

Human Computer Interaction (In English)

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Lecture 1 Part 2

Hello, everyone. Welcome back. So this is the outline of what we have discussed in part one. So we discussed about what we are going to cover as part of this course, course structure, what you are able to achieve, the objectives. And then we discussed why do we need to study design. We discussed several examples from your real world where we need to study design.

For example, another example we can take, another example we can take from our real life is booking a cab. If you want to go from some source to destination, one place to another, how you used to book a cab earlier and what is the experience we have it now? Earlier, probably you need to reach out to some travel agent they charge you exaggerated amount of money to go from one place to another so now we have the solution at our hand we have solutions like uber ola rapido and many others so that's how basically we build a solution which doesn't solve the problem also solve in better way so going forward we are going to study what is HCI how to build a sample HCI project as part of this course if you have to and towards the end you will also have demonstration of two successful projects and that will end by tutorials and some assignments So in real world, we see we encountering the digital transformation for every problem that we face. So let's talk about the example of cab booking itself. If you have to go from one place to another, what you used to do, often you go to taxi stand, bus stand, or probably auto stand to probably ask the person whether you want to go to this place.

And often they charge you a lot of money. They don't go by meters and so on. So that's where basically the corresponding digital transformation is that now you have taxi stand in your mobile itself. You can simply book a cab immediately and in real time all the taxi provider or you can say that all the taxi driver which is in your vicinity can provide you the solution. They can come to your place to pick you and probably drop you at your destination.

So digital transformation is reshaping how we live, work and interact. Same example, we can think about like payment, digital payment. So as I said in the previous lecture, we have some services like Paytm, PhonePay, Cred and many other. If you have to transfer money to someone earlier, you need to go to bank, fill a very detailed form and also basically do a lot of stuff to get it done so it takes a lot of time there may be mistake in

basically filling the form you may need assistance in doing that and so on so now the corresponding digital transformation as you can see that now you have the digital payment app which make your life easier and now you are able to complete the task in few second itself and that's where business must adopt to stay in competition to increasingly digital world so so that is the reason now all the banks not just provide the transaction amount transfer from their bank but You can simply use their net banking or other mobile apps to perform the task. Individual organization must embrace innovation to try the future because if you don't adopt the new technology, you may lag behind.

We have so many examples. We have so many examples in real world if you don't adapt to the new technology you may be outdated and the people will leave you one very big example is Kodak earlier if you see any camera most of them are coming from Kodak they have not and they are leader in basically the capturing photos but what happened they did not probably adapt themselves to the new technology and now kodak is in history similarly we can take examples of mobile phones earlier nokia was one of the biggest mobile manufacturer and so on but after the advent of smartphones they lag behind and again we know what happened so yeah so digital transformation has impact on industry related to healthcare as you can see that now it is happening telemedicine ai for diagnostics digital health records and so on so that even if you go from one doctor to another they know their record they know their history they know what all kind of medicines has been given what kind of test has been done and so on retail so now you have e-commerce websites personalized shopping experience and smart supply chain so that's where basically now we have the quick commerce now which are changing and disrupting whole the process of buying anything and so on similarly we have the finance and we have the fintech digital payments blockchain all those are advancement if industry has to be relevant then they have to adapt to these new technologies and these new technology often for good as well because they are providing solutions which are not possible before using the advancement of ai so now llms as you can see that numerous solutions are getting built which are helping users and industry in many ways. Similarly in education, so e-learning, digital classroom, virtual campuses, especially as we discussed in the previous lecture after COVID. Yeah, so you have to move to online education, online assessment and so on. Manufacturing, so that is one of the biggest revolution that we are seeing industry 4.

0 automation predictive maintenance and so on so when we're talking about all this digital transformation if you're talking about car industry the Tesla comes first in our mind and that's how they are ruling I would say the car industry and change the way car industry was there before Similarly, transforming everyday's life. So we all now have the smartphones, smart homes. So basically you have the IoT-driven automation control system. So now you have.

