**Design Document for UV Exposure Recommendation Tool**

**Southern Skin Cancer Treatment Centers of America**

**Project Overview**

The goal of this tool is to provide personalized UV exposure recommendations for clients of Southern Skin Cancer Treatment Centers of America. This tool will allow clients to log their UV exposure and activities from the past five days, and then receive tailored recommendations for safe UV exposure for the next five days. The tool will pull real-time UV Index data for all locations in the United States, leveraging the Open-Meteo API to get accurate UV index readings.

This tool will help clients manage their UV exposure to minimize the risk of skin cancer by providing them with detailed, data-driven insights into their UV needs.

**System Overview and Key Features**

1. **User Input/Log Data:**
   * Clients will log their outdoor activities for the past five days, including duration of exposure, activity type (e.g., walking, hiking, swimming), and estimated UV exposure levels.
   * Based on this historical data, the system will calculate how much UV exposure the client can safely receive in the next five days.
2. **UV Exposure Recommendations:**
   * The system will provide tailored UV exposure recommendations for the next five days, considering the client’s previous UV exposure, skin type, and current environmental factors (e.g., UV index).
   * Recommendations will include suggested exposure times, necessary sun protection measures, and safety precautions based on UV levels.
3. **Real-time UV Index:**
   * The system will integrate with Open-Meteo API to retrieve the real-time UV index for any location in the U.S.
   * The UV index will be used to provide dynamic, location-specific recommendations.
4. **User Profiles:**
   * Clients will create personal profiles, including their skin type (based on the Fitzpatrick scale), age, and location, which will influence exposure recommendations.
   * Profiles will also store historical data such as past UV exposure levels and activity logs.
5. **Notifications/Alerts:**
   * Clients will receive notifications if they are approaching their recommended UV exposure limits for the day, and alerts if UV levels are high in their area.

**Functional Requirements**

1. **User Interface (UI):**
   * Client Dashboard: An easy-to-navigate interface displaying the following:
     + A history of the past five days of UV exposure activities.
     + Tailored recommendations for safe UV exposure for the next five days.
     + Real-time UV index data for the user’s location.
   * Activity Log: A user-friendly form where clients can log their outdoor activities, including:
     + Date of activity
     + Type of activity (e.g., exercise, walking, sports)
     + Time spent outdoors
     + Estimated UV exposure level (Low, Moderate, High)
   * UV Exposure Recommendations: Clear, actionable recommendations based on the user’s activity and UV index for the next five days.
   * Notifications/Alerts: Visual alerts when the client is nearing their safe UV exposure limit.
2. **Backend System:**
   * User Database: Store user profiles, activity logs, exposure history, and personal settings.
   * UV Exposure Calculation Engine: Use the client's past activity data, skin type, and current UV index to calculate safe UV exposure levels.
   * Integration with Open-Meteo API: Fetch the current UV index data for any location in the U.S.
   * Notification System: System that triggers notifications and reminders based on user settings and exposure limits.
3. **UV Exposure Recommendation Algorithm:**
   * The algorithm will be based on:
     + Skin Type: Different skin types (Fitzpatrick scale) have varying sensitivities to UV exposure.
     + Previous Exposure History: Account for how much UV the client has already received in the last 30 days.
     + UV Index: The real-time UV index will affect the recommended exposure time.
   * The recommendations will be personalized, such as:
     + Maximum safe exposure time for the day (e.g., "You can safely be outdoors for 15 minutes today").
     + Sunscreen, protective clothing, or other precautions based on UV levels (e.g., "Apply sunscreen with SPF 50" or "Wear a wide-brimmed hat").
4. **Real-Time UV Index Data:**
   * Open-Meteo API Integration: The tool will use the Open-Meteo API to fetch real-time UV index data for the client’s geographic location.
   * The API will provide data on the UV index, including forecasts for the upcoming days.
   * Data from Open-Meteo API will be refreshed periodically to ensure the UV Index is up to date.
5. **Notifications and Alerts:**
   * Alerts can be customized to remind users about logging activities, suggest sunscreen use, or notify if they are nearing safe exposure limits.
   * Users can opt into daily reminders to track outdoor activities and receive updates on UV index forecasts.

