***Medical Record App***

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***1-Functional Requirements:***

1. **User Registration and Authentication**

**Description:**

This feature allows patients and doctors alike to sign up securely. Users provide basic info and doctors add their license number. After sign-up, users verify their email. The system then checks their roles and ensures all info is correct and secure. 

* **Function Req.:**
* Users (patients or doctors) provide basic details like name, email, and password to create accounts.
* Additional info may be required:
* Patients can optionally add date of birth, gender, and medical history.
* Doctors may need to include their medical license number and specialty.
* Email verification is needed to activate accounts and ensure email validity.
* The system authenticates each user as a patient or doctor based on the provided information.

   
   
   
**2. Certification Verification:**   
   
**Description:**   
   
The certification process ensures that only verified doctors with valid medical certifications can utilize the Personalized Medical Records app. This verification enhances user trust and confidence in the app's medical data management capabilities. It also strengthens respect for ethical principles and legal requirements guiding the use of medical data.

 

* **Function Req.:**

- Doctors are required to submit their medical certification details during the account creation process.

- Upon submission, the app initiates a verification process to authenticate the validity of the provided certification details.

- If the provided certification details are verified successfully, the doctor's account is granted access to the app's features and patient data.

- Clear error messages are displayed if the submitted certification details are incomplete or invalid.

- Within the app, the certification status of each doctor is displayed in their user profile and users can easily identify verified doctors based on their certification status. 

1. **Create medical records:**
   * **Description :**

The objective of this functional requirement is to design and create an Electronic Health Record (EHR) system that efficiently manages patient's medical records. The system should enhance patient care and ensure data accuracy and security.

* + **Functions Req.:**
* The user should be able to create medical records successfully

* System should display many healthcare boxes in each medical record that includes ( prescriptions, medicine taken, doctors visited, x-rays, CT

scans, MRIs, blood pressure readings, hospitals/clinics visited, blood test results,..etc)

* Users should be able to fill the boxes successfully
* The system should provide options to upload and attach supporting documents, such as scanned prescriptions or test results.
* The system should categorize medical records into relevant sections for easy navigation and retrieval.

1. **Update medical records :**
   * **Description:**

The "Update medical record" function within this app allows you to maintain a chronological record of your health information. This includes medications, doctor visits, test results, and diagnoses. By keeping your medical data centralized, you can easily access it for future reference or share it with healthcare providers. This ensures your medical information stays current and up-to-date.

* + **Functions Req. :**
* The user should be able to edit any field in the medical record successfully.
* The vital signs in the medical record should be updated automatically since the user connected the app with a smartwatch has a health sensor.
* The system should save the updated data in the system database automatically.
* Users can review and edit previously entered medical records as needed.

* Alerts or warnings are generated based on the user’s health condition, with clear explanations and recommendations provided.

1. **Browse Medical Records:**

* **Description:**

Users should be able to browse medical records of patients in the system. This includes the ability to delete or edit existing records and search for specific records based on different criteria.

* **Functions Req.:**

* Browse Records:

•Users can view a list of all medical records stored in the system.

•Each record should display essential information such as patient name, date of visit, and brief summary.

•Records should be sortable by date, patient name, or any other relevant criteria.

* Edit Record:

•Users with appropriate permissions can edit existing medical records.

•Editing capabilities should include modifying patient information, medical history, diagnoses, treatments, and any other relevant data.

•Changes made to a record should be logged with timestamp and user information for auditing purposes.

* Delete Record:

    •Authorized users can delete medical records when necessary.

    •Deletion should be irreversible, with appropriate confirmation prompts to prevent accidental deletion.

    •Deleted records should be archived or stored in a separate location for data integrity and compliance reasons.

* Search Records:

•Users can search for specific medical records using various search criteria.

•Search options may include patient name, date range, medical condition, attending physician, or any other relevant parameters.

•The search functionality should provide relevant and accurate results in a timely manner.

1. **Connect the smartwatch to the app:**

* + **Description:**

  After installing the application on the smartwatch, the vital signs of the patient that measured by smartwatch sensors transferred to the application through the smartwatch and filled automatically in the medical record, also it can be updated if there is any change happens

* **Functions Req.:**

* The system should get access to the smartwatch health sensors by installing an application on the smartwatch and giving permission for the application to get smartwatch data.