.. smart light just by clapping or by time or based on the activity if there is no one it can turn off automatically or turn on based on the you are coming in again similarly transfer transportation so you have automate autonomous vehicles tesla as i mentioned earlier so now we have the electric mobility again friendly to the environment digital ticketing and so on entertainment as you can see that there are streaming services virtual reality gaming and all those are getting quite popular communications was as we know that i mean especially in the millennials and probably the young people very common question to ask are you on social media majority they said yes i am and if you are not on social media you feel like you are an outlier so social media instant messaging video conferencing again all those are the digital transformation of what used to happen in real life so because it's not like i mean transportation was not there before and it was not like um you are not sending message to someone before or you are not speaking with someone before so you have basically probably change from SMS to more, you can say, multimedia-based messages. So now you are able to send images, you are able to send the videos, audio and so on. But at the same time, it also comes with different challenges. Especially when you start interacting with digital services, start putting your details and probably leaving your digital traces, The issue comes with data security. So protecting personal and organizational data is again a challenge.

Digital divide, ensuring that equitable access to the technology because not everyone have access to the technology. So for example, when we move to online education during COVID, people say, okay, join online education, do online lectures. but do everyone have the access to the laptops do everyone have access to the smartphones not really there are especially in the students studying at the government school they do not have such access and that's where they lag behind skill gaps so upskilling the workforce to keep pace with the technology that is also one of the prominent issues which concerns and last but not the least is the privacy concern addressing ethical issues related to the surveillance and the data often we listen that that this this company or that company sell data to the other company and so on because as we discussed often this different users have different characteristics personalities and so and often you may basically have some information which you don't want to share with everyone right so but in digital world i mean often it get propagated it it may be sell and so on so for example one example we can think of a company which is managing your health record it can sell it to some insurance company so we can think of like i mean it will happen no insurance company will further give you probably the insurance or probably give you at very high cost and so on. So again, those are issues with this and so on. So let's go back to some activity based on the digital transformation, as you can see that.

So for example, let's take a use case of renewal of driving license. So earlier what used

to happen, you need to go to the transport office, you need to take the physical form, you need to paste your photo, write all those details and submit it. And probably you may also need to bribe them to get it at some places. and with the benefit of digital transformation now you can apply all those at your home itself from your mobile or probably the laptop itself and the benefit is like it's convenience you don't have to waste time in going there you can save cost global reach and also basically it can curb corruption at some level and also there is now responsibility and accountability of the people if they're not able to complete the task which you have requested for example if you have to apply for a learner license apply for a driving license apply for DL renewal and so on apply for duplicate DL and all those things it's quite clear you can just select that and you need to fill the corresponding form and it's done and also it's quite possible to edit all those details because it's digital for example if you're filling this form you have written something but suddenly you realize okay so you misspelled or probably you have written something wrong so you have to again fill out all a new form altogether but here in digital life i think it's possible and the issues that we discussed like privacy accessibility social impact all those definitely one of the challenges in digital transformation Another example we can think of like ordering food and groceries. So now we have the quick commerce.

We have the basically the Uber Eats, Zomato, which is basically getting you food from the restaurant and similarly groceries using Blinkit and Instamart and many others are there, big baskets are there and so on. So as we can see that, So definitely it comes with many pros, but it also have different limitations as well. That is something you have to think about when you are building the solution for it. So another activity you can think of, digital transformation in education. There are companies like Physicswala, OpenAI, Kanser, Baiju, unacademy, and are there which are doing solutions related to education.

Similarly, Chiron is there, which is basically doing proctor-based online services so that you can conduct a fair examination. Audino is there, which is basically based on LLMs to basically help you understand a given multimedia content. So for example, what has been discussed in this video, at what time, what is the summary, all those things you can do. Unacademy, we all are aware of, it's quite a popular platform for learning baiju though it's now history it's bankrupt but at least it was quite popular and so on chegg is one of the very popular company in us and it used to basically help in completing the homework for students in a way i mean or helping in completing the homework and so it used to be such a big company you can see that it has valuation market valuation in several billions but after the disruption created by openai their market value dropped from several billions to you can say the few millions usd and the stock price if we talk about in just one hour one and a half year it has reduced 85 to 90 percent you can think that that is one of the you can call it one of the victim of chat GPT because so now students used to go to chat GPT

to complete the assignments answers rather than going to check and pay for it so again so this is also the example of digital transformation we are doing and pros and cons for that so you can think about it so the reason being we are talking about these situations What if you will be in situation to build solution for this? How your solution will be? you are going to solve the problem and the best way to solve the problem is see how things happen in real life so for example if it is an education how you need to first look at how a teacher teaches in the class how different students participate in the class what the teacher basically what are the methodologies what are the ways teacher basically teaching in the class and so on how the examinations are happening in the class, so that when we are building a kind of digital transformation, when we are building some kind of interactive system or human computer interaction based system, you need to mimic what is happening in real life and you have to solve in the same way the reason i'm emphasizing you have to solve in the same way because if it is different the user may not adopt it because users are habitual of how they are doing in real life and if you stick to that if you are going to basically follow the similar thing i think it's easier for the it easier for the user to adopt it, it's easier for the user to use it, learn it, and complete the task. That is all the key point as we discussed about usability.

