LAB # 1

NAME : ADEEL ABBAS

SAP ID : 56157

SUBJECT : HCI & CG LAB

Task 1

1.

- **Define HCI and its importance in designing user-friendly systems.**

Definition and Significance of HCI:

HCI (Human-Computer Interaction) is the science of how humans interact with computers and to create technologies that allow humans to interact with computers in new ways. It is significant because it guarantees that systems are easy to use, accessible, and efficient, resulting in increased satisfaction and productivity.

- **Discuss the key components of HCI: User, Computer, and Interaction.**

Key Elements of HCI:

User – The person interacting with the system.

Computer – The system or interface that the user interacts with.

Interaction – The interaction between the user and the system.

- **Explore examples of good and bad HCI designs (e.g., websites, mobile apps).**

Examples of Good and Bad HCI Designs:

Good HCI: Google Search – simple, quick, and intuitive.

Bad HCI: Confusing airline booking websites – messy layout, bad navigation.

2 .

- **Discover list of wireframing tools (e.g., Figma or Adobe XD).**

Wireframing Tools Explored:

Figma. Cloud-based, seamless collaboration, drag-and-drop interface.

Adobe XD. Suitable for designing and prototyping with robust animation features.

Task 2

- **Discuss how HCI and CG work together in applications like virtual reality, augmented reality, and video games.**

How HCI and CG Collaborate:

In areas such as virtual reality (VR), augmented reality (AR), and video games, HCI provides the means for users to naturally interact with the graphical world. CG generates the visual content, whereas HCI addresses how users perceive and manipulate that content.

- **Explore the role of user interaction in CG applications.**

User Interaction in CG Applications

Such user actions as attention, motion, and click are translated via HCI principles and enacted as actions in the CG space, producing an immersive and organic user experience.

THE END

LAB # 2

NAME : ADEEL ABBAS

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SUBJECT : HCI & CG LAB

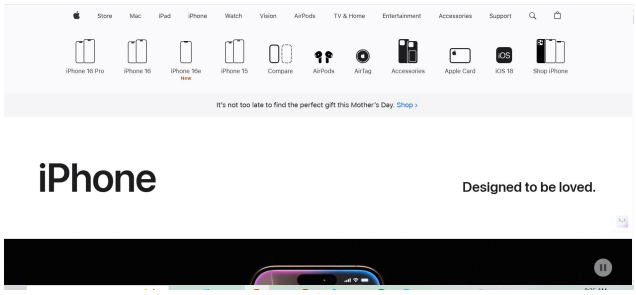
Activity 1: Observing Real-World Designs.

· Observe and document examples of good and bad designs in your environment (e.g., websites, mobile apps, physical devices, public interfaces like ATMs or ticket machines).

Examples:

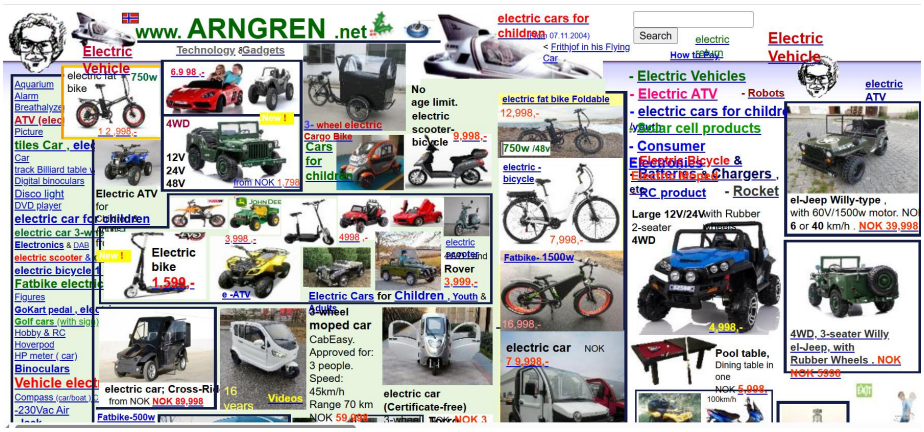
Good Design:

Apple's iPhone Home Screen:



Bad Design:

Confusing Elevator Buttons:



Activity 2: Analyzing Website Usability.

Visit two websites (one well-designed and one poorly designed) and evaluate them based on HCI principles.

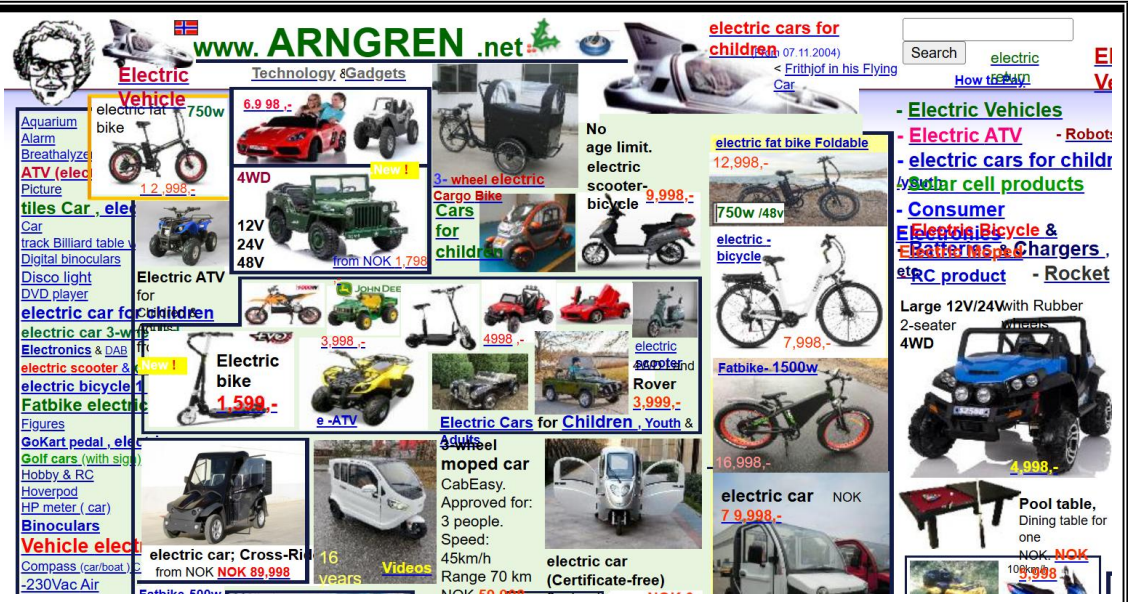
Examples:

Good Design:

Apple Website (apple.com):

