

## **Human Computer Interaction (Hindi mein)**

**Professor Rajiv Ratn Shah**

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

### **Hands-on Prototyping Techniques**

#### **Lec28**

[Sangeet] Namaskar main Ritwik Bamba is course Human Computer Interaction ka sahayak shikshak hoon. Aaiye yeh tutorial shuru karte hain. Aaj ke tutorial ka hamara vishay hai Prototyping. Sabse pehle hum dekh lete hain ki humne isse pehle kya-kya padha hai. Pehle tutorial mein humne dekha ki achha design versus purana design kaise aapas mein relate hote hain aur kya-kya aise pehlu hain jo ek design ko achha banate hain. Iske baad humne inclusivity aur accessibility ke baare mein dekha aur kaise inclusivity, accessibility aur usability saath mein milke inclusive design ki sanrachna karte hain. Iske baad humne paanch mukhya design principles dekhe jo ki hain Visibility, Feedback, Consistency, Constraints aur Affordance. Iske baad humne interaction design process ki chaar mukhya gatividhiyon par dhyan diya. Jismein sabse pehli hai upyogkartaon ki zarooraton ko samajhna. Doosri hai un zarooraton ke hisaab se prarambhik design banana. Teesri gatividhi jo hai hamari prototyping yaani ki unhin design ke interactive versions taiyar karna jisse user ghulmil sake. Aur chautha hai hamara evaluating yaani ki un designs ko un prototypes ko hum pata lagayein ki woh kis tarike se users ki zarooraton ko poora kar rahe hain. Iske baad humne interaction design ki double diamond par dhyan diya. Kaise hum sabse pehle users ki dikkato ke baare mein jaante hain. Uske baad hum sabse mukhya dikkat par dhyan dete hain aur uske baare mein hum pata lagate hain. Dikkat ke baare mein pata karne ke baad hum uske liye alag-alag hal dhoondne shuru karte hain aur unmein se sabse achhe hal ko hum chunte hain apne final design ke roop mein. Iske baad humne user persona par dhyan diya aur kaise banate hain user persona ko. Iske baad humne empathy mapping yaani samanubhuti mapping kari. Ek mental model banaya, conceptual model banaya. Woh kaise ek doosre se alag hain yeh dekha aur ek information architecture kya hota hai yeh pata kiya. Iske baad humne cognition aur cognitive load pe dhyan diya yaani ki maansik bhaar. Kya-kya aisi cheezein hain jinse maansik bhaar zyada evam kam hota hai aur kuch niyam dekhe Miller aur Gestalt ke. Iske baad humne kuch tarike dekhe jinse hum data ko ikattha kar sakte hain aur uska vishleshan kar sakte hain. Chaliye aaj ke baare mein dekhte hain hum aaj kya padhne waale hain. Prototyping. Kya hota hai ek prototype? Prototype ek prarambhik design ke roop mein hum ise samajh sakte hain. Jisse jo hamare upyogkarta hain, user hain, woh isse samajh sakein aur iske saath kaam kar sakein. Prototype ek chalte hue design ka ek prarambhik model hota hai jo uske design se mel khata hai aur kuch usi tarah se kaam karne ke liye banaya jaata hai. Prototyping isi ko banane ki gatividhi ko kehte hain. Teams prototype banati hain

