

University of M'sila

Faculty of Mathematics and Computer Science

Department of Computer Science

Mobile web design

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1. Introduction to Mobile Ergonomics

- Mobile ergonomics = “Don’t adapt your body to the phone—adapt the phone to your body.”
- Mobile ergonomics is the practice of using smartphones and tablets in ways that reduce strain on your body—especially your neck, hands, and eyes.
- **mobile constraints:**
 - Small screens
 - Touch input
 - Context of use (walking, one-handed use, distractions)
- **What it focuses on :Mobile ergonomics looks at how you:**
 - Hold your phone or tablet
 - Position your head and neck
 - Use your thumbs and fingers
 - Manage screen time and breaks

Key principles of mobile ergonomics

- **1. Raise your screen**
 - Bring your phone closer to eye level instead of bending your neck down.
- **2. Keep your neck neutral**
 - Avoid prolonged head tilt. Even a small angle increases strain over time.
- **3. Switch hands and grip**
 - Don't overuse one thumb—alternate hands or use both thumbs when typing.
- **4. Take frequent breaks**
 - Short pauses reduce repetitive strain (e.g., every 20–30 minutes).
- **5. Support your arms**
 - Rest elbows on a surface when possible to reduce shoulder load.

- Mobile vs Desktop
- **Mobile:**
 - Small screen
 - Touch input
 - On-the-go
- **Desktop:**
 - Large screen
 - Mouse + keyboard
 - Stable environment

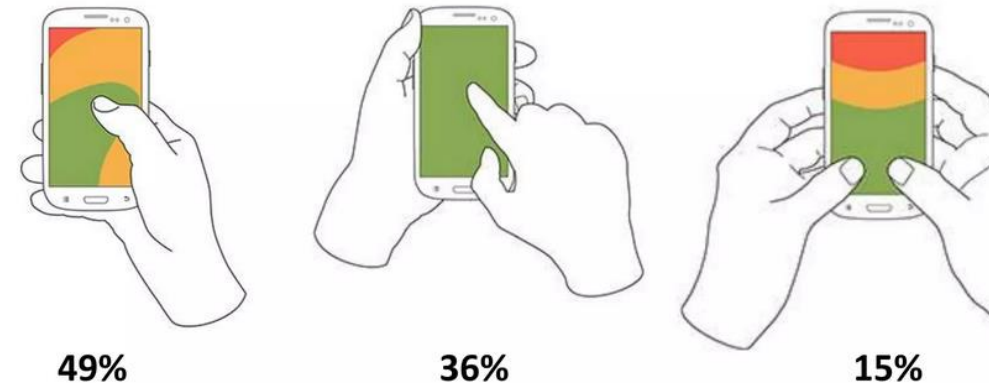
Why It Matters?

- Content:
 - 60%+ of web traffic is mobile
 - Users abandon slow or hard-to-use interfaces
 - Poor ergonomics = more errors + lower engagement
- Example:
- Hard-to-reach buttons → fewer clicks → lost conversions

Human Factors & Mobile Behavior

Thumb zones & reachability

- **One-handed vs two-handed usage;** The study revealed three primary grip patterns among mobile users:
 - One-handed grip - 49% of observed users held their phone with one hand
 - Cradling grip - 36% held the device in one hand while using a finger or thumb from the other hand
 - Two-handed grip - 15% used both hands simultaneously
- **Natural thumb movement areas :**
 - Green zone (easy reach): The bottom-center area where thumbs rest without strain—primary actions live here
 - Yellow zone (stretching required): Mid-screen sides that are reachable but require stretching
 - Red zone (awkward or impossible to reach): Top corners that are hard to reach, often demanding grip changes or two hands

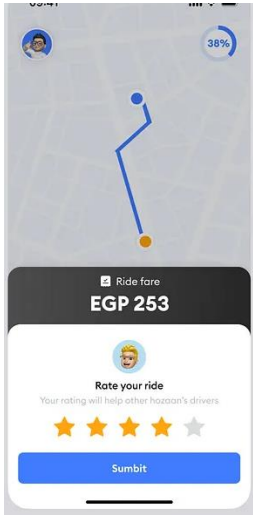


The easy to reach tap zones for various holds...