**Non-Functional Requirements**

1. **Scalability:**
   * The system must be able to handle a large user base as more clients sign up, with the ability to scale as needed to accommodate increased traffic.
2. **Security:**
   * User data (including personal details and medical information) must be encrypted both in transit and at rest.
   * The system must comply with HIPAA regulations to protect sensitive medical information.
3. **Performance:**
   * The tool should provide real-time UV index updates with minimal latency, even when retrieving data from the Open-Meteo API.
   * The recommendation system should be able to process user activity logs and generate recommendations within a few seconds.
4. **Reliability:**
   * The system must have a high uptime (99.9% availability).
   * Regular backups of user data should be performed to avoid data loss.
5. **Usability:**
   * The user interface should be intuitive and accessible to users of all ages, including those who are not tech-savvy.
   * Mobile-friendly design to support users accessing the tool on smartphones or tablets.

**System Architecture**

**Frontend:**

* Web Application: Built with a responsive framework like React or Vue.js.
  + Key features include user authentication, input forms for activity logs, and a dynamic display of UV index data and recommendations.
  + Mobile-responsive design using frameworks like Bootstrap or Material-UI.

**Backend:**

* RESTful API: Handles client requests, processes activity logs, and returns UV recommendations. The backend will also manage user profiles and exposure history.
  + Frameworks: Node.js with Express or Python/Django.
  + Database: PostgreSQL or MongoDB to store user profiles, activity logs, and historical data.
* **UV Index Integration:**
  + The backend will use Open-Meteo API to fetch the real-time UV Index data.
  + API calls will be made to the Open-Meteo service using the geographic coordinates (latitude/longitude) provided by the user’s profile.

**External Services:**

* Open-Meteo API: A free weather API service that provides global weather forecasts, including the UV Index, tailored for various locations. It will be used to gather real-time UV Index information for different regions across the U.S.

**Database:**

* A relational database like PostgreSQL to handle user data and activity logs, ensuring data consistency and fast access to historical data.
* Data model should include tables for:
  + Users: Storing personal information, skin type, and location.
  + Activity Logs: Recording past exposure activities, including time spent outdoors, activity type, and UV exposure levels.
  + Exposure Recommendations: Storing calculated recommendations for each user.

**User Flow**

1. **Sign-Up / Log-In:**
   * The user creates an account or logs in to the system, entering basic details such as age, skin type, and location.
   * Users can set notification preferences for daily reminders or alerts.
2. **Activity Logging:**
   * The user logs their outdoor activities for the past 5 days, including time spent outdoors, activity type, and UV exposure level.
3. **Real-Time UV Index:**
   * Based on the user's location, the system fetches real-time UV index data via the Open-Meteo API.
   * The user can view the current UV index for their location.
4. **Recommendations Display:**
   * The system calculates and displays UV exposure recommendations for the next five days.
   * This includes time limits for safe exposure, sunscreen recommendations, and other protective measures based on the UV Index.
5. **Notifications & Alerts:**
   * Users receive daily reminders to log their activities, and alerts if they are approaching safe UV exposure limits or if UV levels are dangerously high.

**Timeline & Milestones**

* **Phase 1: Requirements Gathering & Design (2 weeks)**
  + Meet with stakeholders to finalize requirements, gather feedback, and create design wireframes.
* **Phase 2: Backend & API Integration (4 weeks)**
  + Develop the backend system, integrate with Open-Meteo API, and implement user authentication and database schema.
* **Phase 3: Frontend Development (4 weeks)**
  + Develop the user interface, activity logging functionality, and UV recommendations display.
* **Phase 4: Testing & QA (2 weeks)**
  + Perform unit testing, integration testing, and user acceptance testing (UAT) to ensure the tool works as expected.
* **Phase 5: Launch & Marketing (2 weeks)**
  + Deploy the tool to production, market to clients, and gather feedback for future improvements.

**Risk Management**

* **Risk: Inaccurate activity logging by users.**
  + Mitigation: Provide helpful tips and examples of how to estimate UV exposure, and remind users to log activities consistently.
* **Risk: Open-Meteo API downtime or data inaccuracies.**
  + Mitigation: Have fallback mechanisms in place (e.g., caching of previous data), and monitor the API’s status to quickly address any issues.
* **Risk: Users not following UV exposure guidelines.**
  + Mitigation: Provide clear warnings and educational content on the dangers of overexposure, and offer regular alerts when users approach their exposure limits.

**Conclusion**

This UV Exposure Recommendation Tool will empower clients of Southern Skin Cancer Treatment Centers to make informed decisions about managing their UV exposure, ultimately helping reduce the risk of skin cancer. By leveraging the Open-Meteo API for real-time UV Index data and integrating personalized recommendations based on user activity logs, the tool will provide a comprehensive and practical solution for safe UV management.