttons. So emerging paradigms of gestures, command of giving UI commands are gesture command and voice command.

So we can also give voice command which is also there within the mobile, smart phone, in iOS device we have Siri and also in android device we have voice command. And gesture commands are even there in apple watch. So we can give certain gestures, can be used as a command. There are smart TV remotes where we can just user our gesture to change the channels and other things are there.

So gesture commands are already there and voice commands are also there in the UI UX devices. And this will definitely be more and more useful and it will be used more as a UI command rather than typing or clicking. Because the typing and clicking requires some larger amount of cognitive load and giving a voice command is very natural for human being so that is how we naturally give the command and gesture command is also quite intuitive and natural.

So that becomes device more user friendly and more easy to use and more natural for the users. (Refer Slide Time: 07:09)

Digital Media Technology New Advancements /Virtual Reality /Mixed reality /Augmented reality

These are the way displays are changing. So one thing is if we understand traditional or the existing personal computer or the desktop one is the input devices which is keyboard and mouse. Through mouse we click the UI button and through keyboard we can type. Similarly, in mobile we have the earlier we use to have this text buttons. Right now we have the touch screen button. So that is one way of giving the input and another is selecting a UI button on the screen.

So few of the advancement in technologies are virtual reality, mixed reality and augmented reality. These are the earlier what we were discussing this voice command and gesture commands are the way to give, it is a kind of a input device, how we give the command, so through voice or through gesture we can give the command and these are few technologies like virtual reality, mixed reality and augmented reality.

Now that is the way, from there we are shifting to voice and gesture command. And now the display is also changing. Now we have a very solid digital display. Through that we see all this informations and everything and that display is also changing in the new paradigm of design which is the virtual reality display and mixed reality display and augmented reality display. So they might not totally differ from the existing way of display but slight addition, alteration and in few cases lot of difference can also be there. So let us discuss what are these.

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Virtual reality is when everything which we perceive through a digital media and we are totally cut down from the physical existence of the visual. So if there is a physical existence of the visual is there in your periphery of 360 degree environment, we do not see that in virtual reality. We see a total different display around a 360 degree periphery.

So in design domain digitally generated visual and sound will be displayed and that can be replicated as a realistic environment. This is the realistic and immersive simulation of a 3D environment created using the interactive software and hardware. So when we look at the virtual, when we wear the virtual reality headset, we will be totally cut down from the existing physical reality from 2 aspects. One is the visual and is the auditory. So these two inputs will be totally given from the virtual reality devices.

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Digital Media Technology New Advancements	
Virtual Reality Oculus Rift Samsung Gear Google Cardboard HTC Vive	

Few of the devices are Oculus rift, Samsung Gear, Google cardboard, and HTC Vive. Google cardboard is a device and within that you can put your phone in front of your eye and that goes through a software so that we split the vision and perceive as a 360 degree environment around us, virtual environment. So this will be the kind of devices which you will see. So it will be totally in front of your eye.

And you will not see anything which is there around your physical reality. So in this virtual reality you will see a totally digitally created 3D visualization as well as the sound will also be there. For sound it is just a visualization. For sound you can also have another equipment. You can wear that and you can hear the virtual reality sounds as well for a more immersive experience. So these are right now this Oculus Rift, HTC Vive is mostly used for gaming.

So when you want to experience a very immersive, you want to have a very immersive experience of a digital gaming, then you can have this. And mostly it is confined right now in gaming or experiencing some 3D visualization in few cases or some walkthrough if you want to perceive a space through a walkthrough that can also be done through this. But yet this did not come as a day-to-day life use, a day-to-day usage.

It does not have a very a day-to-day usage and did not replace our other equipments like for mobile and others and it did not want to because we cannot wear a virtual reality headset all the time and experience a virtual device. So this is not a replacement of personal computer or tab or mobile phone but this is another way of having a more immersive experience of a 360 degree environment so which is more of a gaming experiences right now.

