

Human Computer Interaction (Hindi mein)

Professor Rajiv Ratn Shah

**Department of Computer Science and Engineering
Institute IIT Madras**

Interface: Lecture 5, part 1

Lec20

Namaskar Human Computer Interaction maanav computer ke beech mein jo samvaad hai is course ke saptah paanchve mein aapka swagat hai. Isse ke pehle ke chaar saptahon mein humne alag-alag vishayon par baat ki thi. Mujhe aasha hai ki aap un saari baaton ko yaad rakhe honge. Chaliye unka ek bahut tezi se punravritti karte hain. Jaisa ki pehle saptah mein humne Human Computer Interaction ke introduction ke baare mein baat ki thi. Uska humne parichay diya tha. Usmein humne bataya tha good design kya hota hai? Bad design kya hota hai? Aur aap apne vyavaharik jeevan mein aaspaas mein alag-alag jo bhi upkaran jo bhi cheezein aap dekhte hain chahe woh mobile ho, chahe woh website ho, chahe woh darwaze ho ya khidki ho, jo bhi cheezein aap apne upyog mein laate hain. Aap uske baare mein sochte hain. Kya woh achha design ka example hai ya bura design ka example hai? Humne alag-alag uske characteristics ke baare mein baat ki thi. Kin baaton ka aapko dhyan rakhna chahiye? Achhe design ke liye aur bure design ke liye unko avoid karna chahiye. Jaisa ki humne baat ki thi ki ek achha design ke liye humein usko simple banana hai. Usko ek tarah se consistent banana hai aur saath mein humein in baaton ka dhyan dena hai ki kaise hum upyogita badha paayein. Kaise hum jo upyog karta hai uske anubhav ko badha paayein. Kaise woh easy to learn hai aur kaise woh aasani se usko apne yaad mein rakh sakta hai. Is baare mein humne baat ki thi. Humne ek sample project ke baare mein baat ki thi. Jaisa ki humne bataya tha ki is poore course ke dauran main aapse aasha karta hoon ki aap bhi apna khud ka ek koi project banayenge aur jo bhi alag-alag cheezein hum seekh rahe hain is alag-alag saptahon mein aap unka prayog kar rahe hain aur step by step aap unko poorn kar rahe hain. Jaise agar hum aage baat karein toh humne us saptah mein yeh bhi baat ki thi ki kaise aap uh yeh jo world hai aaj physical world se ek tarah se digital world ki taraf move kar raha hai. Pehle jo saari cheezein do manushyon ke beech mein samvaad se hoti thi. Do manushyon ke beech mein paraspar kriya se hoti thi. Aaj unmein se ek tarah se keh sakte hain ki jo jisse aap batchit kar rahe hain woh ek digital upkaran ki hota ja raha hai. Woh mobile ho sakta hai woh website ho sakta hai. Woh robot ho sakta hai. Woh alag-alag cheezein upkaran ho sakte hain. Toh humne jaise baat ki thi uska mukhya uddeshya yeh tha kaise hum jo alag manushya hain unki dainik kriyaayein hain unko koi karya karne ke liye jo bhi pareshaniyon ka saamna karna pad raha hai usko hum kaise aasani se Human Computer Interaction ke foundation fundamental technique se hum kaise unko sahi tarike se kar sakte hain. Toh uske baad dwitiya adhyay mein humne baat kiya tha design ke upar. Design ke baare mein humne vistar se batchit

ki thi. Humne batchit ki thi ki kaise design principle, kaise design thinking in sab cheezon ka interaction design mein ek aham role hai. Kyunki hum koi bhi interaction design ke madhyam se agar koi bhi ek paraspar kriya ke madhyam se upkaran computer mobile aur manushya ke beech mein jo samvaad karna chahte hain jo karya karna chahte hain usko achhe se karna hai toh kaise design thinking aur design process ko follow karte hue ek aap achha aur bahut hi upyogi system bana sakte hain. Humne alag-alag case study ke madhyam se bhi in sab baaton pe charcha ki thi. Humne Airbnb ka example diya tha. Humne Y Combinator ka example diya tha. Kaise Airbnb jo ki 2008 mein kaafi simple website thi jo ek tarah se host aur traveler ki samasyaon ko hal karne ke liye ek bada achha website banaya gaya tha. Lekin jaise unki apeksha thi uske anusaar wahan pe traveler aur host nahi aa rahe the us platform pe. Toh kaise un logon ne design thinking ke madhyam se pehle jo unke upyogkarta hain chahe woh host ho chahe woh traveler ho unse sahanubhuti ke madhyam se unke zarooraton ko samajhne ke liye unki aashaon ko samajhne ke liye kaise design thinking ke madhyam se woh saari cheezon ko pata karte hain aur kaise design process ke madhyam se alag-alag tarikon se woh unko kriyaanvit karte hain step by step madhyam se jaisa ki humne dwitiya saptah mein design ke baare mein baat ki thi. Design mein humne baat ki thi kaise design principle ke madhyam se aap achhi design bana sakte hain apne upyogkartaon ki samasyaon ko solve karne ke liye. Humne baat ki thi kaise aapka design jo hona chahiye woh inclusive aur accessible hona chahiye jisse ki woh keval kuch logon tak seemit na hokar dher saare logon tak pahunch sake. Aap unki samasyaon ka nidaan kar sakein. Aisa humne uh us adhyay mein us saptah mein humne padhai ki thi. Teesre saptah mein humne interaction ke baare mein baat ki thi. Kaise jo bhi manushya aur jo computer ya anya upkaran hai unke beech mein samvaad aap bade achhe se kar sakte hain. Us saptah mein humne baat ki thi kaise design thinking aur design process ke madhyam se aap ek interaction design ko bade achhe sugam tarike se kisi bhi aapke upyogkartaon ki samasyaon ka samadhaan kar sakte hain. Khaastaur pe humne design thinking ke madhyam se humne baat ki thi. Kaise aap apne upyogkartaon ki samasyaon ko achhe se samajh sakte hain. Unki zarooraton ko samajh sakte hain aur unko kriyaanvit kar sakte hain. Design process ke madhyam se step by step tarike se. Design thinking mein primarily humne baat ki thi kaise pehle step mein hum empathize karte hain. Hum apne jo upyogkarta hain unse sahanubhuti rakhte hue unko unke baare mein janne ki koshish karte hain. Unki aashaon ko janne ki koshish karte hain. Uske baad humne baat ki thi kaise next is define mein jo bhi samasyayein hain unko clear tarike se sahi tarike se simple tarike se aap usko paribhashit kar sakte hain. Jaisa ki define step mein hota hai. Uske baad jo agla step aata hai woh ideation ka step aata hai. Jismein aap ideate karte hue vichaar karte hue alag-alag un samasyaon ke baare mein ek tarike se jo prospective solution ho sakte hain, samadhaan ho sakte hain uske baare mein aapne vichaar karte hain. Uske baad jo agla step humne padha tha humne yeh baat ki thi ki kaise aap jo bhi possible solution hai unka ek namoona banane ki koshish karte hain jo ki prototype step mein hota hai. Prototype ek tarah se ek tarah se toy system hota hai jo dikhne mein prayog karne mein actual system ki tarah hota hai. Par usmein kuch kamiyaan hoti hain. Chahe woh dikhne mein ho chahe uski alag-alag functionality ke baare mein ho. Aur agla jo step hota hai mainly usko implementation kriyaanvayan ka step hota hai. Jaise hum usko finally kaise