* The smartwatch should be able to transfer vital signs data successfully to the application.

* the vital signs in medical records such as (blood glucose, heart rate, blood test, etc...) should be filled by the system automatically after retrieving the data from the smartwatch sensor or when the user requests it.

* The system should be able to update the transferred vital signs data if there is a change in the vital signs sensors at any time.

* The user should be able to see his real vital signs on the application via smartphone or smartwatch without any errors.

* he system should store the vital signs data in the application’s database.
* Alerts or warnings are generated and displayed on the watch based on the user’s current vital signs.

1. **Follow-up with Doctors:**

* **Description**: This functionality establishes a communication channel between users (patients) and doctors within the app. It facilitates appointment scheduling, communication, and management. This feature allows users to search for doctors based on criteria, view doctor profiles, schedule appointments, receive confirmations, reschedule/cancel appointments, and choose a communication method for appointments.

* **Function Req.**:
* The system should display a list of the available doctors based on their rates.
* User should be able to give and review feedbacks about the doctors
* Users should be able to search for a specific doctor by his name.
* Users should be able to view Doctor’s profiles qualifications, experience, and patient reviews (if applicable)
* Users can view available appointment slots and schedule appointments directly with doctors.
* Appointment confirmations are sent via email or push notification.

* Users should be able to reschedule or cancel appointments within a defined timeframe.

* Users can select a preferred communication method for their appointments (e.g., video call, phone call, in-person).

1. **Payment for Doctor:**

* **Description:** This functionality enables secure in-app payments for doctor consultations. It integrates a payment processing system for seamless transactions and manages user payment methods. This feature allows users to securely link their payment methods, see consultation fees, pay for consultations (after or before appointments, depending on doctor's policy), receive receipts electronically, and manage their payment methods and transaction history within the app.

* **Function Req. :**

* Users can securely link a valid payment method to their account.

* The system should display Consultation fees clearly before appointment booking.

* Users can pay for consultations securely using the integrated payment system.

* Electronic receipts are automatically generated and sent to users after payment through.

* Users can access and manage their payment methods and transaction history within the app.
* Doctors should receive the money in their accounts successfully.

1. **Contact with Doctor**

* **Description**: This functionality fosters ongoing communication between users and doctors after appointments. It provides a secure messaging platform for exchanging follow-up questions, updates, documents, and prescriptions. This feature allows users and doctors to send and receive secure messages, upload relevant documents to share with each other (e.g., lab results, and prescriptions), view message delivery confirmation,and read receipts.
* **Function Req:**

* Users and doctors can send and receive secure messages through a dedicated messaging interface for patient-doctor communication offered by the app.
* The system should store the messages sent and received on the system database.
* Users can upload relevant documents to share with their doctor.
* Doctors can share documents (e.g., prescriptions) with their patients electronically.
* Message delivery confirmation and read receipts are available.

1. **Docotr get access to medical records:**

* **Description**:

The system shall provide doctors with secure and real-time access to patient medical records. This includes comprehensive information such as patient history, diagnoses, medications, test results, and treatment plans based on their medical records

* **Function Req:**
* The doctor should be able to get access to the patient’s record successfully, so he can view or edit the record without any problem.
* The system should manage and update any changes to the records by doctors during consultations and save them in the patient's records.
* Doctors should be able to report discrepancies or errors in the records.
* Doctors can manage patient prescriptions, including refills and instructions.
* Doctorsshould be able to create or edit personalized treatment plans for patients based on their medical history and current condition.

**2-Non-functional requirements:**

1-**Security :**

* The application system should have robust security measures to safeguard users’s personal,health, and financial information.
* The messages that are sent between users and doctors should be encrypted through “Signal Encryption Protocol.(WhatsApp uses it to encrypt the messages).

**2-Usability:**

* The system interface should be user-friendly for reporting and viewing unsafe road information and accessible for users with disabilities.
* Users should be able to find the desired field in medical records within three clicks from the homepage.
* The medical records must be easily accessible and reached with minimal navigation.
* the error rate of users submitting their payment details mustn’t exceed 10 percent.