Otherwise many cases of researchers in different cases researchers use that when they want to experience a virtual environment. In architecture this can also be used to give a client a better view of how the building will look like when it is built. Now another type of display is mixed reality display.

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Digital Media Technology New Advancements Mixed Reality When VR mixed with physical reality. The Virtual technology adds on to another informative and interactive layer on the physical world

So when VR virtual reality is mixed with the physical reality that creates the mixed reality. The virtual technology adds on to the another informative and interactive layer on the physical world. So in virtual reality what we have seen is we are, the users are totally seeing a virtual environment and virtual environment as a visual input and also it can have a virtual sound.

But in mixed reality, the physical environment what is around us and the sound and the visuals around us will also be there and there will be another layer of virtual information on top of this physical reality. So we will give example.

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So some of the mixed reality devices are Google Glass and Microsoft Hololens. So these are still in the yet to come in the market. So they have, Google and Microsoft have already made their alpha or beta version within the lab but this did not come as a daily usage and is not, once Google Glass was launched but it is not finally launched with the usage of the everyone. So this is how it will be perceived. So this is not how Google Glass looks like.

So this is a visual impression of how the users will perceive when they will wear a Hololens or a Google Glass. So what you are seeing here, so they will see the physical environment, even the man is seeing what is there within the interior space and this lady is seeing what is the there in the exterior space. But another layer of information on top of the physical reality will be there. So it can be the temperature of this existing space.

So it can have a GPS tracker where exactly you are and it can provide the information of the temperature of that particular place. On top of this what you are seeing within on that it can also project some information. And also it can recognize some of the building through image processing. It can process the image what you are seeing because it has a camera and it can relate to what you are looking at.

So it can identify that image and tell that this building is a hotel or restaurant and through image processing and image recognition. So it will process the image first what you are looking at. So

that is the image processing and later it will recognize so if that the image matches with the data which is already there in the cloud with some information which is already loaded in the cloud.

So it will fetch that information from there and tell that this building based on the visual similarity it will recognize the building and then it can tell that this building is or restaurant whatever and give the information about the building. So it is interacting with the physical reality what you are seeing recognizing the visuals or recognizing the places where you are and then giving data what you may want around your physical reality.

So this is mixing a digital information, putting a digital information layer on top of the physical reality. So this is called the mixed reality devices in terms of the display. So similarly in Microsoft Hololens which is a kind of a computer, so all this datas and files and folders will be on top of your, and you will visualize. So it is a wearable device. So you will see what you want to in the physical reality and on top of that it will perform as a computer.

So all folders and everything you can see while working or while doing other works. And yes, it also incorporates gesture input process and the voice command so that you do not need to type where you want to, the way you type in the mobile or laptop. So it might have a keypad on top of the visual display and you can type there through gesture commands. So another kind of digital medial technology in terms of display is augmented reality.

Augmented reality is right now pretty common, more common than the other two. The mixed reality is right now the least common and still in the inception phase or in the lab. It is not accessible for the, it is not purchasable for the common people.

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Augmented reality you will see, you might have already seen augmented reality devices or augmented reality display. Because you can see augmented reality through a QR code through your own mobile phone. So it does not require a different kind of display. So whatever the display of a smart phone is that can show you the augmented reality display if there is a QR code for a particular augmented reality model.

So augmented reality what it does is that it gives the perception of a 3D simulated image on top of the real world. So if you scan the QR code through your tab or a smart phone, this is the QR code. So after scanning that, on top of this physical reality a model can emerge. So this augmented reality also has a, can also be used as a perception of a 3D model in terms of mechanical engineering if somebody wants to make a 3D model or a product designer or architecture that design can be there as a 3D model.