It's not just about completing the task, but it is also about how efficiently, how effectively, how you are able to complete with fun, enjoyment, and so on. And another example you can think about those who are enthusiast about finance so earlier how you used to buy any stock earlier so there you need to go to stock exchange buy basically the stocks and again it took several days to basically getting the receipt or probably the bond for that stock and so on again very time taking process again there may be cases of fraud when basically someone taking the money from you um but have not bought for you and ran away and so on a lot of issues were there so now i mean you can see the digital transformation for this so now we have the companies like jiroda grow and many others similarly paytm sdcf all those banks are also having their own equity based app and solutions where you can simply buy any pro any um simply buy any stock in just a fraction of seconds you just simply click pay and that's it and that will come to your account immediately that is something You can you can see here and you can also visualize how you are doing how you are doing basically in your portfolio So earlier it's very hard. I mean you have the hard copies It's not easy to visualize how good or bad different stocks are doing so that you can take decision to do so and towards that Which stock is good which stock is not so good which stock do you think is going to do better? So that's where the solutions a number of solutions are there which is try to solve the so like we have the screener we have treasury we have many others which try to basically educate about um the you can the health of different equities that you are going to deal with and that will also help you uh in finding the multi uh multibagger stock right So that is if you don't follow that, if you don't have the knowledge about it, then there is a very

little difference between the multi-bagger and multi-bagger, right? So ideally you need to and these companies are now become a very big company. These companies are now helping users significantly because using these applications, there are so many users who are able to make more money. So here this is the outline of this part so we are going to discuss what is HCI and the primary building about the project and the resources.

So HCI basically explores the interaction of technology and the human behavior and when we talk about technology primarily we are talking about the different machines or devices that we're talking about and human behavior the way human used to complete the work using those. So HCI is crucial field in today's technology driven world. And with the rapid evolution of digital technology, HCI plays a vital role in creating user friendly, efficient system, impacting industry. Again, it ranges from education, healthcare, entertainment, e-commerce, and so on. And that's where basically we have to come up with a solution which not just able to complete the task, but it should be user friendly, it should be basically efficient and so on.

So that's where basically Steve Jobs said, design it not just what it looks like and feels like, design is how it works. That's where basically we have to keep design and human centered design principle in center in order to solve any problems. to formally define the study and design how people interact with computers and other technologies focusing on making these interaction effective efficient and enjoyable and basically i mean the Research in HCI emerges in 1980s. Basically, it's influenced by disciplines like computer science, psychology and cognitive science. And initially, it focused on improving the workplace computing.

But now, as you can see that it covers all digital interaction ranging from any machines that you interact in daily life. So ranging from cars, ranging from mobile phones, laptops, websites, mobile apps, and so on. There are so many contributors in this, but just to name a few, these are top contributors, as you can see that they don't need any introduction like Donald Norman, Alan Dix, and so on. And Professor Fei-Fei Li is also one of the eminent researchers, especially in the area of AI and HCI. So the importance of HCI is primarily it enhances usability, it reduces errors, and it creates satisfying user experience across industry.

So that is why the studying human-computer interaction is one of the most important thing if you want to build some kind of system for the users. So let's take a case study of credit card payment again, as we discussed in the previous video. lecture there are so many solutions which is providing credit card payment as we discussed some of the use cases like you don't want to pay a full amount you want to pay just probably partial payment you want probably see the progress you want to see the due dates and many

others that so many companies which are there which can help you but In terms of completing the task, probably all remain the same. Using Paytm, again, you can also pay the credit card payment. Using PhonePay, using CRED, using SDFC, or probably in net banking, you can all do the payment.