usko aage jaake apne upyogkartaon ke liye launch kar sakein. Uske baad design process mein humne baat ki thi kaise in saari cheezon ko aap step by step tarike se seekh sakte hain. Uske baare mein humne alag-alag techniques ke baare mein baat ki thi. Jaise ki user study ke madhyam se user research ke madhyam se hum kya karte hain ki hum apne upyogkartaon ke baare mein jaante hain. Unki zarooraton ke baare mein jaante hain. Toh is tarike se aap alag-alag cheezon ko dekh sakte hain. Humne design process ke baare mein baat ki thi. Jahan pe humne ek tarah se yeh baat ki ki kaise double design diamond double diamond design process hai. Uske madhyam se usmein hum apne upyogkartaon ki zarooraton ko samajhte hue usko achhe se samajhte hain. Toh usmein humne yeh discuss kiya tha usmein ek tarah se do stages hote hain. Ek samasya kshetra hota hai aur ek samadhaan kshetra hota hai. Samasya kshetra mein humne dekha tha uh pehle woh uh divergent step hota hai. Yahan pe aap jitne bhi possible samasyayein hote hain unko baare mein sochte hain aur uske convergent step mein hum yeh ek tarah se jo kuch problem jis pe hum kaam karna chahte hain usko define karte hain usko clearly mention karte hain. Uske baad jo doosra samasya kshetra tha, samadhaan kshetra tha usmein ek tarah se hum pehle divergent step mein jitne bhi possible solution ho sakte hain unke baare mein charcha karte hain. Unke baare mein vichar karte hain. Gehan adhyayan karte hain aur uske baad convergent step mein punah hum ek tarah se uska jo bhi optimal best solution hota hai usko karte hain. Toh is tarike se is double diamond design process ke madhyam se hum ek bahut hi upyogi solution nikalte hain. Toh humne ek Airbnb ke madhyam se Airbnb ke example ke madhyam se ek case study ke baare mein bhi bade achhe se charcha ki thi. Kaise woh 2008 mein ek bahut hi chhoti company thi aur jahan pe ek achhi achha idea hone ke baawjood vichar hone ke baawjood is navachar ke baawjood woh bade achhe business ko nahi kar pa raha tha kyunki wahan par jo traveler hain chahe host hain woh dono us platform pe achhe se nahi aa pa rahe the. Toh uska sabse bada reason jo tha, kaaran tha woh pata karne ke liye unhone design thinking ka sahara liya aur uske madhyam se unhone jaana kya samasyaon ka kin samasyaon ka unke dono host aur travelers ko face karna pad raha hai. Kin chunautiyon ka saamna karna pad raha hai. Uske hisaab se phir unhone design process ke madhyam se unka samadhaan nikala aur aaj ke zamane mein hum dekh sakte hain ki Airbnb kitni badi company hai. Jaise ki humne uh example ke madhyam se discuss kiya tha. Y Combinator jo ki ek venture capitalist hai. VC firm hai jo ki alag-alag navachar based companies ko ek tarah se unmein paise lagati hai. Paise aarthik sahayata pradaan karti hai jisse ki aap apni company ko apne vichar ko bade star par le jaa sakein. Toh meri aasha hai ki aap bhi shayad aapke jo vichar honge Y Combinator mein usmein pitch kariye. Prototype banaiye aur unko dikhaiye ki kaise yeh logon ki samasyaon ka samadhaan kar sakta hai aur aap bhi apne company ko startup ko ek bade level tak unche level tak le ja sakte hain. Aise dheron example hain jo ki Y Combinator ke sahyog ke madhyam se aaj badi company ban chuke hain. Jaise Airbnb ki humne example ki baat ki. Airbnb mein us samay \$20,000 keval Airbnb ne kharch kiye the 2009 mein aur aaj lagbhag uska jo valuation hai aap keh sakte hain \$100 billion ke aaspaas hai toh kareeb \$20,000 un \$20,000 hum keh sakte hain ki ek tarah se aaj ke samay mein \$5 billion ke aaspaas ban gaya jo ki aap keh sakte hain ki \$5 lakh guna ke aaspaas return unko ko mila. Similarly agar hum India ki baat karein toh India ki bhi

dheron companies hain jo Y Combinator ke madhyam se uska laabh utha paayi hain. Jaise aap aajkal har taraf alag-alag digital payment karte hain toh Razorpay ka naam aapne suna hoga jiske madhyam se aap turant digital wallet aur in tarikon se turant payment kar paate hain. Toh Razorpay bhi ek tarah se keh sakte hain ki Y Combinator ke dwara aarthik sahyog se banayi gayi shuruwat mein company thi aur aaj kitni badi company ban gayi hai aur mujhe aasha hai ki aapki bhi company aapke bhi vichar ko navachar ko ek unchi unchaiyon par le jaaya ja sakta hai agar aapka ek achha idea ho, human ki jo aapke upyogkarta hai unki kamiyon ko aap achhe se samjhe unki zarooraton ko achhe aapko achhe se samjhe aur uske basis pe jo aapka navachar ka idea hoga aise dheron VC firm hai Y Combinator keval ek example ke taur pe maine bataya. 100x VC India mein hai aur bhi kai dher saare VC firm hai Sequoia Capital hai aur dher saare aise hain jinse aap aarthik sahayata prapt karke apni companies ko badi unchaiyon par le ja sakte hain aur iske baad humne pichle saptah mein user perspective ke baare mein baat kiya tha. Khaastaur pe kaise aapke upyogkarta ke drishtikon ko paripeksh ko samajhna bahut zaroori hai. Kyunki jo bhi system aap banana chahte hain, woh unke dwara hi use kiya jayega. Agar woh aise banaye gaye system ko use karna chahte hain, woh tabhi achhe se saavdhanipoorvak ya keh sakte hain saraltapoorvak use kar sakte hain. Kushaltapoorvak use kar sakte hain aur uska zyada se zyada laabh utha sakte hain. Woh tabhi possible hai agar aap unke paripeksh ko samjhe, unke drishtikon ko samjhe. Unki aashaon ko samjhein. Kya woh chahte hain ki aap apne samadhaan ke madhyam se unko saralta dein jisse aasani se woh karya ko kar sakein. Jaisa ki humne alag-alag case study ke madhyam se bhi is pe charcha ki thi. Agar hum for example digital payment ki baat karein toh pehle humein agar kisi mitra ko pariyan ko paise daalne hote the. Humein bank jaana padta tha. Lambi lines mein khade hone hote the. Bank staff lunch ke liye gaya uske liye wahan pe wait karna padta tha. Aaj ke time pe aap chand second mein apne mobile madhyam mobile ke madhyam se digital payment ke madhyam se turant unko paise bhej sakte hain, prapt kar sakte hain aur dher saari shopping aur baaki saari cheezein aap kar sakte hain. Toh kaise yeh aapke jeevan ko saral banata hai. Toh hamare jab naye vichar ki hum baat karte hain toh hamari apeksha hamesha yeh hoti hai kaise hum apne aaspaas ke logon ko dekhein. Kis tarah se woh apne dainik jeevan ko kar rahe hain, kisi karya ko kar rahe hain. Kya usmein digital technology jo bhi aaj ke time par hai, yeh takneekiyan kisi tarike se usmein upyogi ho sakti hain. Kaise usko aur saral bana sakti hain? Agar hum in cheezon ko visualize kar lein. Is cheezon ko agar hum dekh paayein, soch paayein, samajh paayein toh aap bilkul achhe tarike se un samasyaon ka ek achha sa samadhaan nikal sakte hain apne upyogkartaon ki aasha ke anuroop, unki zarooraton ke anuroop aur aapko phir ek badi company banne mein koi nahi rok sakta aur uske liye khaastaur pe aapko kuch cheezon ka dhyan dena hai. Jo bhi aap navachar karna chahte hain. Aapko dekhna hai ki woh kitne zyada se zyada log usko upyog mein laate hain. Is samadhaan jo bhi aap propose kar rahe hain uske madhyam se unka jeevan kitna saral hoga? Kitne samay bata bacha pa rahe hain? Kitne paise bacha pa rahe hain? Kya agar woh aapke system ko, website ko, utpaad ko ya sevaon ko use karna chahte hain toh woh aapko paise tabhi denge agar usse unko laabh mil pa raha hai. Toh is tarike se aap dekh sakte hain ki hamare jeevan mein khaastaur par jab humne baat ki thi kaise hum physical world, bhautik world se ek