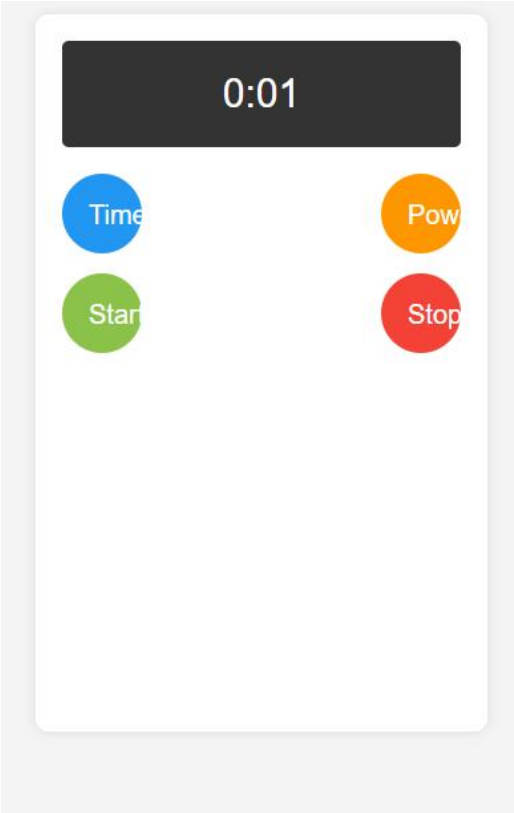
Bad Design:

Arngren Website (arngren.net):



Activity 3: Redesign Exercise

Identify a poorly designed interface (e.g., a confusing mobile app, a cluttered website, or a physical device) and propose a redesign.



Activity 4: Group Discussion and Presentation.

Examples of Good and Bad Designs

Good Design Examples:

Apple iPhone Home Screen

Bad Design Examples:

Arngren Website (arngren.net)

LAB # 3

NAME : ADEEL ABBAS

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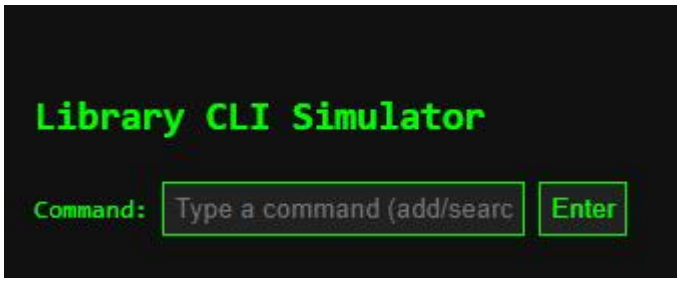
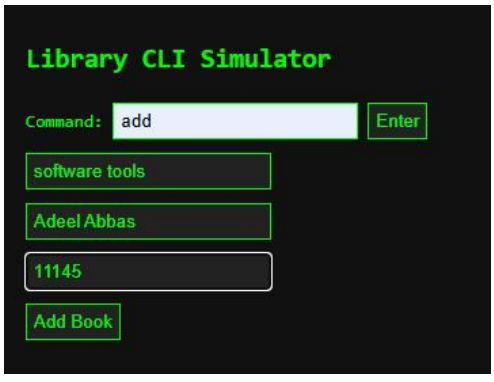
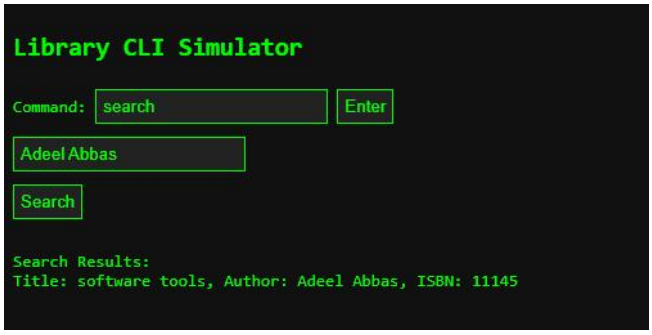
SUBJECT : HCI & CG LAB