But is it fun? Can you make it better? That is something you need to ask. So that's where basically I'm just showing a kind of comparison, not comparison. I'm just showing a basically a use case where you can pay the credit card bill using Paytm and that's it. And you'll get a kind of again all those feedback and notification and like the amount has been paid. but what different trade is doing so when you pay something so basically they give you the rewards they say that for example if you get 777 it's kind of you have the rolling things if you get three sevens probably you'll get a iphone 16 pro or whatever so in this case for example so after the payment has been done you will get a kind of a game where you can just Spin it and you'll get different numbers.

You have basically three kind of columns and you'll get different things. If you get 3, 7, for example, you can get iPhone 16 or anything. In a way, I mean, you're just having fun, right? so after this probably you keep rolling this so for example they after a payment they ask you okay so you can spin for five times and these are the progress it is showing you have used two spins so far and in this pin for example you got two seven so probably you just missed it right so but despite i mean uh okay so since you have received two seven so we'll give you cashback of one and that is interesting ui you can see that i mean visualization you can see that earlier it was zero So now I won a cashback of for example one rupees so now it's going back to my digital wallet and probably after that you'll see you have received one rupee in your wallet and that you can use for further payment transaction and all. So I mean in a way I mean confirmation you are getting reward you are getting and that is in a way you are not just doing the payment but it is more effective efficient enjoyable and so on so you can also i mean consider different such activity in your real life and that you can do so one thing you might have realized that there are there are basically three key components in HCI primarily and the prime most is definitely the user so now you have a user right and there are basically the technology so that is more you can say the different machines you have and so on right and basically there is some interaction in order to complete the work and that's where probably you may have some interface that is something there so the key components in HCI as I mentioned is central to HCI involving understanding user behavior, expectations, and the limitations. You need to set the expectation clear, and you also need to probably keep your user informed what can be achieved and what can't be.

Technology, so that includes hardware, software, and the technical infrastructure that facilitate that interaction. So that's where the interface I was talking about. Interaction, so

how communication occurs between the user and the technology. so for example from clicking a button to voice commands so for example if you are if you are basically interacting with an alexa right in that case you are using voice command to ask alexa to perform something so for example alexa what is day today alexa how is the weather today and so on in order to make it more personalized you can probably add your own name to the system and so on So Jacob Nielsen rightly said, know your users and you are the halfway to success. So it is very, very important to know your users because end of the day, you are building any solution that you have for the user because these users are going to use it.

And if you don't consider what these users want, if you don't consider how they want and what are they based on their limitation, so it's not going to work right so that is something you have to keep in mind so know your user that is the key and after that you can build some technology and interaction to complete the task so in sci usability and user experience is primarily focusing about uh focuses on effectively how user can achieve their goals using a product using a product so when you're using a product how usable they are. So you have to keep the following things in mind. It should be efficient. How quickly task can be performed? So let's take an example of credit card payment itself. So there are app one, which probably take five seconds to complete the payment and probably receive the confirmation in one minute.

At the same time, there is another app which just done in fraction of seconds for example just 10 seconds and you even receive the notifications and your credit limit has been updated just within a say 10 seconds so of course you prefer the first one or second one so probably you choose which is more efficient effectiveness accuracy of the task completion so it should accurately complete the task itself right so for example if you are making a payment of fifteen thousand rupees then ideally fifteen thousand rupees should be credited to your credit card right not the five thousand and so on learnability how easy it is for new user to begin the system so often You want to onboard so many users and so on, right? That's how you grow. So for that, if the system is easy to learn for any new user, I think it's great. And often this learnability are inspired by, you need to basically do the things the way human do in their life. If you somehow follow the legacy system, if you somehow follow the way a user behave in their real life and if you follow those thing in your solution, I think they are going to like it, they are going to learn it quite early. Memorability, how easy, how usually users can return to a system after a break.

So, for example, you are using, for example, payment app for some time and after that probably you went on summer holiday and you did not use it then how is it for you if you just start doing payment again after a break of five months six months how is it for you to memorable and do lastly satisfaction user's comfort and positivity towards the system so

user should be satisfied he should feel sense of probably accomplishing the task and not just accomplishing the task but also complete accomplishing in best way enjoyable way fun way and so on so user experience the overall experience emotion and perceptions a user have when interacting with the product and it is rightly said people ignore design that ignore people so you have to keep human in the loop you need to keep people in the center and try to match the following whether all these things are meeting or not in your product in your solution so if we talk about a broader version. So basically you see, we can see the difference between the journey from usability to user experience to customer experience. So you can see this difference. So where usability primarily talk about easy of use, efficiency and error prevention and primarily the scope limited to the task specific and related issues. An objective is to make the product simple and functional.