alag-alag star par jo ki ek low fidelity yaani ki lo-fi ek kaafi prarambhik star ka prototype hota hai. Phir ek hamare paas madhyam star ka prototype hota hai yaani ki mid-fi aur aakhirkar ek high-fidelity yaani ki hi-fi design. Ek uchh star ka prototype jismein zyada tar vikalp zyada tar feature chalte ho. Hum ek prototype kaafi alag-alag tarikon se bana sakte hain. Jaise ki hum ek gatte se bana sakte hain. Ek prototype kisi app ka chalta hua prototype. Hum aur bhi kuch is tarah ke prototyping tools ka istemal kar sakte hain jo ki hum apne computer par bana sakte hain. Jaise ki Figma aur Miro. Hum kuch aur cheezein bhi istemal kar sakte hain ek prototype banane mein. Jaise ki hum kaagaz par ek pencil se ek prototype bana sakte hain yeh batane ke liye ki woh design kis tarah kaam karega. Ab prototyping ke baare mein hum aur thoda sa gehan vichar karen toh humein yeh pata chalega ki ek prarambhik star par hum jab ek prototype ko design kar rahe hote hain tab humein aasan banana hota hai. Use istemal karna use aasan se aasan banana hota hai. Jo hamare alag-alag tatva hain unhein humein is tarike se prastut karna hai ki woh upyogkarta ke liye istemal karna samajhna aasan ho aur isse hum ek gehan roop se usko istemal karke dekh sakte hain ki woh kis prarup mein ek behtar roop se pradarshan kar raha hai. Prarambhik star par, phir madhyam star par aur phir uchh star par prototype karne ke alag-alag tools hote hain jo hamare vicharon ko ek asal design ke roop mein banate hain. Isse hum ek aasan prastuti ko bina baar-baar badle prastut kar sakte hain. Aur yahi hamara final prototype yaani ki hi-fi kehlata hai. Humein yeh samajhne ki zaroorat hai ki hum aakhir prototyping karte hi kyun hain? Isse jo hamara sabse bada fayda hai woh hai ki hum ek yantra ko kisi design ko kisi application ko hum usko poora karne ke baad yeh dekhte hain ki woh is tarike se kaam kar raha hai. Woh kaam is tarah se nahi karna chahiye. Jab hum aakhir star par hum yeh pata lagate hain ki kuch galtiyen hain ismein tab tak usmein bahut zyada paison ka istemal ho chuka hota hai. Usmein poori ki poori team apna dimaag laga chuki hoti hai. Evam aakhir mein jab galti nikalti hai tab use badalna bhi kathin hota hai. Isliye agar hum prarambhik roop mein hi usko badal dein toh hamare liye aage ke jo star hain un pe badalna un pe kaam karna aasan ho jaata hai. Unke liye unhein samajhna aasan ho jaata hai. Aur aakhirkar jo hamare users hain unke liye is app ko ek behtar roop mein istemal karne ka mauka milta hai. Jo unka user experience hai woh ek behtar roop mein rehta hai. Kya-kya fayde hote hain iske? Sabse pehle humein jo hum paise ki bachat karte hain, jo hum baar-baar usko badalne par jo samay vyarth karte hain, hum uski bachat karte hain aur hum aage ke jo design hai, woh hum pehle se hi bana ke rakh sakte hain. Udaharan ke taur par hum abhi se hi us application mein kuch expansion ke roop mein kuch jagah chhod sakte hain. Aaj hi jo hum agle saal daalna chahte hain kuch aise vikalp aur hum jo hamare stakeholder hain unke liye humein is app ko aasan banana hai taaki jab woh use dekhein uska istemal karke dekhein tab unke liye bhi ise samajhna aasan ho. Teen star par prototyping ki jaati hai. Lo-fi yaani ki prarambhik star par, mid-fi yaani ki madhyam star par, hi-fi yaani ki uchh star par. Aaiye in teeno saron par prototyping ko ek-ek karke dekhte hain. Lo-fi design ek bahut hi aasan sa aur ek chhota sa design hota hai jismein hum kuch ek cheezein daal dete hain jo humein sabse zyada zaroori hoti hain ek app ke shuruwat karne mein. Ismein ek moti moti si humein usko istemal kaise karna hai iski samajh mil jaati hai. Hum isko ek kaagaz aur pencil ke saath bana sakte hain. Jaise ki udaharan ke taur par hum yahan pe ek lo-fi bana ke

