**"Design a voice-activated piano pageturner with:**

1. **Core Hardware**:
   * Adafruit Feather ESP32 V2 (BLE HID + USB-CDC).
   * ICS-43434 I2S mic (16kHz/16-bit PCM, 64dB SNR).
   * 500mAh LiPo , AP2112-3.3V LDO.
   * Power latch: IRLML6402 (P-MOS) + 2N7002 (N-MOS) for zero off-current.
2. **Operation Modes**:
   * **Production Mode**:
     + Edge Impulse model runs on ESP32 (optimized with EON Tuner).
     + Listens for "page up/down" commands → BLE HID keystrokes.
     + Auto-shutdown after 10min inactivity (hardware latch).
     + ON LED (GPIO-controlled), blink LEDs for page turns.
   * **Development Mode**:
     + Button-triggered 1s audio snippets (16kHz/16-bit PCM) sent via USB-CDC
     + Long-press (>1s) enables streaming until release.
3. **Error Handling**:
   * "BAD AI" button saves last 1s PCM (from SpiRAM buffer) to SD as BAD\_<timestamp>\_<predicted\_label>.wav.
4. **Power Optimization**:
   * SD powered via MOSFETs (disabled when unused).
   * Hardware latching circuit cuts all power when off.
   * Battery is charged when powering the board via Feather’s USB port
5. **Additional Specs**:
   * 3.3V rail for all peripherals.
   * Recessed buttons to avoid accidental presses.
   * RGB LED for status (production/recording/BAD AI, recognized command).