And it can be perceived from all this different viewing angles if there is a QR code for a particular model. So each and every model will have a unique QR code. So if that is scanned through a QR code scanner from your tablet or a mobile phone then it will give you the view of this 3D model. So this 3D model does not exist over here but if you scan through your devices then the 3D model can be seen. And if you rotate the QR code it can be, the 3D model will also rotate in front of your eye.

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Digital Media Technology Future of Digital Media 6th Sense

Haptics

So some other different technologies which are emerging is internet of things, 6th sense and Haptics. Haptics also right now it is not confined within the visual because we are starting to give gesture commands and so through gesture command also the Haptic technology which is based on the touch sensation is also is there within the digital interface. So it is not just a visual interface right now and Haptic is not still lot of researches are going on.

It is not still incorporated within the commercial products which is available there so but in near future it might be incorporated within the devices which we see in today's time.

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So internet of things is a concept where every devices are interconnected and exchanging data amongst themselves. So there can be multiple digital devices, smart devices which can communicate within themselves and transmit the data among themselves and through a connected loop. So ioT enables smart devices to control remotely. It can be applicable in various domains like smart homes, intelligent transportation and smart cities.

So smart home concept already is there. So all the home appliances which are smart appliances can be digitally connected. So for example refrigerator, lights, fans, Acs, and washing machines, everything can be connected together and there can be a central monitoring system or system device which can monitor every devices so that it can tell the device when to start, when to start operating and when to stop.

And when the AC might switch on, when the AC will be switched off. And a person who is the user can remotely control that. So they might give a voice command through that the voice command switch board might start operating. So this is how smart in home can function. Similarly, smart transportation, all the transportation devices like the signals, through the smart bus stops the datas on the bus stops can also be there.

You can read more about this ioT devices and how it can be incorporated within the smart cities or smart transportation or smart homes because this concepts are quite difficult to understand because a lot of researches are going on here and how every devices will be connected. So the main concept is every devices are connected and the datas are transmitting. So what data is there in device 1 and which might be required for the device 2 can automatically go to device 2 if device 2 wants to access the data.

And similarly there can be multiple loop of all this devices which are interconnected and shares the information among each other for a better sustainable model. So here is an example of a movie. This is the movie called Her where the computer is connected with all the devices and it starts directing the other devices and also this computer also has a, in this movie it has a the concept of machine learning is there. So it kind of tries to adopt. So this machine learning is also another concept which is there and many of the smart devices also has the capability of machine learning, very high-end equipment might have that capability. So it can automatically learn the behavior of the user and accordingly it will start functioning and optimizing its behavior.

For a very rough example, it is already there in a very, in the primitive way is when we search for few words and when we start typing a few common words in our devices so the suggestion of the next word when we start typing also changes based on our mobile. So our mobile learns what is the pattern of typing and so what kind of text we want. So maybe and it might be based on also our language preference.

So these are the ways, so the device is actually reading, memorizing the typing pattern of the users and adopting itself through the users behavior. And it can adopt based on many other kind of functions for example the walking pattern and daily calorie use and other kind of apps can also get the data and adopt itself and so these are the concepts of machine learning and it can be very difficult and high-end level as well.

So these are some examples which I am giving from a very easy examples and the machine learning program becomes more complicated. It can have more and more capability of machine learning and it can go towards artificial intelligence.

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Now one of the example of internet of things are smart home. So this is a Google Home product. So this device of Google Home can connect all the home appliances which is there within your home which can be connected like smart appliances can be connected with the Google Home and this can control all the smart appliances of the home. So Google Home is an example of this domain of ioT. It is a smart speaker which connects the smart home appliances.

It enables the users to operate home appliances by voice command and it connects with the mobile phones. So when you are away from home, through mobile phone also you can give the command to the Google Home. So this device will receive all the commands from the mobile or if you are around this device, so it can also take the voice command.

It will recognize the voice and then understand the voice command and through that other smart appliances, so the other appliances has to be a smart appliances which can connect remotely with the blue tooth or the other ways of connection has to be there established within this Google Home with the other equipment for example refrigerator, washing machine and it can switch on remotely those equipments.