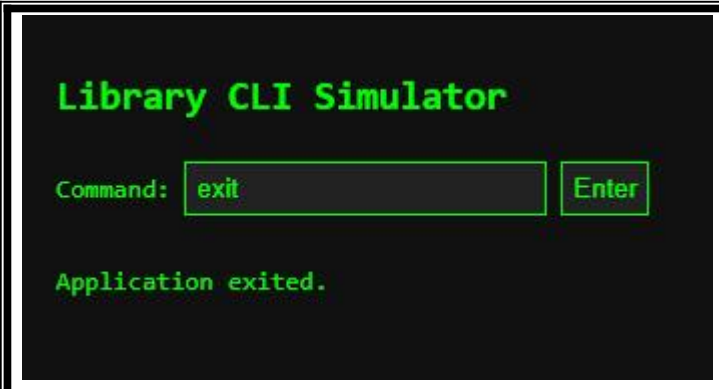
CLI and Menu-Based Interface

1. Command-Line Interface (CLI):

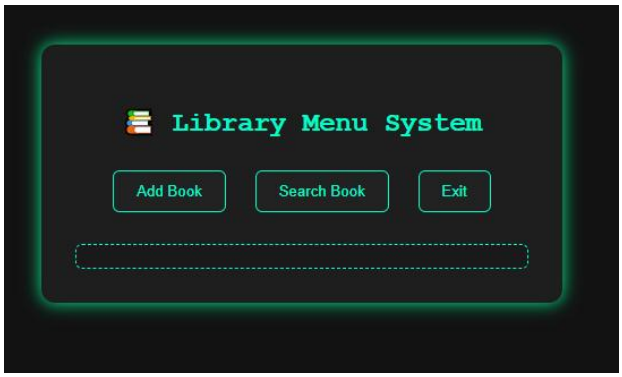


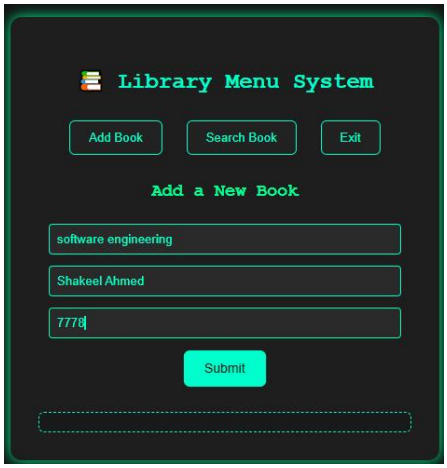


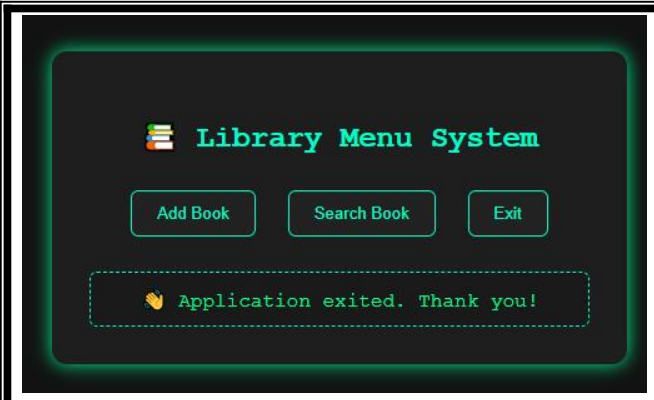




2. Menu-Based Interface.

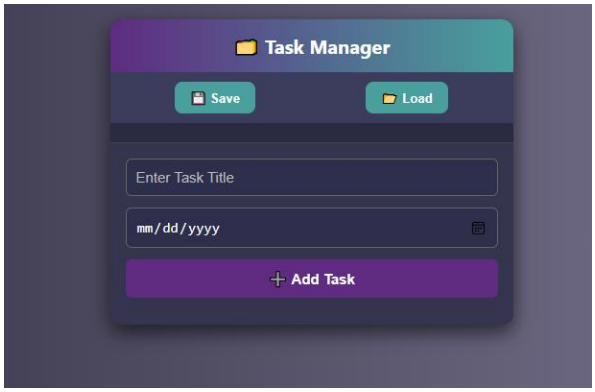


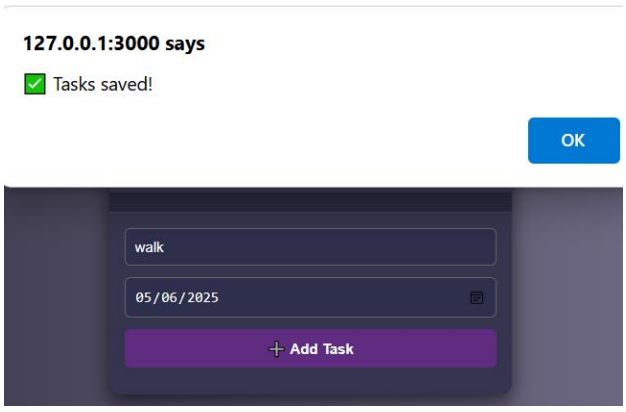


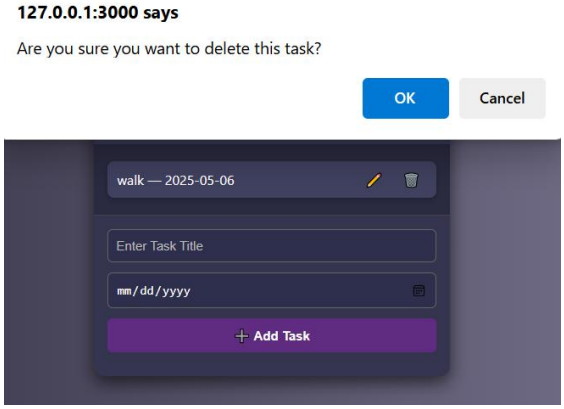


Designing WIMP and Direct Manipulation Interfaces

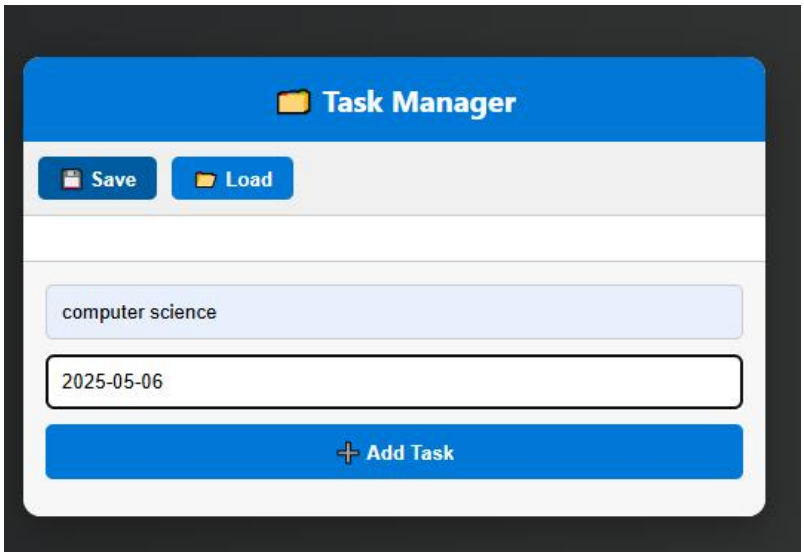
WIMP Interface:







Direct Manipulation Interface:



THE END

LAB # 4

NAME : ADEEL ABBAS

SAP ID : 56157

SUBJECT : HCI & CG LAB

Activity 1: Attention and Distraction in User Interfaces.

Objective:

To analyze how attention shifts due to external stimuli and to design a UI prototype that minimizes distractions.

```
import tkinter as tk

import threading

import time

import random

def show_popup():

    popup = tk.Toplevel(root)

    popup.title("Notification")

    tk.Label(popup, text="New Message!").pack()

    popup.after(2000, popup.destroy)

def random_popups():

    while True:

        time.sleep(random.randint(3, 8))

        root.after(0, show_popup)

root = tk.Tk()

root.title("Attention Test")
```

```
tk.Label(root, text="Read the text carefully and ignore popups.").pack()

threading.Thread(target=random_popups, daemon=True).start()

root.mainloop()
```

Expected Outcome:

Students will understand how distractions affect attention.

A UI redesign will be proposed to minimize distractions.

Activity 2: Perception and Recognition in UI Design:

To research how visual signals such as colors and icons improve user recognition and interaction efficiency**.**

```
import matplotlib.pyplot as plt

import numpy as np

import random

data = np.random.rand(10, 10)

plt.imshow(data, cmap=random.choice(['coolwarm', 'viridis', 'plasma']))

plt.colorbar()

plt.title("Heatmap of UI Recognition")

plt.show()
```

Expected Outcome:

Students will learn how color and icon design influence recognition and user experience.

Activity 3: Memory and Automation in User Interfaces.

```
from selenium import webdriver

from selenium.webdriver.common.keys import Keys

import time

driver = webdriver.Chrome()
```

```
driver.get("https://example.com/login")

time.sleep(2)

username = driver.find_element("name", "username")

password = driver.find_element("name", "password")

username.send_keys("testuser")

password.send_keys("testpassword")

password.send_keys(Keys.RETURN)

time.sleep(2)

driver.quit()
```

Expected Outcome:

Students will understand how automation aids in memory retention and improves user efficiency in repetitive tasks.

LAB # 5

NAME : ADEEL ABBAS

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SUBJECT : HCI & CG LAB

Activity 1: Usability Testing

Pair up students, with one acting as the user and the other as the observer.