tarah se digital world ki taraf ghoom rahe hain. Uski ore ja rahe hain apni samasyaon ke samadhaan ke liye toh kaise hum human centered, maanav kendrit solutions ke madhyam se kaise hum unko aur achha bana sakte hain aur achha solution de sakte hain. Toh aise karte hue humne alag-alag drishtikon ke baare mein baat ki thi ki humne ek tarah se yeh bhi baat ki thi kaise psychology aur philosophy yeh dono ek bahut hi important aspect hote hain maanav kendrit solution banane ke liye. Toh in cheezon ka dhyan rakhte hue user perspective ko dhyan mein rakhte hue agar hum koi solution banate hain toh hum bahut hi achha bahut hi achhe tarike se unko sahyog de sakte hain. Unko unke jeevan ko saral bana sakte hain. Unke jeevan ko aur sugam bana sakte hain. Toh yahi hamari apeksha hai aur usi ke madhyam se hum is saptah mein bhi aage badhte hain. Toh chaliye aage badhte hain. Is saptah mein hum interface ke baare mein baat karenge. Antar falak ya sampark bindu. Toh ek tarah se hum jaise pehle bhi baat kiye the ki jab bhi hum kisi digital solution ko banate hain Human Computer Interaction base system banate hain toh samvaad ke liye koi bindu hona chahiye. Samvaad ke liye kuch interface hona chahiye. Antar falak hona chahiye jiske madhyam se aap apni zarooraton ko system ke saamne rakh sakein. Chahe woh prashn poochna ho, chahe woh koi instruction dena ho. Us tarah se aap kar sakte hain. Toh agar hum aise aage badhein toh is adhyay mein hum dekhenge ki kaise sampark bindu ek aham bhumika nibhata hai kisi bhi maanav kendra system ke liye. Ek quick punravritti agar hum karein pichle adhyay mein pichle saptah mein toh humne user perspective ke baare mein baat ki thi. Humne yeh bhi baat ki thi kaise aap alag-alag tarike se persona bana sakte hain aur yeh persona ek tarah se aapke jo stakeholder hote hain jo aapke upyogkarta hote hain unke baare mein alag-alag jaankari deta hai toh humne bataya tha kaise aap teen se paanch ek persona bana sakte hain aapke system ke anuroop aur uske baad humne baat ki thi kaise aap alag-alag jo data aap sanchay karte hain ikattha karte hain kaise uska synthesis karke aap alag-alag information ko nikaal sakte hain humne uske baare mein alag-alag techniques ki baat ki thi. Humne affinity map ki baat ki thi. Humne alag-alag tarikon se usko alag-alag group mein category mein banane ki baat ki thi. Uske baad humne design thinking ke baare mein phir se discussion kiya tha. Humne tutorial ke madhyam se user perspective ke baare mein aur bhi jaankari aapko pradaan karne ki koshish ki thi aur panel discussion ke madhyam se uske baare mein aur jaankari di thi. Humne Miro ke upar bhi hands on experience kiya tha aur jo hamara weekly assignment ka tha ek tarah se usko aap karte hue yeh dekh paaye honge, samajh paaye honge kaise aapne jo alag-alag concept seekhe the usko aap wahan par use kar pa rahe hain. Toh chaliye aage badhte hain. Yeh is saptah ki rooprekha hai. Hum baat karenge ki interface kya hota hai? Interaction kya hota hai? Jiske baare mein humne pehle baat kar rakhi hai aur uske alag-alag prakaar kya hain? Hum conceptual modeling ke baare mein baat karenge. Uh uske interface ke respective mein aur uske baare mein hum baat karenge kaise cognitive aspect of interfaces bahut zaroori aham bhumika nibhata hai kisi bhi ek achhe interface ko banane ke liye. Humne aur bhi alag-alag khaastaur pe jo emerging trends hain aaj ke samay interfaces ke uske baare mein hum thoda bahut adhyayan karenge. Aur finally hum tutorial aur hands on ke madhyam se alag-alag tools aur alag-alag cognitive aspect ke baare mein janenge aur aasha karta hoon ki weekly assignment ke madhyam se aap usko achhe se karte hue jitni bhi cheezein aap is saptah mein