de rahe hain. Ek mobile ki home screen ke liye. Kuch is tarah se ek prarambhik star ka prototype dikh sakta hai. Yeh jaldi hone chahiye. Humein inhein jaldi bana lena chahiye aur inko badalna aasan hona chahiye. Ek lo-fi ke baare mein sabse zaroori jo cheez hai woh hai usko jaldi se aasan roop se badalna. Yeh humein batata hai ki users iske saath shuruwati roop mein kis tarah se interact kar sakte hain. Kis tarah se batchit kar sakte hain aur hum ek lo-fi ka istemal karke jo hamari zarooratein hain unko hum aur pakka kar sakte hain. Kis tarah se hum bana sakte hain lo-fi? Ek story board yaani ki ek kahani ke roop mein hum lo-fi ko prastut kar sakte hain. Hum kaagaz ke prototype bana sakte hain aur hum computer par bhi kuch software ki madad se ek aasan sa saral sa prototype bana ke dikha sakte hain. Jaisa ki aap yahan dekh sakte hain ek udaharan ke taur par yahan pe humein diya gaya hai ki kaise ek app ko hum kholenge toh hamare paas yeh screen aayegi. Jab hum sign par click karenge toh hum yahan par aayenge aur is ek enter naamak vikalp pe hum dabayenge toh hum ek is aapki screen par aa jayenge. Yahan pe humne ek kahani ke roop mein prastut kiya hai apne lo-fi design ko. Agar hum paper prototyping yaani kaagaz ke saath hum prototyping karenge toh hum kuch is tarah kar sakte hain. Ki hum kuch alag-alag kaagazon par likh sakte hain ki hamari screen par abhi kya aa raha hai aur is tarah se hum ek chhoti si kahani bata bana sakte hain apne prarambhik star ke prototype ke liye. Wireframe bhi bana sakte hain hum. Par ismein jo ek chhoti si khaami yeh hai ki wireframe ko badalna kaagaz ke roop mein thoda sa mushkil hota hai. Ek kaagaz par bane hue prototype ko badalna aasan hai. Isliye logon ko bola jaata hai ki jo hum shuruwati roop ka ek pehla prototype hum khud se ek kaagaz par banein. Ek madhyam sar ka prototype jo hai woh thoda sa usmein aise tatva aa jaate hain jo unhein istemal karne laayak bana dete hain. Jaise ki agar hum is disha mein jayenge toh hum kahan par pahunchenge? Agar hum is peeche jaane ke button ko dabayenge toh hum pichli screen par aa jayenge. Toh ek mote taur par hum ek hum vichaar kar sakte hain is pe. Hum ek idea le sakte hain isse ki hamare app mein kya chal raha hai. Kuch hamare vikalp chalne lag jayenge. Kuch jo hamare upyogkarta hain unke liye is app ko samajhna aur aasan ho jayega aur kuch aur jo gehan feature hain hum unko ismein daal ke test kar sakte hain. Ismein hum thodi si khaamiyon ko bhi dekh sakte hain. Jaise ki jo hamare upyogkarta hain woh isko badalne ke liye thoda sa ek hesitate kar sakte hain. Unhein thodi dikhat ho sakti hai yeh bolne mein kyunki design thoda ban chuka hai. Jo management hai use lag sakta hai ki yeh design hi real hai. Yahi aage jaane waala hai aur woh isko dekhkar sankoch kar sakte hain aage badhne mein. Aur kyunki ismein kuch kuch cheezein kaam karne lag gayi hain par kuch cheezein nahi kar rahi. Toh isliye log jin cheezon par dhyan dete hain woh unhin ko hi dekhne lag jaate hain. Unhin ki jaanch padtaal karne lagte hain aur agar woh theek se nahi chal rahi hoti toh woh usi par atak jaate hain. Yeh ek udaharan hai hamara mid-fi ka ki humein ek mota-mota sa andaza laga sakte hain yahan se dekhkar ki hamare app mein kahan jaane se hum kya karya poora kar sakte hain. Aakhirkar hum aate hain apne uchh star ke prototype par yaani ki hi-fi. Yeh hamare jo aakhri jo hum design karenge final design hoga hamara yeh usse mel khata hai aur ismein hum zyada tar cheezein jo hain, zyada tar hamare feature hain woh chal rahe hote hain. Humein yeh dekh ke pata lag sakta hai ki humein yeh app istemal karne par kaisa lagega. Kya-kya yeh hamari zarooratein poori karta hai. Isko istemal karna upyogkartaon ke liye bahut