To divide students into pairs for Usability Testing:

Pairing: Randomly assign students into pairs (user and observer).

Roles:

User: Performs tasks (e.g., transferring money).

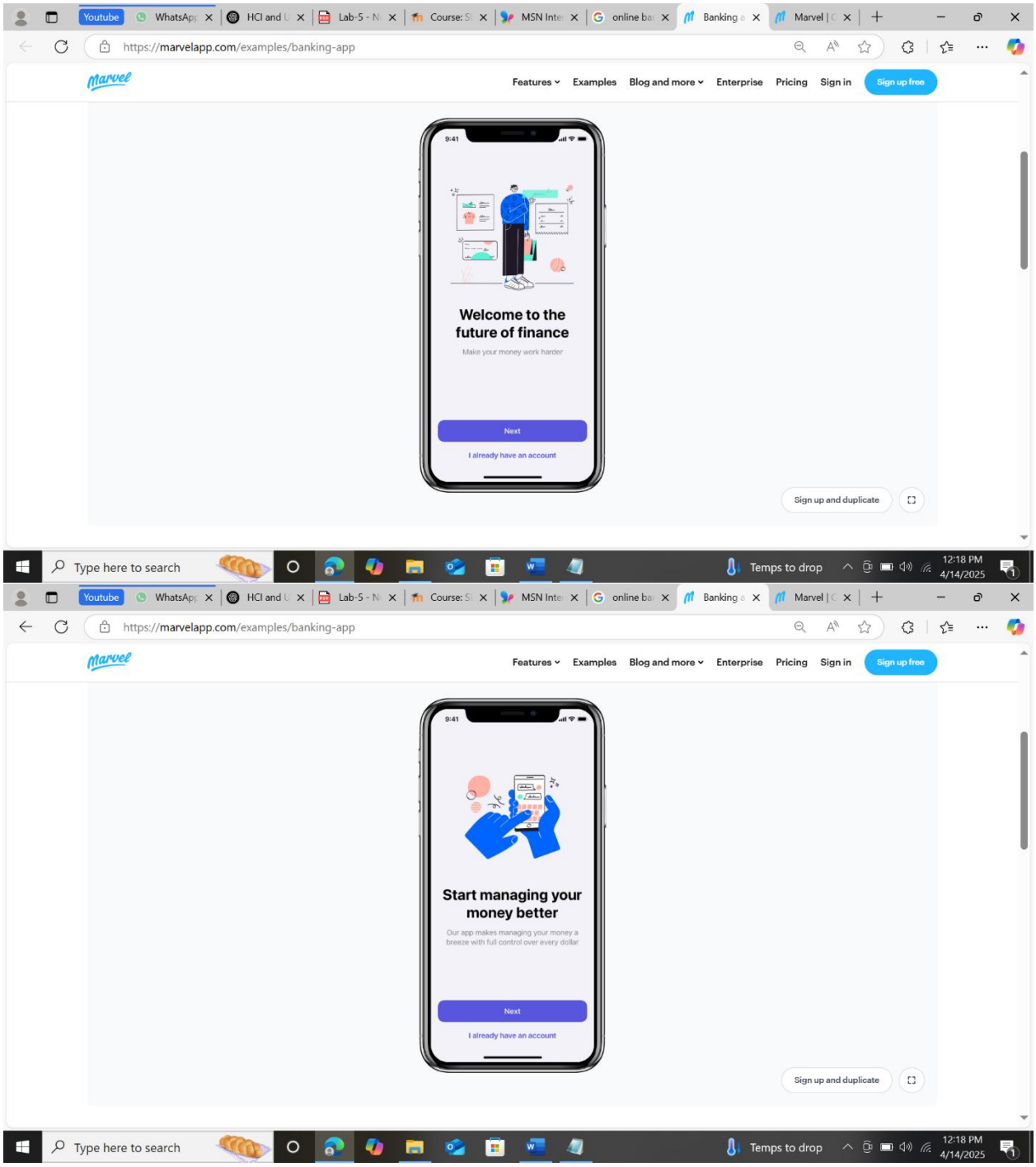
Observer: Watches, takes notes, and identifies issues.

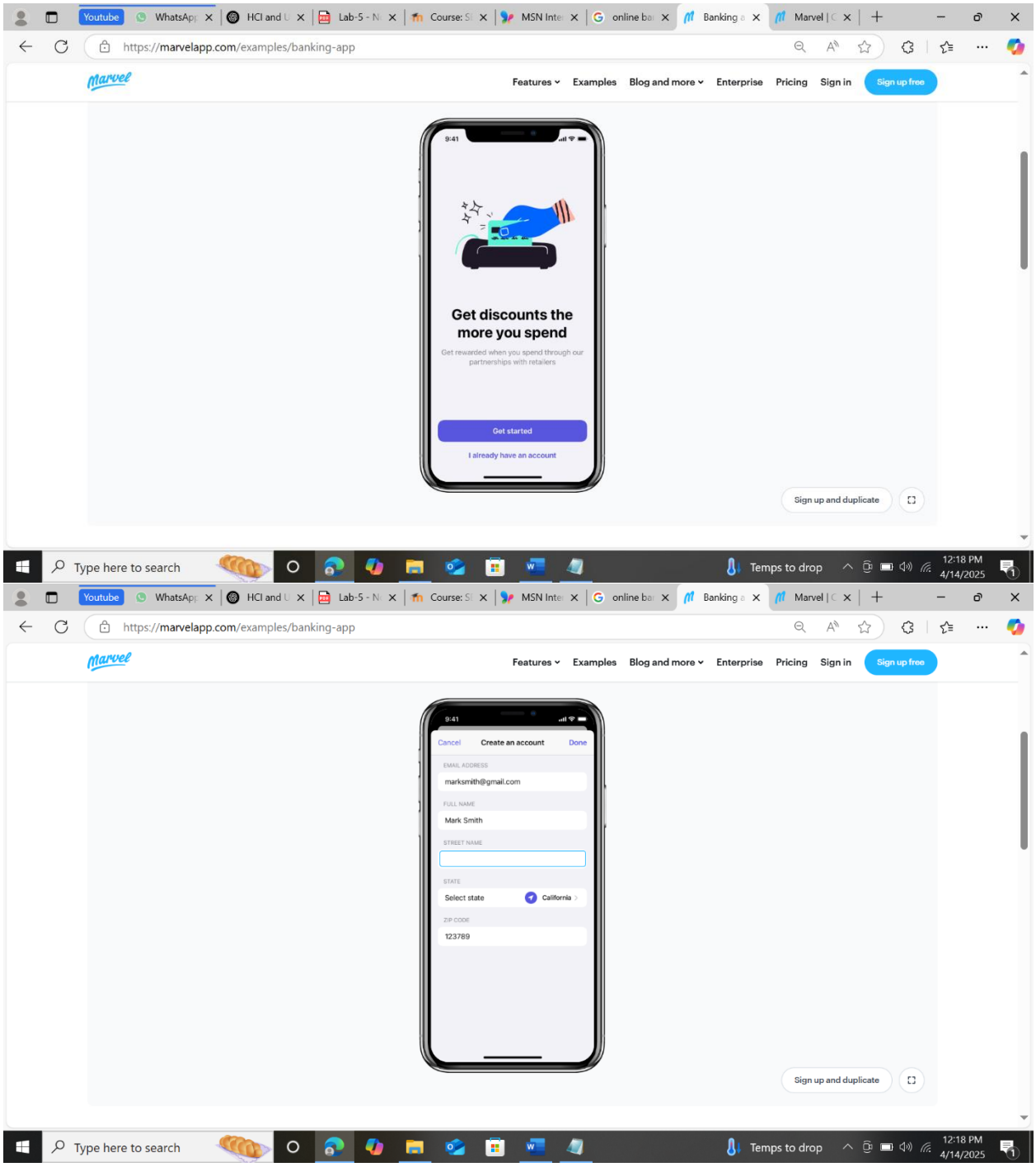
Instructions:

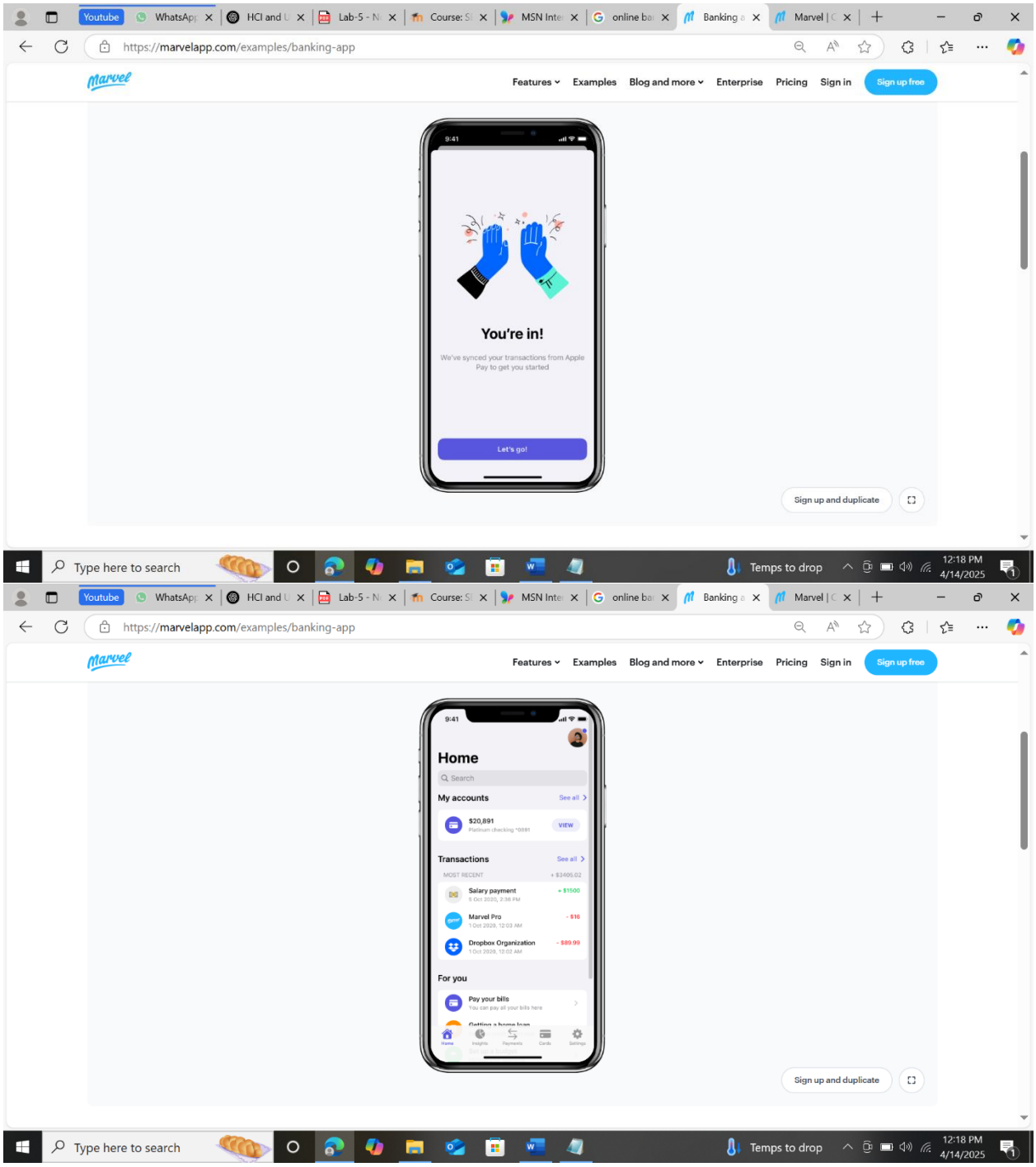
The user performs specific tasks.

The observer notes actions, confusion, and possible improvements.

Provide a simple online banking system prototype (e.g., a mockup or a low-fidelity prototype).


https://marvelapp.com/examples/banking-app
Features
Examples
Blog and more
Enterprise
Pricing
Sign in
Sign up free
9:41
Welcome to the future of finance
Make your money work harder
Next
I already have an account
Sign up and duplicate
Type here to search
Temps to drop
12:18 PM
4/14/2025
https://marvelapp.com/examples/banking-app
Features
Examples
Blog and more
Enterprise
Pricing
Sign in
Sign up free
9:41
Start managing your money better
Our app makes managing your money a breeze with full control over every dollar
Next
I already have an account
Sign up and duplicate
Type here to search
Temps to drop
12:18 PM
4/14/2025


https://marvelapp.com/examples/banking-app
Features
Examples
Blog and more
Enterprise
Pricing
Sign in
Sign up free
9:41
Get discounts the more you spend
Get rewarded when you spend through our partnerships with retailers
Get started
I already have an account
Sign up and duplicate
Type here to search
Temps to drop
12:18 PM
4/14/2025
Cancel
Create an account
Done
EMAIL ADDRESS
marksmith@gmail.com
FULL NAME
Mark Smith
STREET NAME
STATE
Select state
California
ZIP CODE
123789



Short Answer:
Watch how the user uses the system. Write down any problems they face, like confusion on what to click, wrong entries, or delays in finding options.

Example Notes:

- User was confused about where to find the "Transfer Money" button.
- User didn't understand the error message when leaving the amount field blank.
- Took time to find the confirmation button after filling out the form.