seekhenge wahan pe uska upyog kar sakte hain. Toh chaliye start karte hain interface. Pehle sabse pehle hum interface, interaction aur uske prakaar ke baare mein janenge. Toh uske pehle agar hum baat karein user perspective mein humne quickly discuss kiya tha ki aapke jo upyogkarta ho sakte hain woh alag-alag prakaar ke ho sakte hain. Unki cognitive skills alag ho sakti hai. Cognitive capacity alag ho sakti hai. Toh un sab cheezon ko dhyan rakhte hue alag-alag yeh interface jo honge woh alag-alag un tarah ke keh sakte hain ki jo aapke upyogkarta honge unki unko samasyaon ko samadhaan karne ke liye bade aasani se kaam karenge. Toh chaliye aage badhte hain. Interface kya hai? Interfaces are the medium through which user and system communicate. Jaisa ki humne pehle bataya kisi bhi upyogkarta ko apni samasyaon ko, apni zarooraton ko solve karne ke liye usko batana padega system ki mere liye yeh kariye. Jaise agar ek web search engine hai toh aapko usko batana padega ki aaj ka news, aaj ka weather kya hai? Aaj ka itna degree temperature hai? Aaj ka AQI kya hai? IPL kisne jeeta? Ka score kya hai? Jo bhi aapke dimaag mein prashn aa rahe hain usko kisi bhi tarike se aapko batana padega system ko aur system aapke prashnon ko prapt karne ke baad ek tarah se uska baare mein aur detail ikattha karta hai aur aapko ek samadhaan ya uska jo information hai woh aapko pradaan karta hai. Toh is tarah se aapko jo samvaad karne ki koshish hoti hai is tarah se jo system aur jo upyogkarta hai uske beech mein samvaad karne ki koshish hoti hai. Woh ek tarah se interface ke madhyam se hoti hai aur yahi ek tarah se aap keh sakte hain ek medium hai jiske through aap jo upyogkarta hai aur system ke beech mein samvaad sthapit karte hain. Toh in HCI, they are designed to make interaction effective, efficient aur satisfying. Ek tarah se jo dono ke beech mein hum samvaad sthapit karne ki koshish kar rahe hain, woh kaise hum kushal bana sakte hain? Aur efficient, prabhavshali bana sakte hain aur kaise usko usko use karte samay jo aapka upyog karta hai use bhi kisi bhi tarike ka gharshan ka saamna na karna pade. Kisi bhi tarike ka pareshani ka saamna na karna pade. Woh bade aasani se ek tarah se apne karya ko kar sake. Jaisa ki humne ek quote ke madhyam se bhi pehle jaana tha. The best interface is no interface. Kaise aap bina interface ke madhyam se ya bahut hi kam minimal interface ke madhyam se kisi karya ko kar paayein toh woh ek best interface hoga. Toh key elements of interface jo antar falak ki hum baat kar rahe hain. Sampark bindu ki baat kar rahe hain. Input hoga jismein jo aapke user hain, upyogkarta hain, woh kisi bhi madhyam se aapko denge ki yeh hum karna chahte hain. Chahe woh gesture ke madhyam se ho, chahe woh typing ke madhyam se ho, chahe woh apni aawaz ke madhyam se ho. Alag-alag tarikon se aap usko bol sakte hain. Output jo hoga ek tarah se system jo aapko ek tarah se apna uttar de raha hai. Apna aapko jo information ki zaroorat hai usko de raha hai woh hota hai. Woh bhi alag-alag madhyamon mein ho sakta hai. Woh text ke madhyam se ho sakta hai, visual ho sakta hai, audio ho sakta hai aur bhi tarike se ho sakta hai. Aur feedback jaisa ki humne baat kiya tha system response to user actions. Toh ek tarah se feedback bata raha hai ki kya ho raha hai aur kaise ho raha hai. Kaise ho toh nahi bolenge but kya ho raha hai aur kis stage mein hum aapko uttar dene ke kahan tak pahunch chuke hain aapko wait karna padega. Is tarah se ek tarah kuch had tak feedback deta hai. Toh the best interface is no interface jaisa ki humne turant baat ki thi. Yeh Donald Norman one of the best HCI expert hum keh sakte hain. Woh hai when the user doesn't notice the system but simply achieve their goal toh usse

achha kuch nahi ho sakta hai. Toh interface ka jo mahatvapurna bindu hai woh hamare upyogita ko badhata hai. Enhances usability. Good interface make system accessible and intuitive. Kaise bahut sahad tarike se aur sugamtapoorvak aap apne karya ko kar sakte hain. Jaise example ke taur pe yahan pe hum de sakte hain ATM interface with clear step by step instruction. Kaise aap apne karya ko kar sakte hain? Balance check kar sakte hain, paise nikaal sakte hain. Paise jama kar sakte hain. And so on. Usi tarike se yeh ek tarah se accessibility ko bhi facilitate karta hai aur inclusive design banane mein humein madad karta hai. Toh inclusive design ensure usability for the people with disability. Toh jaisa ki hum accessibility mein humne baat ki thi. Kaise hum sabhi logon ko irrespective of agar woh kisi bhi tarike se disability se grasit hain, pareshan hain toh bhi hum unko apne upkaran ke madhyam se ya seva ke madhyam se unko unke karya ko karne mein madad karte hain. Jaise ki humne baat ki thi kaise visually impaired jo user aapke hote hain unko screen reader ke madhyam se website pe jo bhi information hai usko padh ke sunata hai. Woh usko sun paate hain, samajh paate hain. Toh design is not just what it looks and feel like, design is how it work. Toh kaise aap bahut hi simple tarike se kind of with minimal interface, very simple interaction. Aap kaise saare karya ko poora karte hain yeh bahut important baat hoti hai. Toh, yeh humein ek tarah se innovation ki taraf bhi le jaati hai. Interfaces open now new possibility for interaction. Jaise aaj ke taur pe hum ab hum AR/VR ki baat karte hain. Gesture ke madhyam se baat karte hain aur bhi alag tarikon se baat karte hain. Kaise aap alag-alag karya kar सकते hain? Jaise ek example ke taur pe yahan diya gaya hai gesture control in Tesla vehicle. Aaj ke time pe jo autonomous vehicles hote hain woh ya semi autonomous vehicle hote hain. Kaise keval aapko even gesture ke madhyam se bhi aap alag-alag karya bade aasani se kar sakte hain. Aapko bahut zyada pareshan hone ki zaroorat nahi hoti hai. Toh alag-alag alag-alag quote ke madhyam se aap iske baare mein jaan sakte hain. Iski mahatva ko samajh sakte hain. Toh jaise ki humne bataya ki Human Computer Interaction mein jab bhi hum human jo maanav hain aur computer ya anya upkaran hai unke beech mein samvaad karna chahte hain, interaction karna chahte hain, toh beech mein ek interface jo hota hai, sampark bindu hota hai, woh usko achieve karne mein madad karta hai. Toh is tarah se agar aap dekhenge, toh yahan pe teen key elements hain. Human jo ki samvaad karna chahta hai. Apne prashn ko poochna chahta hai. Machine jo ki uske prashn ko sunke uska uttar dena chahta hai. Uske karya ko karna chahta hai. Interface jo ki ek tarah se uska sampark bindu hai. Toh yahan pe aap aise dekh sakte hain kaise jo human hota hai woh alag-alag madhyamon se information ko prashnon ko machine ko deta hai aur machine un cheezon ko aap process karke ek tarah se wapad manushya ko deta hai. Manushya apne alag-alag sensory madhyamon se unko samajhta hai aur aage process karta hai. Toh yeh ek bahut hi simple ek tarah se uska visualization aap keh sakte hain. Kaise human jo hota hai alag-alag zarooraton ke saath, alag-alag skill ke saath, alag-alag goals ke saath kaise cognitive aur physical capabilities ke saath interaction kar paata hai. Aur machine jo hote hain hardware, software system ho sakte hain. Robot, computer, vehicle ho sakte hain jo ki alag-alag sensor, actuator, algorithm ke madhyam se aapke pooche gaye prashn ka jawab dete hain, karya karte hain aur aapko dikhte hain ki dekho yeh karya ho gaya hai aur again yeh saari cheezein ek tarah se interface ke madhyam se ho rahi hain. Toh, interface jo hota