And the key element that we discussed in previous slide, learnability, efficiency, satisfaction, and all those. So example could be a user-friendly interface with very clear button. That is something you have to do. So user experience is like oral experience that you have when you use a product. So it's broader than usability and include even the aesthetics and the content.

It's not about just how you are doing but also how does the interface look like how does the ui look like and so on make the product delightful engaging and valuable and the key elements is usability design and emotional experience are you able to relate yourself uh emotion with the probably for example after credit card payment are you happy how you feel about it so example is a mobile app that intuitive and visually pleasing And lastly, the customer experience. Basically, it's a holistic relation with the brand. So it's now beyond the product that you're using. So for example, you may be using iPhone 16 Pro, but customer experience is beyond the product that you're using. So for example, how do you feel about Apple company itself? How do you feel about its launch? Are you crazy enough to probably standing in the long queue on the first day to probably grab iPhone 16 or even the future version and so on? So it compasses UX plus interaction design outside the product.

That's what I mean by the launch and so. So it also basically works toward the building brand loyalty, satisfaction and advocacy. I've seen the people basically once they start using Apple phone, they continue using the Apple phone, all the different new versions which are coming and so on. So often people have some brand perception as well. customer service and communication and so on so for example you are using a person you are using a basically one perception is like okay so if you are using any product by elon Musk then it has to be good as compared to any other traditional local vendor then probably it may not be that good So a seamless product process from start to end.

So that is something we have to do. So ultimately for companies, they eventually want to build a better customer experience, right? Then only they are able to have better user experience for even for the new product or the usability and so on for anything which is coming. So another very important aspect in HCI is the interaction design. So interaction design is the practice of designing interactive digital products, environments, system and services. It focuses on creating meaningful relation between the users and the technology through engaging interfaces and seamless experience. Here the key goal is how to make interaction intuitive, efficient and enjoyable so some example you can see that apple's iphone swipe to unlock a simple interaction that become iconic for its intuitive user so one of the another reason apple is able to build a kind of such a great customer experience and such a user base and become such big company because of their innovation often they come up with many features which world has not seen before and that is something now we also able to see in the solution which elon musk is providing through different things he is offering through its tesla car or using chopsticks to probably land the rocket and so on similarly netflix autoplay feature so an interaction that anticipate user needs by auto playing the next so earlier one of the problem you might be facing right so once one episode finish you need to basically go to the probably the list of episodes and then select the next one and play and so on so now it is now autoplay for you right once one ends in a few seconds they also show you the progress if you see the next button you can also stop there but by default it is going to play the next one So Google search suggestions, so predictive suggestions that speed up the search process because and that is also one of the another reason the Google becomes such big company because they made the search simpler.

and and that basically improve the overall user experience so using their predictive suggestions for example often you write something one possibility you write everything another possibility would be based on against based on the search history based on the probably the way you are using google can suggest you okay so after even not just completing the word i mean just writing a few letters itself you get a lot of suggestion by google do you mean that you simply add simply click tab and probably you'll get all those suggestions. So there are some key principles of interaction designs. One of the most important one is affordance. The user should be understand one of the key most principle is affordance. User should understand what actions are possible just by looking at an interface.

So for example, when you are interacting with a Kind of website, right? So there if the content on the page is like a lot So there is a kind of elevator button. You might have seen that using that you can go up and down Similarly, there are different buttons. So for example Renew for a recall the example of renewing driving license. So there is a button right simply on or off for renew click here for applying a new license click here and so

on so these are visibility that we have when you look at the buttons in a kind of affordance so it's a kind of self-intuitive in nature you just simply look and do accordingly feedback so clear feedback should be provided after user action for example when you hover your mouse over the different buttons so some particular when your mouse cursor is at some particular button you might have seen that it changes the color it means now you are going to click it maybe and after the clicking you may hear the sound click so those click sound basically again a kind of feedback to the user so this action has been performed and after that you may show the progress bar that comes later on Next is the consistency so design elements should be predictive and uniform throughout The interface because if you are using different color scheme at different pages different layout at different pages It's very very disturbing. I mean you may not be able to Like you are not going to like this.