Talk together about what problems were observed and how the user felt using the system. Share ideas for improving the design.

Activity 2: Mental Model Mapping

- Provide students with a blank sheet of paper or a digital tool (e.g., MindMeister).

Mental Model Map – Online Shopping Platform

Accurate Aspects:

- **Product Search**: I know how to use the search bar to find products.
- **Add to Cart**: I understand how to add products to the cart.
- **Checkout Process**: I know I need to enter my address and payment method.
- **Order Tracking**: I can track my order status (Processing, Shipped, Delivered).

Incomplete Aspects:

- **Return Policy**: I'm unsure about how long I can return an item.
- **Delivery Time**: I don't clearly know how estimated delivery time is calculated.
- **Payment Security**: I'm not sure how my credit card details are protected.

Inaccurate Aspects:

- **Instant Order Confirmation**: I used to think orders are confirmed the moment I pay (but there's usually a short delay).

Stock Availability**: I assumed that items in the cart remain in stock until I buy them (but they can go out of stock anytime).**

LAB # 6

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SUBJECT : HCI & CG LAB

Activity 1: Redesigning the Issues-Evaluators Matrix

Issues-Evaluators Matrix is applied to aggregate usability evaluation findings from several evaluators to determine individual usability issues and prevent duplication. Each evaluator evaluates individually and then meets to consolidate their findings into a report. This matrix assists the designers in measuring each evaluator's performance by using evaluators as rows and usability issues discovered as columns. The matrix enables designers to see which evaluators find relevant issues and separate highly effective evaluators from less insightful ones. The method guarantees a more efficient and integrated usability report. Problem**:**

The current **Issues-Evaluators Matrix** (Figure 3.2) is confusing. Users can't easily interpret what the black and white grid means.

Solution:

Redesign the matrix using an **alternative design approach** from prototyping or HCI tools to make it more **clear and readable**.

Tool Suggestion:

Use Figma, Adobe XD, or a simple Python GUI (like Tkinter or PyQt), but here is the conceptual design idea:

Redesigned Matrix Approach:

- **Heatmap Visualization** instead of black-and-white dots.
  - **X-Axis**: Usability Issues
  - **Y-Axis**: Evaluators
  - **Color Intensity**: How many evaluators found that issue
    - Darker = More evaluators found it
    - Lighter = Few found it

Add-ons:

- Hover tooltips (in interactive tools) to show more info like the actual issue title and evaluator comments.
- Color legend for clarity.

Explanation:

The redesigned matrix uses a heatmap to indicate how many evaluators found each usability issue. This allows designers to instantly identify common issues (dark boxes) and also evaluate which evaluators are more thorough (rows with more marks). This is clearer than a binary dot matrix.

Activity 2: Chat Window Redesign

Redesign a basic chat window using **alternative design approaches** to make it:

- More aesthetic
- User-friendly
- Interactive

Redesign Plan

Key Features of Redesigned Chat UI:

1. **Modern UI Elements**:
    - Rounded corners
    - Minimalistic layout
    - Clear time stamps
    - User avatars
2. **Themes**:
    - Light/Dark Mode toggle
    - Custom color themes
3. **Interactions**:
    - Emoji reactions (, etc.)
    - Voice input option
    - Typing indicators
    - Read receipts
4. **Accessibility**:
    - Font size adjustment
    - High contrast mode
5. **Extra Features**:
    - File sharing (images, docs)
    - Message edit/delete
    - Search messages

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LAB # 7

NAME : ADEEL ABBAS

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SUBJECT : HCI & CG LAB

How do Nielsen's heuristics contribute to a positive user experience?

Nielsen's heuristics are a set of **10 usability principles** developed by Jakob Nielsen that help guide designers in creating intuitive, user-friendly interfaces. They are widely used in Human-Computer Interaction (HCI) and contribute to a **positive user experience** in the following ways:

Evaluation Using Nielsen's Heuristics:

1. Visibility of System Status

- **What's good:** If the page shows loading indicators after clicking "Login," that's a positive.
- **Issue:** No feedback if login is taking too long.
- **Improvement:** Show a progress spinner or status message like "Logging in…"

2. Match Between System and the Real World

- **What's good:** Using familiar terms like "Username" and "Password."
- **Issue:** Technical terms like "credential error" may confuse users.
- **Improvement:** Use clear, human language—e.g., "Incorrect email or password."

3. User Control and Freedom

- **Issue:** No "Cancel" or "Back" option.
- **Improvement:** Add a "Cancel" link or make browser back button behavior smooth and predictable.

4. Consistency and Standards

- **What's good:** Common layout (fields on top, buttons below).
- **Issue:** Different wording for similar actions across the site (e.g., "Sign In" vs. "Login").

- **Improvement:** Use consistent terminology throughout.

5. Error Prevention

- **Issue:** Users can click "Login" with empty fields.
- **Improvement:** Disable the button until required fields are filled; validate input formats.

6. Recognition Rather Than Recall

- **What's good:** “Remember Me” checkbox helps reduce effort next time.
- **Issue:** Users may forget their username/email format.
- **Improvement:** Provide suggestions (e.g., autofill or saved emails).

7. Flexibility and Efficiency of Use

- **Issue:** No keyboard shortcuts or social login options.
- **Improvement:** Add keyboard support (e.g., Enter key submits form), and optional login via Google or Facebook.

8. Aesthetic and Minimalist Design

- **What's good:** Simple, focused design is common.
- **Issue:** Too many links ("Forgot?", "Sign Up", "Help", etc.) can clutter the interface.
- **Improvement:** Prioritize the main action (Login) and visually downplay secondary ones.

9. Help Users Recognize, Diagnose, and Recover from Errors

- **Issue:** Error messages may be vague or disappear too quickly.
- **Improvement:** Show clear, persistent errors in red, like: “Password must be at least 8 characters.”

10. Help and Documentation

- **Issue:** No help or FAQ link nearby.
- **Improvement:** Add a small help icon with a tooltip or link to FAQs near the login area.

LAB # 8

NAME : ADEEL ABBAS
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SUBJECT : HCI & CG LAB

Exercises:

Heuristic Evaluation: Evaluate an existing website or application using Nielsen's 10 usability heuristics.

Condensed heuristic evaluation of the **Instagram mobile app** using **Nielsen's 10 heuristics**:

Instagram Heuristic Evaluation (Short Version)

Heuristic	Evaluation	Suggestion
1. Visibility of System Status	Loading and activity indicators are clear.	Add confirmation for uploads.
2. Match with Real World	Familiar terms like "Stories" and "Reels."	Use tooltips for less obvious icons.
3. User Control & Freedom	Back and undo are available.	Add undo for post deletions.
4. Consistency & Standards	Icons and UI are consistent.	Standardize Reels/Stories UI.
5. Error Prevention	Warnings before discards.	Improve upload error prevention.
6. Recognition vs Recall	Navigation is icon-heavy.	Show recent interactions (e.g., watched Reels).
7. Flexibility & Efficiency	Supports saved items, quick access.	Add voice/gesture controls.