hai, the medium enabling interaction. Woh touch screen ho sakta hai, button ho sakta hai, voice assistant ho sakta hai. Alag-alag hi madhyam ho sakte hain. Toh agar hum interaction ki baat karein toh jaise ki usko humne pehle ke adhyay mein bade detail mein discuss kiya tha. It refers to the communication and the action between a user and the system jo facilitated by interface. Jo interface hai jo ki antar falak hai, sampark bindu hai uske madhyam se yeh samvaad sthapit karta hai dono logon ke beech mein manushyon aur uske corresponding jo human manushyon aur jo doosri taraf jo computer ya upkaran hai uske beech mein ek tarah se ismein input hota hai jo ki user ke dwara hota hai. Alag-alag tarikon se hota hai. Chahe woh click karne se ho, type karne se ho, gesture se ho, bolne se ho ya alag anya kriyaon se ho aur system ka jo response hota hai, woh aapko system display karta hai result ko feedback deta hai ya kuch anya madhyamon se bolta hai jisko aap sun sakte hain. Toh key element humne jaise discuss kiya user, system, context aur goal. Kyunki is baat ka bhi dhyan dene ki zaroorat hai. Kis situation mein kis tarike se interaction happen ho raha hai, ho raha hai, woh humein aur madad karta hai. Toh interaction is an essence of HCI, it transforms static system into dynamic user-centric experiences. Ne bola tha. Agar hum interaction ke essence ki baat karein toh yeh upyogita ko badhata hai. Kushalta ko badhata hai. It improves user satisfaction and engagement. Jo aapka upyogkarta ka anubhav ho user experience usko kaise aur achhe se badha sakta hai aur unke engagement ko unke sahyog ko aur achhe se badha sakta hai aur yeh bridge karta hai gap between the user goal and the system functionality toh kaise system jo function kar raha hai aur jo user ka lakshya hai usko prapt karne mein ek tarah se bridge ki bhumika nibhata hai. Agar hum alag-alag real world example ki baat karein in interaction ki toh airline airport pe aap jab jaate hain toh wahan pe alag-alag ki hote hain jiske madhyam se aap apne alag-alag karya ko kar sakte hain. Chahe woh aapke boarding karna ho, checking in karna ho, chahe apne keh sakte hain ki seat ko allocate karna ho, fix karna ho. Augmented reality ke madhyam se aap alag-alag jo virtual object hai in AR games like Go logon ne khela hoga. Woh ek tarah se kar sakte hain. Educational apps hote hain jismein aap interactive exercise kar sakte hain. Quizzes kar sakte hain aur apne progress ko track kar sakte hain. Aap kaise kar rahe hain. Toh jaisa ki humne bataya tha alag-alag interaction types in HCI. Toh woh instruction ho sakta hai nirdesh dena. Toh ismein aap alag-alag command ke madhyam se ya se koi alag-alag option ko select karne ke madhyam se system ko nirdesh dete hain ki hamare liye yeh karya kariye. Aap unse ek samvaad sthapit karte hain aur bolte hain ki aap hamare liye yeh kariye. Interacting with the system as if having a conversation jaise aap samvaad ke madhyam se koi karya karte hain. Teesra ek tarah se hum keh lein manipulating jismein aap ek tarah se hastakshep karte hain. Use chhedchhad karte hain. Usmein changes karte hain aur apne karya ko karte hain. Jaise interacting with object in a virtual or physical space by manipulating them. Ek example ke taur pe hum baat karein. Agar aap log Windows system use karte hain toh ek tarah se kabhi-kabhi aap jo file hoti hai usko drag karke recycle bin mein jab daalte hain toh ek tarah se aap manipulate kar rahe hain. Us particular file ko delete karne ke liye aap usko recycle bin mein daal dete hain. Toh ek tarah se aap manipulate kar rahe hain. Explore karte hain, anveshan karte hain. Jismein madhyam se aap virtual environment ya physical space mein kaise navigation kar rahe hain, kaise aa ja rahe hain. Un cheezon ka dhyan dete hain aur

respond karte hain. Apna pratuttar dete hain jiske madhyam se system initiate the interaction and user chooses to respond kisko aapko batana hai, pratikriya deni hai is baare mein karte hain. Toh ek tarah se dekh sakte hain aap alag-alag tarike se interaction kar sakte hain. Toh jab humne baat ki ki alag-alag tarikon se aap interaction kar sakte hain toh humein is baat ko bhi dekhne ki zaroorat hai. Kaise alag-alag sampark bindu hone chahiye in saari cheezon ko karne ke liye? Kis tarah ka sampark bindu hona chahiye? Kya sampark bindu hona chahiye? Jo ki humein instruction ko facilitate karein. Niradesh dene ke liye niradesh dena hamare liye aasan ho sake. Hum usse samvaad karna sthan ho sake. Hastakshep karna aasan ho sake. Anveshan karna sthan ho sake ya pratikriya dena aasan ho sake. Aur in saari cheezon ko hum kaise achhe se kar sakte hain. Chaliye ab hum in saare instruction type ke baare mein detail se baat karte hain. Kaise yeh alag-alag instruction kis-kis situation mein kaise use hota hai. Toh sabse pehle chaliye hum instruction ke baare mein baat karte hain. Instructing yeh wahan pe kaafi bahumulya hota hai. Jahan pe humein simple ek command deni hoti hai. Aap yeh kariye. Jaise tell me the time, aap kisi file ko print kariye, chahe is file ko save kariye. Is tarike se agar hum dekhein toh yeh bahut hi common conceptual model hai. Jo ki alag-alag diversity of devices and system mein support karta hai. Chahe woh word processor ho, VCR ho, vending machine ho. Jaise vending machine mein hum simple instruction dete hain ki is item ko dijiye. The main benefit is that instruction support quick and efficient interaction. Ismein galti hone ki sambhavna bahut kam hoti hai. Nahi ke barabar hoti hai aur yeh bahut hi tez hota hai. Kyunki ismein isko clear hota hai ki isko exactly yahi karna hai aur bade tezi se aur ek is tarah se hum dekh sakte hain ki jo repetitive task hote hain uske liye instruction bahut hi sahi tarika hota hai samvaad karne ka. Toh agar hum activity ke madhyam se dekhein toh yahan pe aap dekh sakte hain ki do vending machine hai. Aap bata sakte hain ki kaun sa kisse samvaad karna aasan hoga. Chahe yahan par aapko item lene ke liye jo ek tarah se alag-alag items ke jo code hain yahan par aapko type karna hai. Paise daalne hain phir woh niklega aur ya yahan pe simple jo bhi item lena hai paise daalne ke baad isko directly press kariye woh nikal ke aa jayega. Toh kaun sa tarika aasan hai aap bata sakte hain. Yeh aapke liye sochne ka karya hai. Doosra tarika samvaad karne ka humne bataya tha. Conversing hai. Kaise aap samvaad ke madhyam se apne karya ko kar sakte hain. Toh underlying model having a conversation with another human. Kaise hum apne vyavaharik jeevan mein kaise hum alag-alag tarike se samvaad ke madhyam se apne karya ko karte hain us pe based hai. Us pe nirbhar karta hai. Toh yeh alag-alag tarike ke samvaad ko support karta hai. Chahe woh voice recognition ke madhyam se menu driven system ho jo ki alag-alag natural language dialogue ke madhyam se karta hai. Example ke taur pe aap dekh sakte hain time table search engine, advice giving system and help system, chatbot aaj ke time pe ek bada achha example hai jismein aap samvaad ke madhyam se apne karya ko karte hain. Yeh virtual agent bhi ho sakta hai. Chatbot ho sakta hai, toy ho sakta hai. Pet robot designed to converse with you. Jaisa ki humne baat ki. Toh mukhya iska uddeshya jahan par samvaad ki zaroorat hai jahan par instruction dena mushkil hai ya keh sakte hain clear nahi hai ya usmein aapko usko instruction dene ke liye aapko kai step mein dena padega toh kya aap simple conversation ke madhyam se kar sakte hain jahan pe kisi bhi tarike ki ambiguity ki gunjaish ho toh us ambiguity ko door karna

