A. Project Title: AR-Assist Pro

Concept: A mobile AR application that allows a remote expert to guide an on-site technician through complex machine repairs using real-time spatial annotations.

B. Full User Integration Workflow

1. Entry & Environmental Mapping (The Onboarding)

- **User Action:** The technician opens the Android app and points the camera at the machine.
- **System Logic:** The app uses ARCore (Android) or Spatial Mapping to scan the physical surfaces and recognize the machine's geometry.
- **UI Element:** A "Scanning Progress" circle appears on the screen, followed by a green mesh overlay to confirm the environment is "anchored".

2. Expert Connection & "See-What-I-See"

- **User Action:** The technician taps a "Request Expert" button.
- **Integration:** A secure RTC (Real-Time Communication) link is established, sharing the live video feed with the remote expert.
- **UI Element:** A small "Expert Online" orbiter panel appears at eye level (0.75m – 1.75m depth) to ensure user comfort.

3. Spatial Annotation & Collaborative Repair

- **User Action:** The remote expert identifies a faulty valve and "draws" an arrow on their desktop screen.
- **AR Integration:** The arrow appears in the technician’s mobile view, anchored to the physical valve. Even if the technician moves the phone, the arrow stays locked on the part.
- **UI/UX Feature:** A **Floating Checklist** appears in the "Mid-Field" view, allowing the technician to mark tasks as "Complete" using voice commands or gestures.

4. IoT Data Visualization (The "Advanced" Layer)

- **User Integration:** The system fetches real-time sensor data from the machine (via MQTT/IoT).
- **UI Element:** A floating "Digital Twin" readout appears above the motor, showing the current temperature and RPM in high-contrast text for visibility in low-light environments.

5. Completion & Documentation

- **User Action:** The technician takes a "Spatial Photo" of the repair for the audit.
- **Integration:** The app captures the photo with the AR annotations still visible and automatically uploads it to the backend database.

C. Key UI/UX Principles Applied

- **Ergonomic Zones:** All interactive panels are placed at chest-to-eye height (15°–30° below eye level) to prevent "Gorilla Arm" fatigue.
- **Visual Hierarchy:** High-priority warnings use "Spatial Elevation" (32dp Z-depth) to pop out from the background.
- **Safety First:** The UI maintains "Visual Clear Space" in the center of the FOV so the user can always see the real-world hazardous parts of the machine.