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Subject – Human Machine Interaction
Exp 4: Design Principles

Aim: Understand principles of good UI design by heuristic evaluation.

Theory:

Heuristic evaluation is a usability inspection method used to identify potential usability problems in a user interface. It involves assessing the design based on established principles or heuristics, which act as guidelines for improving the user experience. Jakob Nielsen's 10 heuristics are commonly used for this evaluation:

1. Visibility of system status – Keeping users informed about what's happening.
2. Match between system and the real world – Using familiar language and concepts.
3. User control and freedom – Allowing users to easily undo or redo actions.
4. Consistency and standards – Following platform conventions to prevent confusion.
5. Error prevention – Designing to minimize errors before they occur.
6. Recognition rather than recall – Reducing memory load by making options visible.
7. Flexibility and efficiency of use – Providing shortcuts for expert users while maintaining simplicity for beginners.
8. Aesthetic and minimalist design – Avoiding unnecessary information or visual clutter.
9. Help users recognize, diagnose, and recover from errors – Offering clear error messages.
10. Help and documentation – Providing assistance when needed, though ideally the system should be intuitive enough that minimal help is required.

The designed UI follows the Jakob Nielsen's principles for heuristic evaluation in the following ways:

1. Visibility of system status

- Login Page (Image 1): The app provides clear feedback with a login button and error messages in case of incomplete form filling. The system status is clearly communicated by showing input fields like "Mobile Number" and "Password."
- Form Submission (Image 2): After successfully submitting the form, users are given clear feedback with a checkmark symbol and text, confirming the form submission status. The visual confirmation is effective for keeping users informed.

- Verification Page (Image 3): The page shows the status of document uploads (Aadhar card, Voter ID, etc.) using clear checkmarks, ensuring users know what has been successfully uploaded.

2. Match between system and the real world

- The app communicates using simple and familiar language. Texts like "लाभार्थीची पात्रता जाणून घ्या" (Know the eligibility of the beneficiary) and "अर्ज" (Application) use the local language (Marathi), which matches the target users' real-world language. This enhances usability and makes the app more intuitive for Marathi speakers.
- Icons and imagery are reflective of real-world scenarios. For instance, the tea-seller photo used in the "सांवाद साधा" (dialogue) section adds a familiar and relatable context for users.

3. User control and freedom

- Back Navigation (Home Page): A home button (green icon) is consistently available throughout the pages, allowing users to return to the homepage or previous step easily. This helps users recover from mistakes and navigate with flexibility.
- Form Controls: Users can recheck, edit, or add new information using the form's editable fields without facing constraints, enabling a high degree of freedom in data entry.

4. Consistency and standards

- Consistency is maintained through repeated use of color schemes (green, white, and red), buttons (rectangular shapes with rounded corners), and icons. For example, the back arrow and home icon are always placed in the top corners, making the interface predictable and easier to navigate.
- The verification page shows a consistent document upload process, where each document type (Aadhar, Voter ID) follows the same format for user interaction.

5. Error prevention

- Input Validation: The form asks users to enter specific details (like the mobile number), and the design likely includes validation, preventing users from proceeding without entering a valid phone number. This minimizes errors before form submission.
- The document upload interface provides visual checks (green checkmarks) that confirm a successful upload, preventing errors related to incomplete submissions.

6. Recognition rather than recall

- Buttons and Labels: All the actions (like "अर्ज," "पात्रता") are clearly labeled and placed in buttons with distinct shapes, reducing the need for users to recall the meaning of ambiguous symbols or text.
- Forms and Fields: The app uses placeholder text ("Enter your mobile number") and consistent labeling for each form field, ensuring users do not have to remember what each field represents.

7. Flexibility and efficiency of use

- The app appears to cater to both new and experienced users. Experienced users can quickly complete tasks like form filling and document uploads. Clear icons and consistent navigation enable users to speed up their interactions as they become familiar with the interface.
- Form Submission Feedback: Users can verify their actions (like document uploads) efficiently by reviewing the highlighted checkmarks and progress indicators on the verification page.

8. Aesthetic and minimalist design

- The design maintains a clean, uncluttered layout. Key elements are given prominence, such as the login form, application buttons, and document verification areas. The use of green and white colors adds a sense of calm and focus, while red is used sparingly for warnings and essential points, such as eligibility criteria.
- The design avoids excessive information on each page, focusing only on the necessary elements for that particular interaction (e.g., form submission, login, or verification).