So consistency is also one of the key things interaction design principle visibility so in important function should be visible and not hidden in complex menu so that is something you should be you should be provide to the user to perform anything error prevention so good design minimizes user errors and offers easy recovery if mistakes are made because it's like you are using something you may by mistake you may click button instead of applying a new driving license similarly probably because often when you are interacting with different mobile phones usually the you have quite limited space so it's it is possible that you may probably click some other button or even for example typing so on typing on Mobile phone you might have seen that the keyboard is very very small. I mean you have very small keys and a small space for different keys that you have and you end up probably Writing or typing some wrong letters. So how quickly you are able to basically do the representation. There is something we have to do so With respect to the interaction design the details are not the details ideally you do not need and you should not need to provide the detail let it be self intuitive itself and Yeah, they make the design.

So, that is what Charles said. So, human centeredness in HCI. As I said, I mean, in case of HCI, human is one of the key component and you need to keep human in the loop because you are going to build solution for the human. So human centeredness in HCI is one of the key aspect and it is the strength and tradition of HCI has been its human centeredness and the usability concerns. So HCI has evolved methods, guidelines, principles and standards to ensure that systems are easy to use and easy to learn. and it is also very important to have the understanding of the users because if you don't understand user then you are probably going to build something which user don't want or probably you are going to build something in a way which probably user don't like it so consider it what people are good at what are bad at what are their conditions what do they like similarly consider what might help people with the way they're currently doing

things so nobody wants to use a system where you are deteriorating the things ideally they want improvement in the existing way of doing it be in terms of time be in terms of efficiency be in terms of experience and so on so thinking through the through what might provide quality experience that is something we have to keep in mind and listening to what people want and getting them involved in the design so because often if you don't involve the people in design probably end up building something which they don't want that's why it is very very important to have regular feedback from the users going to be i mean in the upcoming lectures we are discussing we will be discussing these topics in greater details where we study how to involve the people how to involve what are the ways basically in all the people how to get the feedback and how to do the, you can say the evaluation, how to get the feedback, all those things can be done.

So in case of user centered design, so there are, These key aspects you have to keep in mind. So user research, because in order to keep human in the loop, in order to keep your user informed or understand their limitations and strength, you need to basically interact with them. So user research basically primarily talk about this and that you can get to know using by conducting some surveys, you can interview them and also the observe to understand the user needs. So there are expert, who basically know a lot about it, but often expert also may miss out something.

So it's why you also need to discuss the real users. Ideation. So brainstorming and sketching ideas are based on the user study.

So what all... users what all you have received in user research you can brainstorm you can sketch the ideas how you are going to forward how you are going to solve the problems and so on so it's more about conceptualizing the solution so once you have conceptualized the solution so now the next thing would be how to basically translate your idea into something tangible and that is what prototyping focuses on so it develops mock-ups wireframes to visualize the solution and next how good your solution is you need to test it and conducting usability testing with real user to gather the real feedback and accordingly you need to update the system prototype and even the solutions and come up again so iteration is basically the key and it redefine design based on the user feedback and observation that you have so as donald norman rightly said design is really an act of communication because through your design without word you can just communicate with probably your user which means having a deep understanding of the person with whom the designer is communicating so until you don't understand the user who is going to use it It's not going to work. And that's where basically design plays an important role to bridge this gap. So there are several ways you can interact with the system. So there are different interaction styles. So you can use CLI, command line interface, and efficient for technical user often you might have seen that the Linux user,

there are basically the system programming where basically it relied on the command line interface.

So similarly, we have the graphical user interface, so where you have some visual elements involved. So for example, you can see what is happening. So I'm going to do this, and there is corresponding elements or icons, and you see what is the progress accordingly. Similarly, voice user interface, which is now getting quite popular, so uses speech recognition for interaction.

So for example, Siri, Alexa, Google Assistant are the examples. Gesture based interaction. So it employs the physical movements for control So for example the way you swipe on a smartphone again is kind of gesture, right? similarly Similarly in order to interact with someone you can also build similar system AR VR again it's kind of you can see the advance in immersive interfaces that blend real and virtual environment for unique user experience and there is something called MR in between mixed reality that is in between of them so virtual reality is more like you're putting the user in completely virtual environment. Augment reality that is more, I mean, it's basically also interacting with some phones, there are some device and accordingly you are interacting in the virtual world. So we are kind of doing. So if you think good design is expensive, you should look at the cost of bad design.