ek tarah se samvaad ke madhyam se aur aasan ho jaata hai toh wahan pe is tarah ka system bahut hi upyogi hota hai. Toh iske pros and cons hum dekh sakte hain. Jaise ki example ke taur pe yahan pe dekh sakte hain. If you like press one, press three. Is tarah se kaafi keh sakte hain ki hum baat kar sakte hain. Toh yeh basically allow users specially jo nausikhiye hain to interact with a system in a way familiar to them. Kyunki unko baat karna aasan hai unke liye rather than system mein alag-alag karya ko karne ke liye alag-alag jo process karna hai uska toh ek tarah se unko bada comfortable feel karta hai, easy feel karta hai aur bahut se darte bhi nahi aur apne karya ko aasani se kar sakte hain. So mis-misunderstanding can arise when the system does not know how to parse what user say. Khaastaur pe large language model ke pehle. Yeh bada mushkil hota tha ki aap system se samvaad kar paayein. Natural language mein apni saahaj tarike se baat kar paayein aur system usko samajh paayein. Isiliye pehle jab bhi aap baat karte the toh bade sahi tarike se rakhne ke liye kaafi time pe woh aapko bolta tha ki aap yeh option select kariye, yeh option select kariye, yeh option select kariye kyunki wahan pe ambiguity ho sakti thi. Toh is wajah se voice assistant can miss what child or person with speech disorder se kaafi time par woh bada clear bhi nahi hota toh hum kaise usko bade achhe se kar paayein. But aaj ke samay mein large language model ke madhyam se yeh kaafi aasan ho gaya hai aur bhi kushal aur prabhavkari hota ja raha hai samay ke saath. Uske baad humne hastakshep ki baat ki thi kaise manipulation ke madhyam se aap samvaad baat kar sakte hain system aur maanav ke beech mein. Toh it involves dragging. Jaise aap kisi bhi jaise example humne shuru mein diya tha. Kaise ek file ko aap utha ke jo aapka recycle bin hai usmein drag and drop karte hain woh delete ho jaata hai. Ya ek folder mein yeh file jo ek folder mein hai, doosre folder mein aap daalna chahte hain toh drag and drop karke yahan pe daal dete hain. Toh ek tarah se example hai hastakshep ka. Selecting, opening, closing, zooming, action on virtual object. Yeh bhi ek tarah se hastakshep hai. Jaise map aap use karte hain, usko zoom karte hain. Uh zoom in, zoom out karte hain, toh woh bhi ek tarah se hastakshep ho raha hai. Jiske madhyam se aap jo bhi jaankari aapko chahiye, jo karya aap karna chahte hain, bade aasani se aap kar pa rahe hain. Toh, it exploits use of knowledge how to move and manipulate in the physical world. Kuch samay isko karne ke liye hum keh sakte hain ki physical controller bhi hote hain. Jaise aap alag-alag game use karte hain. Jaise Nintendo ek bahut hi popular video game hai. Jahan pe aap alag-alag manipulation karte hain aur khelte hain. Air gesture hai jaise Microsoft Kinect hai. Aur in control the movement of an on screen avatar. Us tarah se aap alag-alag tarike se inko use karte hain. Tagged physical world hai. They are manipulated in a physical world result in a physical digital event such as animation. Us tarike ki cheezein aap dekhte hain kaise manipulate hote hue, hastakshep hote hue aap usse apna karya kar pa rahe hain. Manipulation bhi kai tarike se hota hai. Kuch hota hai direct manipulation jaisa ki aap ismein dekh sakte hain jo ki Ben ke dwara bola gaya tha. Toh iske teen core properties hain. Continuous representation and object and action of interest, physical action and button pressing instead of issue commands with the complex syntax. Jaise ki humne bataya sabse pehle main instruction ke madhyam mein jaise ki for example command line hai uske madhyam se aap koi bhi command daalte hain apne instruction ke liye toh jo nausikhiye hote hain jo naye use karne waale log hote hain unke liye woh kaafi mushkil hota hai usko karna,

manipulation unke liye aasan hota hai kyunki woh dekh paate hain ki woh kya karna chahte hain aur kya ho raha hai toh ek tarah se aap keh sakte hain ki kaise physical action aur button pressing ke madhyam se aap jo underneath ya beneath complex cheezein hain. Woh aap unko chhipa pa rahe hain. Toh GUI ek tarah se graphical user interface usmein aapko kaafi madad karta hai. Rapid reversible action with immediate feedback on the object of interest. Aap turant dekh paate hain kya hua. Jaise ki humne example diya tha. Yeh jo particular file hai agar aap isko doosre folder mein daalna chahte hain toh aap dekhte hain ki jab jaise hi aapne isko move kiya woh yahan se delete ho gaya ya yahan se hat gaya aur is file ke andar dikhne laga toh turant aap dekh sakte hain ki jo aap karna chahte the hua ki nahi. Is file ko humne recycle bin mein daal diya toh yahan se delete ho gaya. Recycle bin ke andar aa gaya. Toh ek tarah se direct usko dekhna aur samajhna aasan hota hai. Iske benefit jaise ki humne bataye nausikiyon ke liye kaafi aasan hota hai isko karna. Experience user bhi bade achhe se bade tezi se is karya ko kar sakte hain aur even defining new functions. Intermittent user jo hote hain can retain operational concept over the time. Usko achhe se apna jo bhi cheezein hain usko yaad rakh sakte hain. Kaise isko karna hai. Yahan pe error message rarely needed kyunki ismein galti hone ki sambhavna badi kam hoti hai. Users can immediately can see if the action perform furthering their goals or not. Woh unka jo lakshya hai uski taraf ja rahe hain. Ho raha hai ki nahi ho raha woh turant dekh sakte hain aur nahi ho raha hai toh turant jo unko action lena hai woh kar sakte hain. User experience less anxiety kyunki yahan pe galti hone ki chance kam hai. Bade simple hai isko karna. Toh is wajah se user ko bhi chinta kam hoti hai. And users gain confidence and mastery and feel in control. Aur kuch samay ke baad hi ek tarah se jo aapka upyog karta hai bade kam samay mein ek tarah se expert user ki tarah kaam karne lagta hai. Toh iske kuch nuksaan bhi hain. Jaise ki some people take the metaphor of direct manipulation too literally. Aisa metaphor hai usko kuch zyada hi samajh lete hain galat tarike se. Not all task can be described by objects and not all action can be done directly. Jaise ki maine bataya ki kai kai jaisa ki maine bataya kai action aise hote hain jo complex hote hain. Unko aap simply direct manipulation ke saath nahi kar sakte hain. Toh us case mein aapko direct manipulation kaam mein nahi aayega. Some tasks are better achieved through delegating for example spell checking. Aapko jo documents hain usmein check karna hai ki kis-kis word ki spelling galat hai. Yeh aap manually direct manipulation ke madhyam se karna chahenge toh bada mushkil hai. Jatil karya jaisa ki humne upar bataya. Usko aap delegate kar sakte hain system ko karne ke liye. Aur direct manipulation ke liye agar hum cheezein dene lagein toh hamara jo poora screen hai woh bhar jayega aise-aise option se aur humein kaafi samay hum bade screen pe nahi use karke mobile pe use karte hain. Aajkal toh hum apne smart watch pe use karte hain. Toh jo screen size hai woh kaafi limited hoti hai. Aur agar hum direct manipulation ki yeh saari cheezein dene lagein tab toh hamara poora screen hi bhar jayega aur kisi kaam ke layak nahi rahega. So moving a cursor using a mouse or touchpad can be slower than pressing function key to do the same. Toh jaise ki control search aur replace yeh aap soch sakte hain ki kaise karna aasan hoga. Toh agla hai jo step hai exploring anveshan karna. Toh usmein hum dekh sakte hain ki it involves moving through virtual or physical environment. Toh user can explore aspect of virtual 3D environment, AR/VR ki jahan par hum baatein karte hain.