Heuristic	Evaluation	Suggestion
8. Aesthetic & Minimalist Design	Clean and media-focused.	Separate ads more clearly.
9. Recover from Errors	Some unclear error messages.	Add clearer recovery suggestions.
10. Help & Documentation	Help exists in settings.	Provide contextual help pop-ups.

User Interview: Conduct an interview with a potential user to understand their needs and goals for a specific task or application.

User Interview Summary

- **User:** Ayesha, 23, University Student
- **Goal:** Track daily expenses easily
- **Current Method:** Notes app & Google Sheets
- **Pain Points:**
  - Forgetting to log expenses
  - Manual categorization
  - No summaries or reminders

Wants in an App:

- Simple and clean interface
- Auto sync with bank
- Visual summaries (charts)
- Spending alerts and goal tracking

Wireframing: Create a wireframe for a simple application or website.

Here's a **simple wireframe description** for a **Budget Tracker App** — a minimal personal finance app.

Wireframe: Budget Tracker App (Mobile)

1. Home Screen

- **Top Bar**: App name + Profile icon
- **Main Area**:
  - Monthly Balance Summary (e.g., "This Month: ₹12,300 left")
  - Pie Chart of Expenses (Categories: Food, Travel, Bills, etc.)
- **Buttons**:
  - Add Expense
  - View Reports
  - Settings

2. Add Expense Screen

- **Fields**:
  - Amount (₹)
  - Category (Dropdown: Food, Travel, Bills, etc.)
  - Note (Optional)
  - Date (Calendar Picker)

- **Button**: Save Expense

3. Reports Screen

- **Tabs**: Daily | Weekly | Monthly
- **Graphs**: Bar or Line chart for expenses over time
- **List**: Expense breakdown by category

4. Navigation (Bottom Bar)

- Home
- Add
- Reports

Usability Testing Plan: Develop a plan for conducting usability testing for a specific application or website.

Here's a **concise Usability Testing Plan** for a **Budget Tracker Mobile App**:

Usability Testing Plan

1. Objective:
To evaluate the ease of use, clarity, and functionality of the Budget Tracker App and identify usability issues.

2. Target Users:

- Age: 18–35
- Students & young professionals
- Comfortable with smartphones
- Interest in budgeting or personal finance

3. Test Scenarios:
Participants will complete tasks like:

- Add a new expense
- View monthly report
- Set a spending limit
- Change category names
- Delete an old entry

4. Method:

- **Type:** In-person or remote moderated testing
- **Duration:** 20–30 minutes per session
- **Tool:** Figma prototype or working app
- **Data Collection:** Screen recording, notes, follow-up questionnaire
-

5. Metrics:

- Task success rate
- Time taken to complete tasks
- Number of user errors
- User satisfaction (post-test survey, e.g., SUS scale)
-
-

6. Test Environment:

- Quiet room or Zoom call
- Smartphone or emulator

7. Post-Test Questions:

- What did you like/dislike?
- Was anything confusing?
- Any features you wish were there?

LAB # 9

NAME : ADEEL ABBAS
SAP ID : 56157
SUBJECT : HCI & CG LAB

1. Usability Issues Identified Based on Nielsen's 10 Heuristics

Heuristic	Feature	Violation Description	Severity
Visibility of System Status	Upload Cover Photo	No clear success confirmation after upload	Major
Match Between System and Real World	Change Password	"Security Settings" label is unclear for some users	Minor
User Control and Freedom	Add Friend	No immediate undo button after sending request	Major
Consistency and Standards	Update Post	Edit and delete icons vary in different views	Minor
Error Prevention	Change Password	No warning before saving weak passwords	Major
Recognition Rather Than Recall	Search a Person	No autocomplete suggestions if history is cleared	Minor
Flexibility and Efficiency	Upload Cover Photo	No drag-and-drop or shortcut available	Minor
Aesthetic and Minimalist Design	Timeline Post	Excess icons when editing posts	Minor

		clutter the interface	
Help Users Recognize and Recover from Errors	Login / Password	Vague message like “Something went wrong” on error	Critical
Help and Documentation	Change Password	Support content is buried deep in settings	Major

2. User Evaluation Summary

Question (Summary)	Majority Response
Clear feedback on actions	Sometimes
Easy-to-understand terms	Somewhat clear
Can undo/cancel actions easily	Somewhat easy
Consistent button behavior	Sometimes
Warnings before irreversible actions	Sometimes
Helpful search suggestions	Somewhat helpful
Availability of shortcuts	Somewhat efficient
Interface cluttered or minimal	Somewhat cluttered
Clear error messages	Somewhat clear
Ease of finding help	Somewhat easy

3. Recommendations for Improvements

- Add a visible “Undo” option after sending friend requests.
- Improve feedback messages after actions (e.g., "Cover photo updated successfully").
- Include autocomplete suggestions in search even when history is cleared.
- Ensure uniformity in icons/buttons across all sections.
- Enhance error descriptions with clear solutions.
- Move help resources to be more easily accessible in one tap.

4. Conclusion

While Facebook performs reasonably well on several usability heuristics, specific features like error recovery, feedback clarity, and user control can be enhanced. This evaluation aligns user experiences with theoretical heuristics, reinforcing the importance of design consistency and usability testing.