So that is being said by the Ralph Farmer, CEO of Jaguar Land Rover. And it is rightly said, right? Because if you make a good design, probably you can even capture the whole market. And that's where basically you can you can basically come up with a greater you can say the benefits and if you come up with a kind of bad design then it's nobody is going to like you're not able to earn and even you may not going to have the user who is going to use it so recently i came across an article where tesla was on the verge of bankrupting but what made them different is like their design their user experience and in just the span of probably six seven years or probably just six years you can see that tesla is now one of the leading automotive company which is building kind of state-of-the-art cars electric cars and auto autonomous vehicles and so on and now much bigger than many traditional companies which are working in that area for several years even hundred years and so So there are many emerging techniques and trends in technologies AI and machine learning so the now the interfaces that learn from the user behavior and accordingly adapt to the user need and have the personalization and Augmented reality and virtual reality, that is creating immersive experience as we discussed. Wearable technology, so that is also one of the integral part of our life these days. So integrating technology into everyday accessories like watches as I showed and similarly the glasses.

So you may use, recently Meta has released a kind of uh glass where basically it has

camera and basically what it does for example if you are reading something some book which is in english it will automatically translate and you can see in your glasses that translated version and so on similarly so again google glass is also one such example and so on so natural user interface so interface is relying on the intuitive actions like gesture voice and all that is something you can do and that is something i mean emerging techniques and we have to be updated with this in order to building our solution so one key thing that we should keep in mind when we are building our solution we need to keep all kind of stakeholders in mind. So for example, there may be users who are basically disabled, right? So in that case, basically you need to build your solution which is accessible in nature. So for example, example of visual accessibility would be high contrast, scalable text, alternative text for images and so on. So in order to build our solutions, we need to consider the following. So for visual accessibility, we need to consider high contrast scalable text, alternative text for images.

For motor accessibility, it should have simplified navigation, keyboard shortcut, voice commands. and for cognitive accessibility use simple language consistent navigation and clear instruction for auditory accessibility captions for videos transcript for audio sound alternative and you need to follow the guideline which is well established by the different organization so for example WCAG Web Content and Accessibility Guideline and area is like one of the most popular guideline for accessibility which different company has to comply with so accessibility is not a feature it's a social trend and it is one of the most important thing you need to have when you are building solutions so the next step after building this you have to basically see how good your system is and for that you will have to evaluate though i mean the dedicated lecture for this later on but in brief user testing observe real user interacting with the product and there are different techniques like heuristic evaluation where expert assesses the interface against the usability principles and provide their feedback There are surveys and questionnaires as part of user research, where collect the quantitative data on the user satisfaction. There are cognitive walkthrough, simulate a user's experience to identify the usability issues. There are A-B testing, you might have probably already heard about it. So given kind of two versions, which one you like? So comparing two versions of product to determine which performs better.

and evolution is very very important aspect of building anything not just related to HCI but anything that you build right because that help you to understand is it completing the expected task or not with again what all the condition that you have so what get measured gets managed otherwise you also have surprises in life right you'll have surprise for example if if you don't measure it if you don't evaluate it how your solution is going to work in different environment i mean it is not it may or may not able to work so that's why it's very important to measure it and so on evaluate it there are some useful case

studies that you should definitely consider and we should not just learn from the successful case studies but we should also consider the failed case studies because there is almost always some learning from a failed case study why it failed why it did not work. So, in case of successful case studies, a well-known product that excelled in usability is Apple iPhone, Google Search and so on, which also basically again following the different accessibility guideline as discussed in the previous slide. In case of failed case study, an example of poor design leading to failure. Example, early versions of Windows Vista or Google Glass, people did not end up people did not like it and so on so analysis is like what was learned again analysis what was learned from both successful and the failed cases how it impacted the user positively or negatively and changes made for improvement so that whenever you're coming with the next solution better version you need to basically apply those learning so So as I said, I mean, I do expect like as part of this course, you may able to come up with some kind of a CI project towards the end of this course. So for your reference, I'm going to start with one of the project that we are doing with my students.

aditya and manya so where basically i'm going to show the progress we are going to have in different lectures and towards the end we'll see a kind of our final solution that we have for the problem we are working on. So, let us quickly talk about the problem. So, this project is called Wave. As you can see that it is being done by our students Aditya and Manya. They are amazing wonderful students and they are thinking out of the box to solve the different problems related to the learning for visually impaired students.