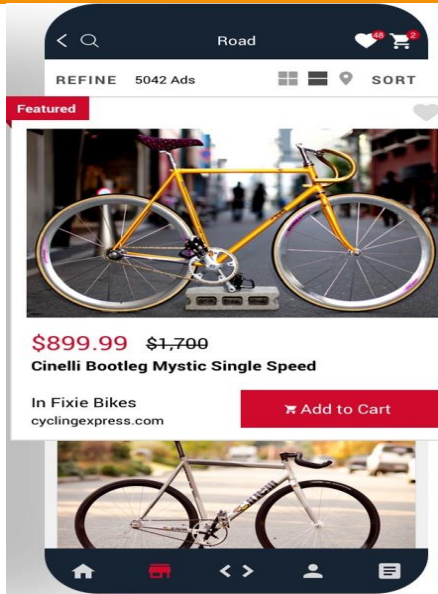
Mobile-Specific Thumb zone Design Considerations

- A thumb-friendly UI prioritizes bottom placement for key actions.
 - Place navigation bars at the bottom.
 - Use floating action buttons (FABs) for quick actions.
 - Position important CTAs near the middle-lower region, not at the top.
 - Avoid critical buttons in top corners
- The idea is to make interaction fluid—users shouldn't have to juggle their phones or switch hands to complete tasks.

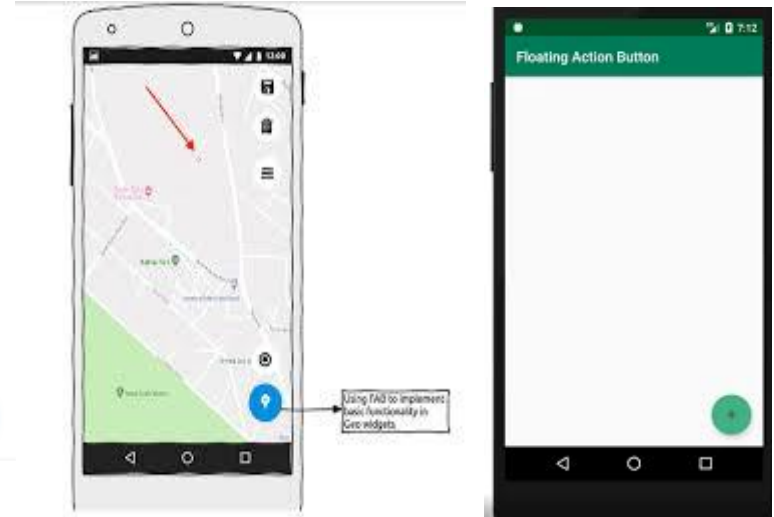
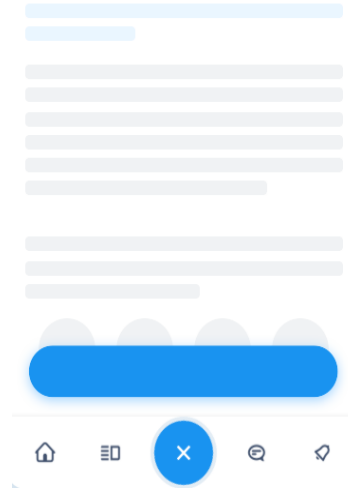
Mobile-Specific Thumb zone Design Considerations



Call To Action button (CTA)



NavBar



Floating Action Buttons (FABs)

Screen Design & Layout

- Responsive vs adaptive design
- Visual hierarchy on small screens
- Content prioritization:
 - Above-the-fold essentials
 - Grid systems for mobile
 - Safe areas (notches, rounded corners)

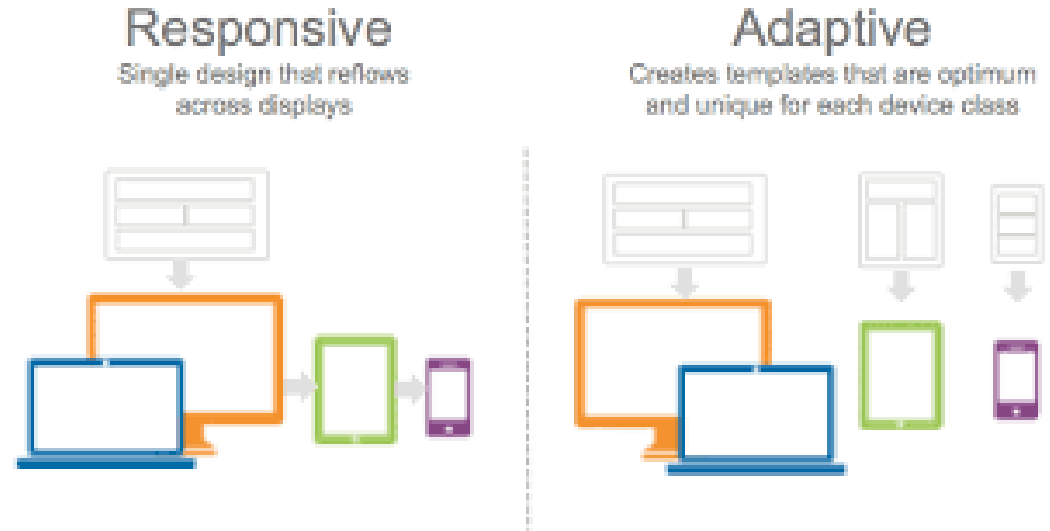
1. Responsive vs adaptive design

- **A. Responsive Design**

- A **responsive** website is flexible, it adjusts its layout based on the available screen space. It does this by changing the placement of design elements to fit the screen size.