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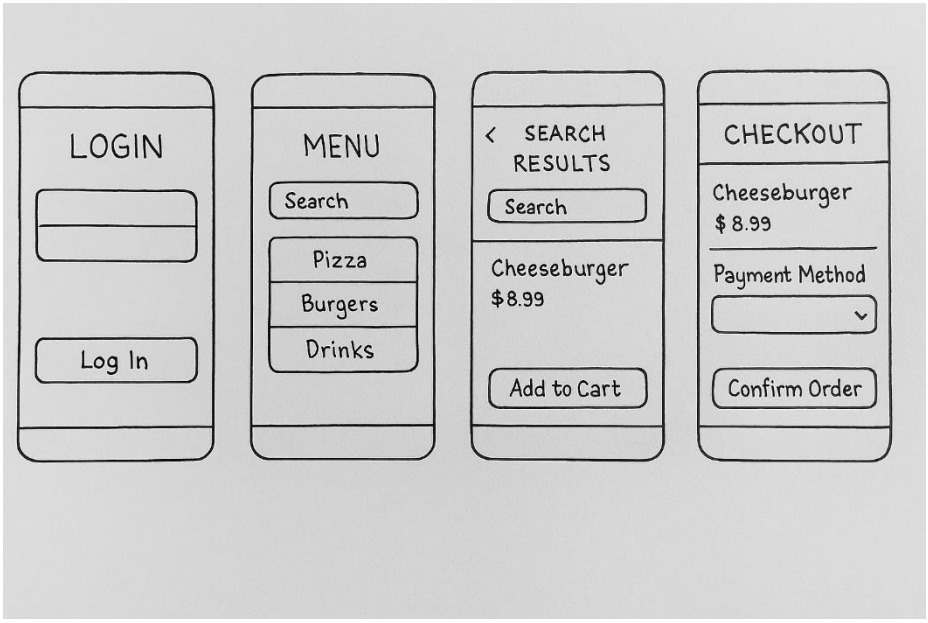
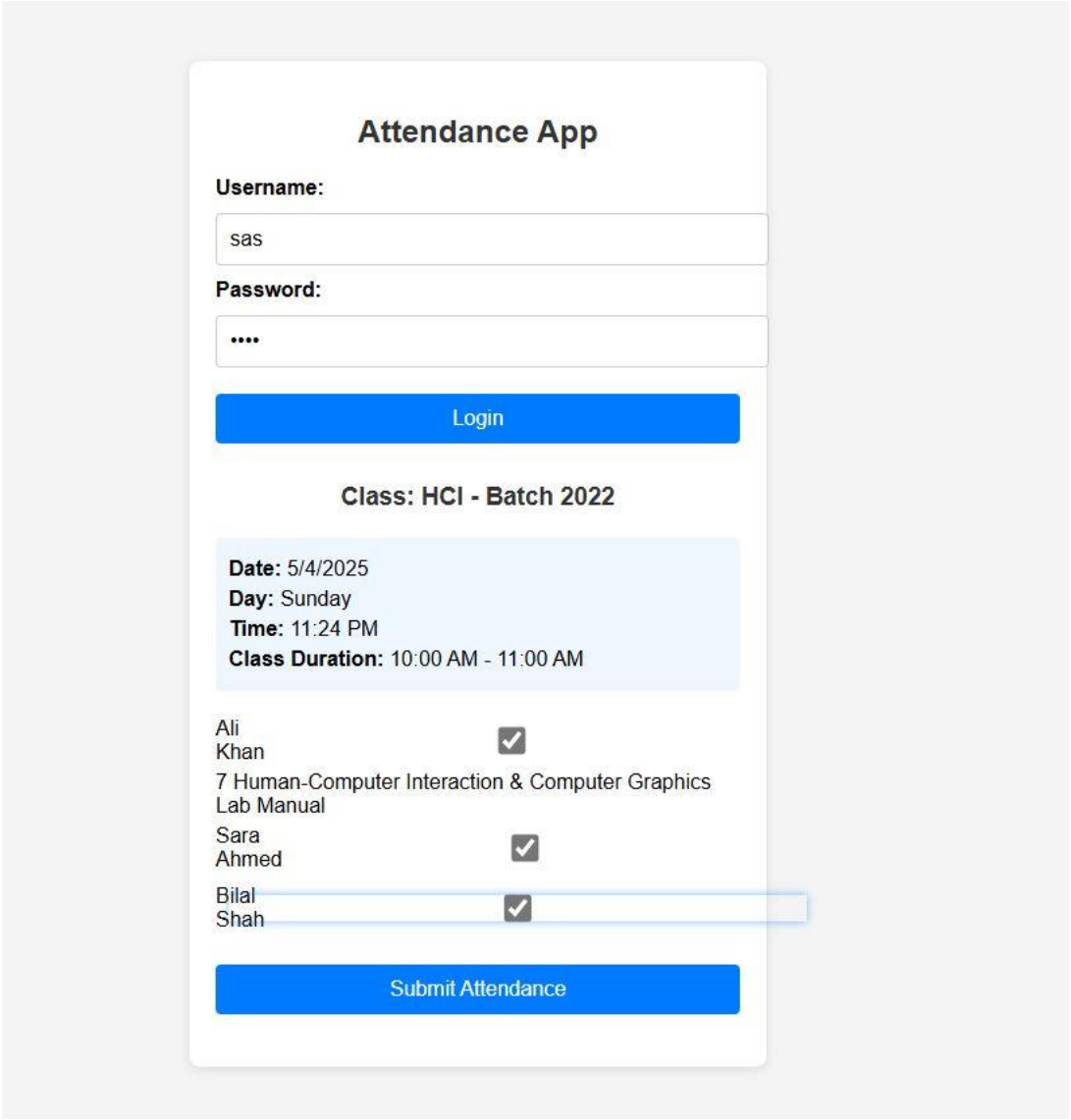
LAB # 10

NAME : ADEEL ABBAS

SAP ID : 56157

SUBJECT : HCI & CG LAB




Attendance App
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Login
Class: HCI - Batch 2022
Date: 5/4/2025
Day: Sunday
Time: 11:24 PM
Class Duration: 10:00 AM - 11:00 AM
Ali Khan
7 Human-Computer Interaction & Computer Graphics Lab Manual
Sara Ahmed
Bilal Shah
Submit Attendance

LAB # 10

NAME : ADEEL ABBAS
SAP ID : 56157
SUBJECT : HCI & CG LAB

Task 1: Persona Creation (Individual Work)

Persona 1: Sarah (The Busy Professional)

Name: maria
Photo:

Age: 30
Occupation: Marketing Manager
Goals: Wants quick, healthy meal options with minimal effort.
Frustrations: Limited time, dislikes long delivery times.
Tech Use: Uses smartphone frequently, prefers apps with one-click ordering.

Persona 2: John (The Elderly User)

Name: Johnson
Photo:

Age: 70
Occupation: Retired
Goals: Wants easy-to-use app for meal ordering with voice assistance.
Frustrations: Small text, complex navigation, difficulty with new technology.
Tech Use: Limited smartphone use, prefers simple, large buttons and voice commands.

Task 2: Applying Personas in Design (Group Work)

Sarah (The Busy Professional)

Design Features:
- Add a "Favorites" section for quick reordering.
- Implement "One-Click Ordering" for quick, seamless purchases.
- Display healthy meal options on the home screen.
- Use time-based recommendations for quick meal options based on time of day.

John (The Elderly User)

Design Features:
- Use larger buttons for easy interaction.
- Add voice-assisted ordering to make navigation easier.
- Implement a simplified UI with fewer steps to place an order.
- Provide larger text and high-contrast colors for readability.

Wireframe Sketches

Sarah: Wireframe should include a "Favorites" section, quick reorder buttons, and healthy options highlighted on the home screen.
John: Wireframe should show large buttons, voice-assistance, and simplified navigation with prominent features for easy access.

Deliverables

1. Two well-defined personas (Sarah and John) in PDF or Word format.
2. A report explaining design decisions based on personas.