So it can change the AC volume and other illuminants through the light. So electronic devices like smart TV, refrigerator, and lighting fixtures and ACs can be operated through Google Home. So this is already existing which is there in the, already in the market.

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So another example can be internet of things can be in the smart city. So this is a conceptual model by MIT Media Lab. So this is Florence bus stop which they have designed for the Florence city of Italy. So what it can do is gathering information about locations of transportation system through GPS and whether data through sensors installed in the various part of the city. So the location of the bus or trams and other transportation systems or vehicles can send the data of their location through GPS.

And this bus stop will have all this datas of which route might come and where is the exact location and after how long it might come and all the datas, the time, temperature, other weather data can be shown here and if there is a jam or other things which every datas will be updated on real time.

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Digital Media Technology Future of Digital Media

Internet of things

Intelligent Transportation

BMW Motorrad VISION NEXT 100



So intelligent transportations another example is BMW Motorrad Vision Next 100. So this is a conceptual model by BMW. So you just wear a device, head-mounted device where you see all the datas regarding what we use to see on the car or two-wheeler on the display that you can see on your head-mounted device and this user is wearing a jacket which is interactive jacket so that through movement and hand gestures it can give command to this bike.

So if the user wants to go this way, so there will be some gestures which will be accustomed with the, the bike will be accustomed with that and through that it will automatically go and the speed and everything will be controlled through this movement. So this is still in a conceptual stage, so you can see the BMW Motorrad's concept on internet and you can read more about it. **(Refer Slide Time: 28:46)**



So another concept is 6th sense which is given by Indian designer Pranav Mistry who worked in Samsung. So this is a wearable gesture interface which enables the users to perceive the physical world with augmented digital informations. So his concept was every devices can become a smart devices and every devices can be interactive. So it is not just limited to display screen of a mobile or display screen of a PC.

So every devices right now in the near future can become a point of information system, everything around us. So that is his concept of 6th sense and we can give input through gestures and voice commands.

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Digital Media Technology Future of Digital Media

Haptic technology

Next step towards infusing physical reality into virtual platform. Touch sensation of tactile textures and physical forms can be transferred through digital platform



Now the next level where the researches are going on not just we are not talking about in the terms of visual anymore. So Haptics sensation or the touch sensation is also they are looking at. So the next step towards the infusing physical reality into virtual platform is through touch or the Haptics. Touch sensation or the tactile sensation or the tactile texture, the feelings of the tactile texture of physical form can be transferred through the digital platform.

So whatever the tactile texture of a physical form in the remote world which so the hardness, softness, or the texture of the material which is not existing in front of us can be simulated through a device. So it can take the form of the softness or hardness of a device which is not present in front of us and also give the feelings of the texture. So this is a research going on so this is in a inception level.

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So this is MIT Media Labs, tangible media lab of MIT, tangible media team of MIT Media Lab. So what they are doing is, you can see this person is playing with the ball while sitting remotely. So his hand's position and the shape and everything is transferred here in this Haptic device. So this is taking the form of his hand which is not existing in front of this system.

So they have used instead of a pixels, of a digital pixel, so they are pixels of a 3D pixels which can take the form of other solid 3D form of something which is not in the physical vicinity of this device. So this is a very initial model of Haptic Media. So the pixels are more sensitive and smaller. It can mimic more different kind of materials and it can give the sensation of the material of which is not existing in front of them.

So these are some new directions of technology where the UI UX design and SGI design can lead to. But right now UI UX designers or visual designers are not commonly using this, working on this devices. If you are in the research field then you might be interested to these kind of domains but otherwise the main commonly used domains, the platforms are mobile tabs and PCs and within that we have different systems like android and iOS and other kind of operating systems.

So we mostly design on that but still this paradigm will be there for near future but later this kind of new technology might percolate and we have to adapt according to that technology.