- **B. Adaptive Design**

- An adaptive website changes its layout based on the device's screen size. An adaptive site has multiple fixed layouts that are served based on the device being used.



2. Screen Design & Layout- visual hierarchy on small screens

- **Visual hierarchy on small screens**
 - visual hierarchy ensures users can instantly:
 - Understand content
 - Identify priorities
 - Take action quickly
- Because of limited space, hierarchy must be stronger and simpler than on desktop.

2.1 Screen Design & Layout- visual hierarchy on small screens

- **Clear Priority Structure:** Organize content in order of importance:
 1. Primary goal (e.g., “Buy”, “Submit”)
 2. Supporting info
 3. Secondary actions
- **Typography Scaling**
 1. Large, bold headings = attention
 2. Medium subheadings = structure
 3. Small text = details

2.1 Screen Design & Layout- visual hierarchy on small screens

- **Contrast & Focus** : Use color and contrast to highlight actions:
 1. Primary button → high contrast
 2. Secondary → subtle
- **Spacing & Grouping**
 1. Group related elements closely
 2. Separate sections with whitespace
- **Single-Column Layout**
 1. Vertical flow (top → bottom)
 2. Avoid side-by-side content
- **Progressive Disclosure**: To prevent "information overload," only show the user what they need right now
 - Use "Read More" links, accordions, or tabbed navigation to hide secondary details.

- Touch Interaction Design is about designing interfaces that people can tap, **swipe**, **drag**, and **gesture** on comfortably and accurately—especially on mobile devices.
- Unlike mouse-based interfaces, touch relies on:
 - Fingers (less precise than a cursor)
 - Direct manipulation (you touch what you interact with)
 - Gestures instead of clicks
-  So design must account for human limitations and natural movement.

- **Key Principles**

- 1. Finger-Friendly Targets

- Buttons must be large enough to tap easy
- Recommended size: ~44-48 px

- 2. Spacing Between Elements

- Avoid placing buttons too close together
- Provide enough padding

- 3. Gesture Simplicity

- Use intuitive gestures:
 - Tap → select
 - Swipe → navigate/delete
 - Pinch → zoom
 - Long press → additional options

- **Key Principles**

- 5. Immediate Feedback

- Every touch should produce a response:
 - Button highlights
 - Vibration (haptic feedback)
 - Animations

-  Confirms the action was successful.

- 6. Response Time

- Interactions should feel instant (<100 ms ideally)
- Show loading indicators if needed

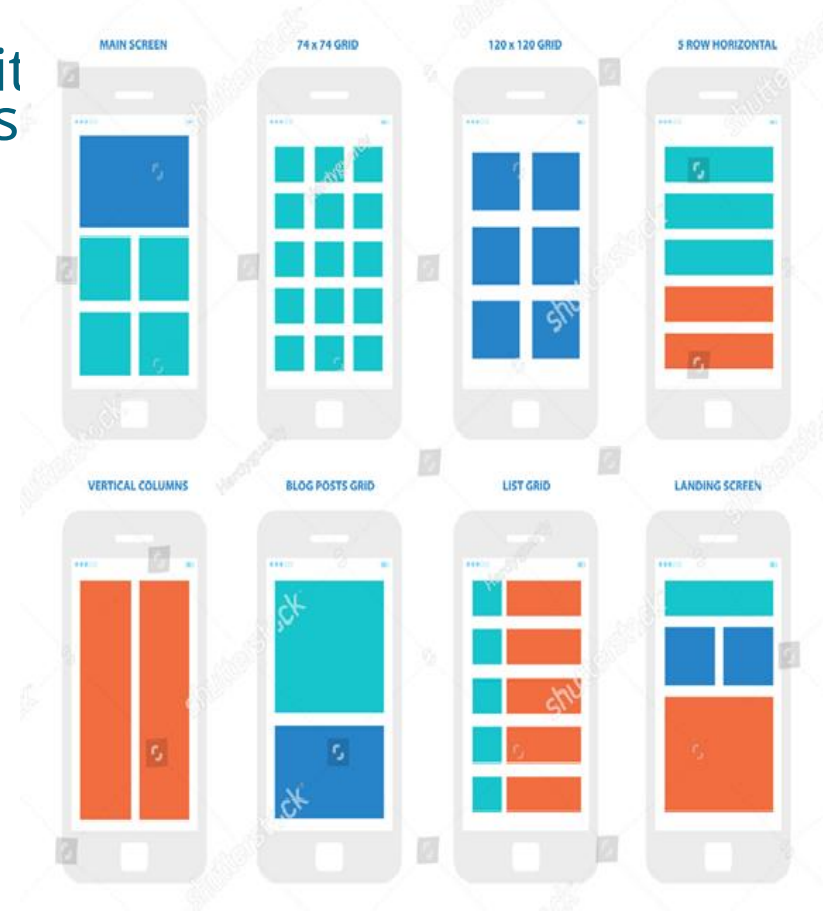
-  Prevents confusion or repeated taps.

