Mini Server By ESP-32 ProtoType

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Notes

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1. Why ESP32 over Arduino?

For beginners, the **ESP32** is a massive upgrade over the traditional Arduino Uno:

- **Integrated WiFi/Bluetooth:** Unlike Arduino, the ESP32 has built-in wireless capabilities, making it a "web server out of the box."
- **Dual-Core Power:** It runs much faster (240MHz vs. 16MHz) and has significantly more memory (SRAM) to store complex HTML pages.
- **Storage:** It features "Preferences" and "SPIFFS/LittleFS" to store data permanently, even after power is lost.

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2. Setting Up the Arduino IDE

To program the ESP32, you need to add its "board definition" to the Arduino IDE:

1. **Open Arduino IDE:** Go to `File` > `Preferences`.
2. **Add Board Manager URL:** Paste this link into "Additional Boards Manager URLs": `https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json`
3. **Install ESP32:** Go to `Tools` > `Board` > `Boards Manager`. Search for "ESP32" and click **Install**.
4. **Select Your Board:** Go to `Tools` > `Board` > `ESP32` > **DOIT ESP32 DEVKIT V1**.

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3. Port Selection & Uploading

1. **Connect the ESP32:** Plug your DevKit into your PC via a Micro-USB or USB-C cable.
2. **Select Port:** Go to `Tools` > `Port` and select the one that appears (e.g., COM3 or /dev/ttyUSB0).
3. **Upload:** Click the **Upload** button (arrow icon).
    - *Note:* If you see "Connecting... ___", press and hold the **BOOT** button on the ESP32 board until the progress bar starts moving.

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4. IP Addresses vs. `.local` URLs

When the ESP32 connects to WiFi, it gets a dynamic IP address like `192.168.1.15`. Since these are hard to remember, we use **mDNS (Multicast DNS)**.

- **The Code:** `MDNS.begin("ashik")`
- **How to access:** Instead of typing the IP, you can simply type `http://ashik.local` in any browser connected to the same WiFi. This works on most modern phones and PCs automatically.

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5. The "Admin Panel" Feature

A common problem with ESP32 projects is that if you take it to a friend's house, you have to rewrite the code to change the WiFi SSID.

Our Solution: We've added a hidden route at `/admin`.

- Navigate to `http://ashik.local/admin`.
- Enter new WiFi credentials.
- The ESP32 saves these to its **Permanent Memory (Preferences)** and restarts. It will now connect to the new network without ever touching a computer!

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6. Hardware Vision: The "Mini Server" Device

To make this a professional standalone product, you can mount everything on a custom PCB.

Components Needed:

1. **ESP32 DevKit V1**
2. **I2C LCD Display (16x2):** Displays the IP address and status.
3. **TP4056 Charging Module:** To manage the Li-ion battery safely.
4. **3.7V Li-ion Battery:** To keep the server running portably.
5. **Slide Switch:** For On/Off control.

7. The Full "Mini Server" Code

Copy and paste this into your Arduino IDE. Ensure you have the **Preferences** and **ESPmDNS** libraries (they are usually built-in).

```
#include <WiFi.h>
#include <WebServer.h>
#include <ESPmDNS.h>
#include <Preferences.h>

Preferences preferences;
WebServer server(80);

// Default Credentials (used only if no settings are saved yet)
String ssid = "Al Amin Islam Ar";
String password = "ALAMINASR60";
```

```
// --- Main Portfolio HTML ---
const char index_html[] PROGMEM = R"rawliteral(
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Ashikul Islam | Portfolio</title>
  <style>
    :root { --bg: #ffffff; --text: #000000; --gray: #666; --border: #eee; }
    * { margin: 0; padding: 0; box-sizing: border-box; font-family: sans-serif; }
    body { background: var(--bg); color: var(--text); line-height: 1.5; }
    nav { position: fixed; top: 0; width: 100%; padding: 1rem 5%; display: flex; justify-content: space-between; background: rgba(255,255,255,0.95); border-bottom: 1px solid var(--border); z-index:100;}
    header { height: 80vh; display: flex; flex-direction: column; justify-content: center; padding: 0 10%; background: #fafafa; }
    h1 { font-size: 3rem; line-height: 0.9; margin: 1rem 0; }
    .btn { display: inline-block; padding: 0.8rem 1.5rem; background: #000; color: #fff; text-decoration: none; font-weight: bold; }
    section { padding: 3rem 10%; border-bottom: 1px solid var(--border); }
  </style>
</head>
<body>
  <nav><div class="logo"><b>ASHiK</b></div></nav>
```

```
  <header>
    <p>EEE & AI DEVELOPER</p>
    <h1>ASHIKUL ISLAM</h1>
    <p>B.Sc. in EEE | AI & RAG Solutions</p>
    <br><a href="/admin" class="btn">ADMIN PANEL</a>
  </header>
  <section id="about">
    <h2>About Me</h2>
    <p>Specializing in AI-driven solutions and power systems.</p>
  </section>
</body>
</html>
)rawliteral";

// --- Admin Panel HTML ---
const char admin_html[] PROGMEM = R"rawliteral(
<!DOCTYPE html>
<html>
<head>
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <style>
    body { font-family: sans-serif; display: flex; justify-content: center; background: #f0f0f0; padding: 20px; }
    .card { background: white; padding: 30px; border-radius: 12px; box-shadow: 0 4px 10px rgba(0,0,0,0.1); width: 300px; }
```

```
      input { width: 100%; padding: 10px; margin: 10px 0; border: 1px solid #ddd; }
      button { width: 100%; padding: 10px; background: #000; color: #fff; border: none; cursor: pointer; }
    </style>
</head>
<body>
    <div class="card">
      <h2>WiFi Settings</h2>
      <form action="/save" method="POST">
        <input type="text" name="n_ssid" placeholder="New WiFi Name" required>
        <input type="password" name="n_pass" placeholder="New Password" required>
        <button type="submit">Save & Restart</button>
      </form>
    </div>
</body>
</html>
)rawliteral";

void handleRoot() {
    server.send(200, "text/html", index_html);
}

void handleAdmin() {
    server.send_P(200, "text/html", admin_html);
}
```

```
void handleSave() {
  if (server.hasArg("n_ssid") && server.hasArg("n_pass")) {
    preferences.begin("wifi-creds", false);
    preferences.putString("ssid", server.arg("n_ssid"));
    preferences.putString("pass", server.arg("n_pass"));
    preferences.end();
    server.send(200, "text/html", "<h2>Restarting...</h2>");
    delay(2000);
    ESP.restart();
  }
}

void setup() {
  Serial.begin(115200);
  preferences.begin("wifi-creds", true);
  ssid = preferences.getString("ssid", ssid);
  password = preferences.getString("pass", password);
  preferences.end();

  WiFi.begin(ssid.c_str(), password.c_str());
  while (WiFi.status() != WL_CONNECTED) { delay(500); Serial.print("."); }

  MDNS.begin("ashik");
  server.on("/", handleRoot);
```

```
  server.on("/admin", handleAdmin);
  server.on("/save", HTTP_POST, handleSave);
  server.begin();

  Serial.println("\nServer Online!");
  Serial.print("URL: http://ashik.local | IP: ");
  Serial.println(WiFi.localIP());
}

void loop() {
  server.handleClient();
}
```

Modify the Main HTML Code part according to your choice. Enjoy