So basically we are working on a visually impaired student often struggle to learn Braille due to the lack of interactive tools and the guidance. Traditional methods are outdated and fail to engage and that's what I said, right? You need to adapt the technology. You need to follow the latest technology to to come up with a better solution so can we do something here i mean there are so many better so because the braille which still students are using are outdated in a sense I mean the it could be improved with the better you can say the technology which are around so limited and inefficient teaching assets lead to the decreased instructor motivation and while existing tools make tracking progress difficult and have again steep learning curve so despite government funding like PWD sector and regional language support their implementation struggle due to the lack of user-centric tools and adapt support systems and what you have to do in order to come up with a solution for visually impaired student to learn to help them in learning the Braille. So what you can do basically you can come up with a kind of solution by keeping all the stakeholder by keeping all the stakeholder together right or at least learn from them again you can perform the user research and all those So with this, I mean, we can come up with a solution which can help the visually impaired student learn how to write A, how to write B, how to write the numbers and so on.

So quickly about the Braille alphabet. It is developed by the Louis Braille in 19th century. And these are the Braille characters that you can see. And each Braille character consists of six dots arranged. So like in this case, you can see here. So, these are the first three dots and these three are the second three dots for D.

So, you can think it like two columns and three rows and dot representation are like dots are number one to six like one, two, three, four, five, six and starting from the top left and that's what I told. So now given that this great alphabet you have given that how the numbers and the alphabets are represented how you can help a visually impaired student learning Braille can we do so so the solution is wave variable assistive for your vision so in this case basically we they have developed a variable glove that helps visually impaired learn Braille through simple gesture so this has basically uses haptic sensors and that is the key in our solution to gently nudge the user on their movement and actuators to confirm input and output audio feedback driven instructor website with two modes of assistive students and enable instructor to track the progress how the students are progressing over the time how much error the person is making now when the person has started in order to learning or typing the Braille so it aligns with the government initiative to provide the regional language support bharti Braille and so on to create a more diverse and inclusive learning so this is a visualization you can think of where we are having kind of haptic sensor feedback and based on the Gesture that you are going to make with the fingers you are able to learn and type the things so in summary you can see that as I said in the Braille you have what you have you have these six dots so you can call it 1 2 3 4 5 6, right? so for example in this case in order to write for example e so you need to press 1 and 5 and Right. So can we use these three fingers as basically these representing these dots? So, for example, these three dots from the left hand and these three dots from the right hand, basically a kind of representation of how the Braille works. So in this work, I mean, although we discuss in more details in the coming lectures, But for briefly, we can say that, I mean, in order to write E, person has to simply use finger one and from left hand and probably this finger from the right hand to type E, right? So simply have to, basically the person has to write, okay? So like in this case, the person has to move these two finger together to type E. So in order to provide a summary, good design is intuitive, it should be simple, user-friendly, and It should indeed solve the problem effectively while bad design is confusing, inefficient and fails to meet the user needs or expectations.

The goal of interactive system is to create a seamless and efficient user experience that align with the user needs and objective. And digital transformation, as we have studied, is the integration of digital technology in all areas of business, fundamentally changing how organizations operate and deliver values to customers. Next, we studied user-centered

design, which is an approach that prioritizes the needs, preferences, and the behavior of the user to create intuitive and effective product or solutions. choosing product idea from real world around us to ensure that solutions are relevant. So in our lecture, we have tried to take many real world example around us, starting from credit card payment, to cab booking, to helping visually impaired person for running or crossing the road, or probably even the typing in this case, using the project wave and so on.

So I also want you to basically think aloud think about the problems around you and choose a project statement and the problem around you so that along with this course you can start working towards it and build on top of every lectures that we are doing and complete towards the end of this course And towards the end, I mean, we'll be having a tutorial and two sample projects, as I said. So tutorial will be covered on the topic of good design and bad design with our amazing teaching assistant, Hrithik Bamba. And sample projects will be presented by our brilliant student, Hardy and Sanjana. And we'll also be doing an assignment one towards this. And for further readings, you can go through uh these links along with the books which are mentioned in earlier slides with this thank you