3. Above-the-fold essentials (first screen impact)

- Above the fold” means everything visible before the user scrolls.
- What must go there
 - Clear value proposition (What is this? Why should I care?)
 - Primary call-to-action (CTA)
 - Key visual or context (image, product, headline)
- **Practical rules**
 - One main goal per screen
 - Avoid clutter (no competing CTAs)
 - Use hierarchy: headline → subtext → action
 - Keep critical info visible without scrolling

Grid systems for mobile (structure & consistency)

- A grid system organizes content so it feels balanced and predictable across devices.
- **Common mobile grid patterns**
 - Single-column layout (most common)
 - Best for readability and scrolling
 - 2-column grid
 - Used for galleries, cards, or products
 - Card-based design
 - Modular blocks that stack vertically



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 - Modular blocks that stack vertically
- **Key elements of a mobile grid**
 - Margins (outer spacing)
 - Gutters (space between columns)
 - Columns (content containers)

Safe areas (notches, rounded corners, system UI)

- Modern phones (like iPhones and many Android devices) have non-rectangular usable areas due to hardware and OS overlays.
- **What are safe areas?**
 - Zones where content is guaranteed not to be cut off or blocked by:
 - Notches / camera cutouts
 - Rounded screen corners
 - System bars (status bar, home indicator)

Safe areas (notches, rounded corners, system UI)

- **Design considerations**
 - Avoid placing buttons near edges
 - Add padding to critical UI elements
 - Respect system-defined safe area insets
- **Example risks**
 - CTA hidden behind gesture bar
 - Text cut off by curved corners
 - Icons blocked by notch

- **Key principles**

- Keep it short
- Only ask for essential information
- Single-column layout
- Easier to scan and interact with
- Smart input types
 - Email → email keyboard
 - Phone → numeric keypad
- Inline validation
- Show errors instantly (not after submit)
- Autofill & suggestions
 - Reduce typing effort

- **Ergonomic rules**

- Large input fields (easy tapping)
- Clear labels above fields (not placeholders only)
- Logical grouping of fields

key rules for ergonomic navigation

- **Rule #1: Thumb-Friendly Zones**
- Content:
 - Users mainly use one thumb
 - Best interaction zone = center & bottom of screen
- Design Tips:
 - Place key actions at the bottom
 - Avoid top-corner critical buttons
- Example:
 - Bottom navigation bar instead of top menu

key rules for ergonomic navigation

- **Rule #2: Large Touch Targets**
- Content:
 - Minimum size: 44 × 44 px
 - Space between buttons to prevent errors
- Why:
 - Fingers are not precise like a mouse
- Example:
 - Big “Buy Now” button instead of tiny link

key rules for ergonomic navigation

- **Rule #3: Readable Text**
- Content:
 - Minimum font size: 16px
 - Use high contrast
 - Avoid long paragraphs
- Tips:
 - Use short sentences
 - Break text into sections

key rules for ergonomic navigation

- **Rule #4: Clear Visual Hierarchy**
- Content:
 - Guide the user's attention
- Use:
 - Size
 - Color
 - Spacing
- Example:
 - Big headline → smaller description → CTA button

key rules for ergonomic navigation

- **Rule #5: Simple Navigation**
- Content:
 - Limit choices (3–5 main items)
 - Use familiar patterns
- Examples:
 - Bottom tabs
 - Hamburger menu for secondary items

key rules for ergonomic navigation

- **Rule #6: Fast Loading**
- Content:
 - Users expect fast performance
- Optimize:
 - Images
 - Code
 - Fonts
- Rule:
- 👉 Load under 3 seconds

key rules for ergonomic navigation

- **Rule #7: Provide Feedback**
- Content:
 - Show system response to user actions
- Examples:
 - Button changes color
 - Loading spinner
 - Success message

key rules for ergonomic navigation

- **Rule #8: One Task Per Screen**
- Content:
 - Avoid clutter
 - Focus user attention
- Example:
 - Checkout screen → only payment
 - Login → only essential fields

key rules for ergonomic navigation

- **Rule #9: Handle Connectivity Issues**
- Content:
 - Design for slow or no internet
- Include:
 - Offline mode
 - Retry buttons
 - Error messages

key rules for ergonomic navigation

- **Rule #10: Test on Real Devices**
- Content:
 - Simulators are not enough
- Test:
 - Different screen sizes
 - Real user interactions
- Why:
 - Touch behavior varies across devices