Physical environment can also be embedded with sensor that when detect the presence of someone will trigger digital or physical event to happen. Toh us tarike se uske madhyam se aap AR/VR mein alag-alag action le sakte hain. Many examples of virtual environment including cities, parks, buildings, rooms, data sets jo ki hain. Aap usko uske baare mein soch sakte hain. Kaise AR/VR aur anya madhyamon se aap virtual aur physical environment ke beech mein upyogkarta ka samvaad karwa sakte hain. Yeh enable users to fly over them, zoom in, zoom out of different parts. Woh saari cheezein aap kar sakte hain. Jaise is case mein aap dekh sakte hain kaise cyber insect in the cave yeh visualize kiya gaya hai. Agar aap visualization ke madhyam se dekhein tab toh phir bhi theek hai. But kaafi samay mein cheezein kuch cheezein kaafi badi dikhti hai jo ki real life mein hoti hai. Jaise ki yahan pe likha gaya hai seeing things larger than life in VR. Jaise yahan pe jo manushya hai aur jo yeh cyber jo ek tarah se spider hai ya insect hai woh kaafi bada dikh raha hai. Similarly aap yahan pe dekh sakte hain kaise aap isko visualize kar rahe hain apne jo VR headset hai uske pehenne ke baad. Toh last samvaad jo humne baat ki thi pratikriya ki toh system takes initiative to alert user something that it thinks is of interest jaise ki system karta hai detecting the location and or presence of someone in vicinity and notify them on their phone or a watch jaisa ki aap bhi dekhte hain ki kuch samay pehle Facebook ya Meta pe jaisa ki aap jaante hain ki aap kisi location ke aaspaas jaate hain toh aapko kabhi-kabhi recommendation milta hai ki yahan pe these are the places to see, these are restaurant to go aur aisa kar sakte hain. Facebook ne ek functionality di thi ki jab aapka koi mitra ya aap kisi mitra ke vicinity mein ho toh woh aapko alert karta tha ki this friend is in this 500 meter radius and so on. Toh ek tarah se aap unse mil sakte hain, samvaad kar sakte hain. Iske naitik pehlu alag hain. Woh alag baat hai ki aap ki privacy reveal ho rahi hai. But agar aap apne setting mein isko off karein toh ek tarah se yeh aapke nirdesh ke baad hi yeh saari cheezein karega. So it alert the user nearby coffee bar when some friends are meeting. User fitness tracker notify them of milestone disease. Jaise humne baat ki thi ki alag-alag running app hai, alag-alag gym app hai. Toh kaise aap jo bhi aap goal set karte hain, kaise woh poore ho pa rahe hain, system aapko batata hai. Jaise aap running karte hain, toh aapko ek tarah se pratikriya deta hai ki aapne 1 km running kar li. Aapne 6 minute laga 1 km daudne mein. Agla aapne 7 minute lagaye. Agla aapne 6.5 minute lagaye. Is tarike se aapko pratikriya deta hai aur agar aapne koi goal set kar rakha hai jaise 5 km toh aapko batayega aapne aadhi daud पूरी kar li. Aapne 3 km daud पूरी kar li. Keval 2 km bacha hai waghera-waghera. So automatic system response without any request made by the user. Is case mein user ko explicitly koi request nahi dena padta. Toh, kis tarah ka humein interface, interaction type choose karna chahiye. Toh yeh depend karta hai ki kis tarah ka aap karya karna chahte hain. Jaisa ki humne discuss kiya alag-alag interaction type alag-alag suvidhayein pradaan karta hai. Alag-alag scenario mein better kaam karta hai. Toh each interface types offer unique advantage and drawbacks. Toh unka jo selection hai usi aadhaar pe hota hai. Jaise suitability for the task and user. Aapke user aur task ke liye kaun sa zyada upyogi hoga? Kis tarah ke environment mein aap usko use kar rahe hain. Kis situation mein usko use kar rahe hain. Kis tarah ke resources aapke paas available hain? Technology aur paise uske madhyam se aap alag-alag interaction type ka chayan kar sakte hain. Jaise AR/VR ek tarah se thode mehenge

honge aur thode se aur jo interaction type honge woh thode saste honge. Kuch interaction time mein galtiyan ki sambhavna kam hai. Jaise instruction mein, kuch mein galtiyan ki sambhavna zyada hai. Jaise ki bolne mein, gesture mein ya AR/VR mein toh usi tarike se jaisa aapka purpose ho, jaisa aapka environment ho aur jaise resources aapke paas ho aap apne instruction type ka chunaav kar sakte hain aur usi ke mutabik aap aage jo sampark bindu hai, interface hai, uska bhi chunaav kar sakte hain. Jaisa ki humne aur bhi discuss kiya tha. Kaise direct manipulation is good for doing types of task. For example uh designing, drawing, flying, driving waghera-waghera aur ek instruction jo hai ek tarah se repetitive task jo hote hain unke liye bada achha hota hai. Conversation wahan pe zyada achha hota hai jahan pe information dhoondna hota hai ya request karna hota hai. Hybrid concept models are also good. Toh aap alag-alag tarike ki jo interaction types hain usko ek saath combine bhi kar sakte hain zarooraton ke mutabik aur baaki cheezein jaise humne upar ki uske mutabik. Toh ek tarah se aap dekh sakte hain kaise yeh multimodal HCI hai jo ki humne pehle bhi dekha jo yahan ka upyog karta hai jisko information ki zaroorat hoti hai interface ke madhyam se aage woh system mein apne request ko bhejta hai aur is multimodal input system mein ek tarah se information process hota hai aur multimodal output system ke madhyam se aage jo upyogkarta hai usko bhejta hai woh usko phir yeh multimodal output system ke madhyam se aage upyogkarta aapko deta hai, upyog karta hai. Usko leke usko perceive karta hai. Usko samajhta hai aur apne ek tarah se jo bhi requirement hai woh dekhta hai. Fulfill hui hai ki nahi hui hai. Agar nahi hui toh woh aage punah sampark karta hai system se aur apne karya ko poora karta hai. Toh kuch jo system ke dwara notification kaafi time pe humein milta hai. Toh uske nuksaan hum dekh sakte hain. Uske fayde bhi hain aur nuksaan dekhiye yeh hai. Jaise kaafi time pe aap frustrate ho jaate hain jab aapko too many notifications aate hain aur kuch samay agar woh notification galat hote hain toh aur bhi frustrating hote hain. Toh jab bhi galti hoti hai toh kya aapka system aapse sorry bolta hai? Toh kya system usko sahi karne ki koshish karta hai? Woh sab cheezein bhi humein dhyan dene ki zaroorat hai. Toh jo system initiated notification hote hain woh faydemand bhi hote hain aur nuksandayak bhi hote hain. Toh chaliye ab alag-alag interface ke baare mein baat karte hain. Jaise ki humne baat ki kaise alag-alag interaction ko support karne ke liye uske corresponding alag-alag sampark bindu hote hain, interface hote hain. Jaise ki graphical user interface uh jo ki bahut hi simple novice uh jo aapke user hain unke liye bade aasani se usko use kar sakta hai. Simple ek icon ke madhyam se, menu ke madhyam se, Windows ke madhyam se apne karya ko karta hai. Jaise Microsoft Windows, macOS, mobile apps in sab cheezon mein GUI ke madhyam se aap bade sahay tarike se user friendly tarike se alag-alag multitasking karyon ko bade kushalta aur kushalta aur prabhavshali tarike se karte hain aur woh learning curve khaastaur par jo naye user hote hain, woh bada kam hota hai aur bade jaldi se woh ek expert user ke taur par karya karne lagte hain. But uska nuksaan ek tarah se yeh hai ki kaafi resource intensive hota hai aur it requires advance hardware jo ki har jagah possible nahi hota hai. Limited flexibility for power user jo ki bahut expert har cheezon ko bade tezi se aur bade achhe tarike se karna chahte hain. Shayad wahan pe woh cheezein thodi slow ho jaati hain. Complex design mein overwhelm users in advance application. Agar aapko kaafi jatil kaam karne hain toh us clash mein aap dekh sakte