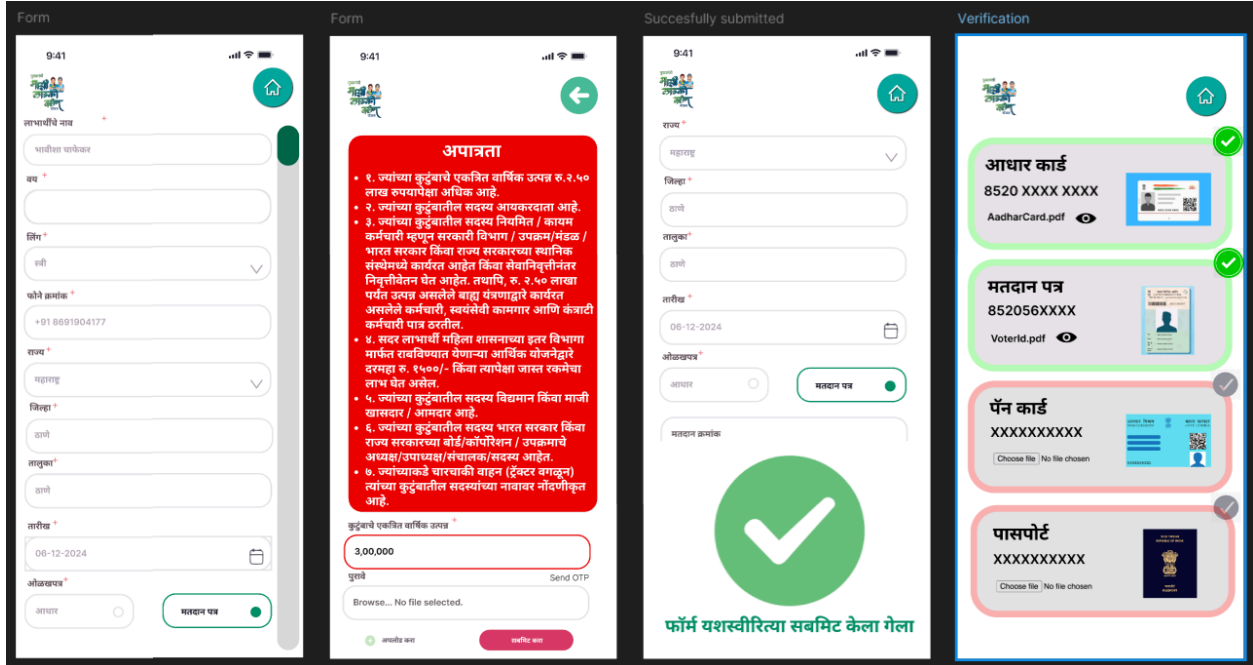
9. Help users recognize, diagnose, and recover from errors

- If there are errors, the app likely provides clear feedback in the form of error messages (though not shown in the current screenshots). For instance, the login page could show "invalid password" or "incomplete form" messages, helping users diagnose and correct the problem.

10. Help and documentation

- Eligibility Information: A dedicated section ("अपली पात्रता जाणून घ्या") provides comprehensive help on eligibility, including specific conditions in an ordered list format. This helps users understand the application process without confusion.
- Instructions: The app also includes visual cues, like in the form page (where the character is pointing to "Click here for the form"), guiding users on what to do next.

Output:



Conclusion:

1. The designed UI adheres well to Jakob Nielsen's principles of heuristic evaluation, enhancing usability and improving the user experience.

2. The app provides clear feedback through consistent design elements, uses familiar language for its target audience, and ensures error prevention and recovery.
3. The system status is communicated effectively through progress indicators, while the interface maintains a minimalist and aesthetically pleasing design that avoids overwhelming the user.
4. Furthermore, flexibility and efficiency are ensured by offering easy navigation and clear instructions.
5. The use of local language, familiar icons, and real-world metaphors makes the app more intuitive for the users, while validation mechanisms prevent common errors.
6. Additionally, the app supports both novice and experienced users through simple and consistent interactions.

Rating HMI Principles:

| Sr. No. | Principles | Poor | Avg | Good | Very Good | Excellent |
|----------------|-------------------------------|-------------|------------|-------------|------------------|------------------|
| 1 | Aesthetically pleasing | | | | ✓ | |
| 2 | Compatibility | | | | | ✓ |
| 3 | Comprehensibility | | | | ✓ | |
| 4 | Consistency | | | | | ✓ |
| 5 | Control | | | ✓ | | |
| 6 | Efficiency | | | | ✓ | |
| 7 | Flexibility | | | | ✓ | |

| | | | | | | |
|----|----------------|--|--|---|---|---|
| 8 | Forgiveness | | | ✓ | | |
| 9 | Recovery | | | | ✓ | |
| 10 | Responsiveness | | | | | ✓ |