aasan hota hai. Aur hum inko dekhkar hum jo chhoti-chhoti cheezein hain, hum unko bhi istemal karke dekh sakte hain ki woh kaam kar rahi hain. Jo stakeholders hain unke liye bhi ise humein prastut karna aasan rehta hai. Woh yeh dekh ke aasani se samajh sakte hain ki hamara jo app hai woh kis tarah se pradarshan karega. Yeh hamare ek uchh star ke prototype ka udaharan hai. Hum yeh dekh ke bata nahi sakte ki kya yeh ek asal app ka screenshot hai ya phir ek prototype ka screenshot hai. Chaliye ek saath hum in sab kuch diye gaye pehluon par dekh lete hain ki kaise alag hai hamare lo-fi, mid-fi aur hi-fi. Sabse pehle hum dekhenge zaroorat kyun banaye jaate hain? Yeh lo-fi ek prarambhik roop se hum ek andaza lagane ke liye banate hain. Hum hamara jo concept hai hum usko validate karne ke liye banate hain. Mid-fi mein hum usi jo banaye gaye design ko hum thoda sa aur behtar kar paate hain. Jabki hi-fi design mein saari jo usability testing hai woh ki ja sakti hai. Jo ek star hai detail ka level of detail woh hum jaise-jaise prarambhik se madhyam se us star par jayenge woh badhta jayega aur isi tarah jo hamare design elements hain woh bhi badhte jayenge. Lo-fi mein haath se banaye gaye chhote-chhote shapes honge. Mid-fi mein ek andaze ke taur par humein jo icons hain woh bana diye jayenge aur hi-fi mein wahi sab cheezein ek aakhiri roop mein banke taiyar ho jayengi. Lo-fi banane ke liye hum kaagaz aur pencil ka istemal kar sakte hain. Aur kuch hum tools jaise ki Figma ka bhi istemal kar sakte hain. Mid-fi ke liye hum kuch digital tools jaise ki Adobe Express, Figma, Sketch ka istemal kar sakte hain. Jabki hi-fi ke liye hum kuch aur behtar yantron ka istemal kar sakte hain. Figma, code, Adobe XD aadi. Feedback se hum kya le sakte hain? Lo-fi mein jo hum dekhenge ki ek andaze ke taur par kya chal raha hai. Kis tarah se hamara jo app ka flow hai woh chalega. Kahan pe kya element kya tatva diye jayenge. Mid-fi mein yeh thode behtar roop mein aa jayenge ki jo hamara layout hai woh kis tarah se istemal hoga. Jo hamara upyog karta hai woh kaise kya-kya gatividhiyan karega, kaise unse paar jayega aur hi-fi toh hamara aakhri ek star hai hi jis pe jaake woh ek final look and feel le sakta hai ki hamara app kaisa lagega. Inke alag-alag shrotagan honge. Lo-fi hamari design team ke liye hoga aur jo ek chhota ek samooh hoga users ka. Mid-fi baaki kuch ek bada samooh ho ho sakta hai users ka aur jo baaki kuch stakeholder ho sakte hain. Hi-fi jabki hamare final clients, hamare jo user hain unko ja sakta hai. Interactivity ek aakhiri jo hamara pehlu hai us pe hum jaise-jaise prarambhik se madhyam se us par jayenge woh badhta jayega. Lo-fi mein kuch bhi interactive nahi hoga. Mid-fi mein kuch ek do cheezein aisi ho sakti hain jabki hi-fi mein zyada tar cheezein interactive hi honggi. Ek udaharan ke taur par aap dekhenge ek hi app ke lo-fi, mid-fi aur hi-fi yahan par diye gaye hain. Jaisa ki aap yahan dekh sakte hain. Yahan pe humein bataya gaya hai ki is button se hum aage khol sakte hain. Yahan pe woh asal mein khol ke dikhaya ja raha hai aur yahan pe woh ek proper look and feel ke saath diya ja raha hai. Ek animation ke saath. Ab aapke liye ek assignment di ja rahi hai jismein aapko ek food delivery app ek khana mangane ki ek app ka ek lo-fi, mid-fi aur hi-fi banana hai aur aapko jo users ke saath ek gatividhi पूरी karwani hai woh hai khana dhoondna aur use order karna. Lijiye thoda sa samay aur ise poora karte hain. Chaliye aaiye shuru karte hain ise. Hum apne lo-fi mein dekh sakte hain ki ek bahut hi chhoti-chhoti icons ke roop mein diya gaya hai humein yeh ki khana yahan pe kuch yeh ho sakta hai, kuch yeh ho sakta hai. Kahan pe hamare restaurant diye jayenge. Kahan pe aapka address hoga? Is tarah se kuch chhoti-chhoti cheezein di

gayi hain. Hi-fi mein yeh thoda sa behtar ho jayega. Jo design hai woh thode behtar ho jayenge. Jo icons hain woh thode se behtar ho jayenge. Aur hi-fi mein aap dekh sakte hain yeh poora rangeen ek hamara final prototype banega. Jisse hum user testing kar sakte hain. Prototyping par aur janne ke liye aap in kitabon evam websites ko bhi dhyan mein rakh sakte hain. Prototyping ke liye itna hi. Dhanyavaad. [Sangeet]