hain ki aapko bada durgam ya bahut si jatil GUI banana padega jo ki again durgam karya hai dono ke liye chahe woh upyogkarta ho chahe designer ho. Command line interface mein jahan pe text based madhyam se aap expert ke liye alag-alag simple command de sakte hain. Instruction de sakte hain karya karne ke liye. Jaise Linux terminal hai, Python interpreter hai aur yeh kaafi lightweight hota hai kyunki yahan pe ek tarah UI nahi hota hai. And adaptable, quickly and ideal for repetitive and complex task. Flexible and powerful for expert users. Jaisa ki humne pehle baat ki thi. Iske nuksaan yeh hai ki itna aasan nahi hota sabhi ke liye seekhna. Khaastaur pe beginners ke liye aurki visually appealing nahi hota hai. Yahan pe saari cheezein memorize karni hoti hai. Commands aapko yaad rakhne hote hain. Toh yahan pe galti ki chances bhi ek tarah se keh sakte hain zyada hoti hai ki agar aap sahi syntax yaad nahi rakhte hain toh. Toh isliye agar aapko exact syntax yaad hai toh tab toh phir bade achhe tarike se aap kar sakte hain. So natural user interface jahan pe bade natural tarike, sahay tarike se manushya apne karya karta hai. Kya usko karte hue apne karya ko kar sakta hai? Toh apne gesture ke madhyam se, voice ke madhyam se, touch ke madhyam se kaise aap kisi karya ko karte hain? Toh alag-alag upkaran mobile, laptop yeh saari cheezein aajkal provide kar rahe hain. Chahe woh Apple ki Siri ho aur Amazon ka Alexa ho, Kinect ho, gaming system ho woh intuitive tarike se natural human actions ko accessibility ke saath ek tarah se hands-free option ke saath aap bade engaging aur highly interactive tarike se upyogkarta apne karya ko kar sakta hai. Toh it may lack decision for detail task, challenging in noise or crowded environment, requires advance technology and increasing cost. Toh agar hum tangible user interface ki baat karein toh tangible matlab ki kuch aisa jisko aap dekh sakte hain, chhu sakte hain. Toh interacts with physical object jaise yahan pe Sphero robots in STEM education jo use kiya jaata hai jisse aap interact kar sakte hain, touch kar sakte hain, dekh sakte hain. Toh it encourage collaboration in group setting, combine physical and digital interaction effectively and enhances learning experience specially for the children. Aur cons yeh hai ki kaafi mehenga hota hai yeh. Can be costly to produce, maintain, require physical space for installation. Scalability is of limited in sab wajahon se jagah ki zaroorat hai, paise ki zaroorat hai and so on. Virtual reality interface jaise humne baat ki ki 3D environment pe ek tarah se kaam karta hai toh Oculus Rift for gaming, training, simulations in sab kshetron mein isko use kar sakte hain. Toh iske ke fayde dekhiye ek tarah se full immersive, engaging experience hota hai. Ideal for simulation and training scenario and facilitate experiential learning in safe environment. Aur nuksaan iska ek tarah se kaafi mehenge hardware hote hain. Yeh isko setup karna bhi itna aasan nahi hota hai. May cause motion sickness and fatigue kyunki aap 3D world mein karya karne lagte hain. Limited applications in everyday task. Har cheezon ko AR/VR ke madhyam se karne ki zaroorat nahi hai. Toh woh bhi cheezon ka dhyan dene ki zaroorat hai. Usi tarike se AR jahan pe aap virtual element ko real world mein overlay karte hain. Jaise ki humne pehle bhi discuss kiya tha kaise aap apne photo ko alag-alag filter ke madhyam se overlay karte hain. Virtual element ke madhyam se aur apna karya karte hain. IKEA ka bhi example humne discuss kiya tha. Go ka bhi example discuss kiya tha. Toh iske fayde aap dekh sakte hain. It combines real and virtual world seamlessly versatile across fields like retail, healthcare, education and it enhances real world interaction with overlay toh aap chahe woh map

ho, chahe woh education se related ho, chahe woh game se related ho, chahe woh upyogita se related ho jaise humne IKEA ka baat kiya tha aur nuksaan iske ek taraf yeh hai ki heavily dependent on the hardware and battery life, expensive to implement at scale, may distract user from their surrounding. Toh in sab cheezon ka dhyan dena chahiye. Toh yeh interface bhi ek tarah se aap dekhenge toh samay ke saath evolve ho rahe hain aur alag-alag interaction ke mutabik evolve ho rahe hain. Alag-alag zarooraton ke mutabik evolve ho rahe hain. Alag-alag user ki zarooraton ke mutabik evolve ho rahe hain. Jo ki agar hum dekhein toh abhi interfaces has evolved from simple text-based command jo ki bahut pehle hua karte the aur abhi aaj ke time pe kaafi immersive aur context aware system ke mutabik kaam kar rahe hain. Toh agar hum phases ko dekhein toh ek tarah se command line interface, GUI interface, web base interface, natural user interface aur abhi immersive interfaces ki hum baat karte hain. Aur agar hum real world example dekhein in sab cheezon ke toh GUI jaise aap simple Google Docs uthate hain. Ismein alag-alag tarike se alag-alag toolbar ke madhyam se kaam karte hain. Voice interface ki baat karein toh jaise Amazon Alexa, hands-free smartphone control, VR Google Earth VR aur bhi alag-alag games jo hote hain AR Snapchat filters, Go and other bhi cheezein jaise humne baat ki thi jo ki augmented reality apply to the faces for entertainment, touch interface jaise iPhone multi-touch gesture aur pinch to zoom waghera-waghera aap karte hain. Ek tarah se yeh jo interaction type aap dekh sakte hain description of what user is doing when interacting is a system for example instruction, talking, browsing, responding aur interface style jo hai the kind of interface used to support the interaction for instance command, menu, gesture, query waghera-waghera is sab cheezon ko kaise style dono support karte hain. Isi ke saath hum yahan pe ek chhota sa break lete hain aur iske second part ke saath hum punah jaldi aayenge. Dhanyavaad.