**3-performance:**

* The app should respond to user actions and data requests in a timely manner, even under high load.
* The response time under pressure must be less than 3 seconds or less.
* search results of a specific field or doctor should be displayed within 3 seconds for 90% of the searches under normal conditions.
* For real-time data updates, the system should refresh and display updated analytics within 5 seconds of receiving new data.

**4-Reliability:**

* The system should be able to handle and recover from errors without data loss or incorrect data processing.
* The system must perform without failure in 98 percent of use cases during a year.
* All financial transactions should be processed with 100% accuracy, and the system must ensure data integrity at all times.

**5-Integration:**

* The app should have the capability to integrate with any other systems like payment services (pay bill) .

**6- Scalability:**

* The system should have the capability to handle a growing user base and increasing amounts of reported unsafe roads.
* The Application must be scalable enough to support 100,000 visits at the same time while maintaining optimal performance.

**7- portability:**

* The software must be capable of running on multiple operating systems, including Windows, macOS, and Linux, without any modifications.
* The app should be operable and maintain a consistent user experience across various mobile devices and smartwatches.

**8. Availability:**

* The app must perform consistently across different devices and operating systems with a reliability rate of 99%.
* Application services must be available to the users 99.98 percent of the time.

**3-Use case diagram:**

A diagram of a diagram

Description automatically generated with medium confidence

**4-User story:**

* 1. **Patient updates medical record**

**As a patient,** I want to update my medical records with new information or changes to existing data, so that I can maintain an accurate and up-to-date health history for myself and my healthcare providers.

* **Acceptance Criteria:**

**.** The user can access the "Update medical record" function from within the app.

**.** The user can select the specific record they want to update (e.g., medications, vitals, test results).

**.** The app provides a user-friendly interface for entering or modifying health data.

**.** The user can review and confirm the updated information before saving it.

**.** The app successfully saves the updated data to the patient's medical record.

**.** The app displays a confirmation message upon successful update.

**.** The updated information is reflected in the patient's medical record.

* 1. **doctor view patient medical record:**

**As a doctor,** I want to securely access and view a patient's medical records with their explicit consent, so I can effectively diagnose and treat their condition, reducing the need for repetitive questioning and expediting the treatment process.

* **Acceptance Criteria:**

**.** Authorization: The doctor can only access a patient's medical record after obtaining the patient's informed consent through the app.

**.** Authentication: The app requires the doctor to log in with secure two-factor authentication before accessing any patient records.

**.** Authorization Levels: The system implements role-based access control, ensuring doctors can only view records for patients they are authorized to treat.

**.** Record Access: The doctor can view various sections of the patient's medical record, including medications, allergies, past procedures, and lab results.

**.** Data Visibility: The doctor can see a clear and concise record of the patient's medical history, including the date and time each entry was added or updated.

**.** Privacy Controls: The doctor can only view the patient's medical record and cannot modify any information.

**.** Audit Log: The system maintains an audit log that tracks every access to a patient's medical record, including the doctor's name, date, and time of access**.**

* 1. **Browse**

**As a user,** I should be able to browse and navigate through the app easily, so I can create a medical records or search ,modify , delete specific record in the medical record

Or search for a specific doctor.

* **Acceptance Criteria:**

* Browse Records:

•Users can navigate through a paginated list of medical records.

•Records are displayed with accurate and up-to-date information.

•Sorting options work as expected, and records are displayed in the selected order.

* Edit Record:

• Users with edit permissions can modify existing medical records.

• Changes made to a record are reflected accurately and saved securely.

• Audit logs capture all edits with timestamps and user details.

* Delete Record:

•Authorized users can delete records, and the process requires confirmation to prevent accidental deletions.

•Deleted records are permanently removed from the active record list and properly archived.

* Search Records:

•The search functionality returns relevant results matching the specified criteria.

•Search results are displayed in a clear and organized manner, allowing users to quickly locate the desired records.

•Searches perform efficiently, even with large datasets, ensuring a smooth user experience.

* 1. **. Certification Verification:**

**As a doctor**, I should easily provide my certification and medical license, so I can get authenticated as a “Doctor” and get access to the patient's medical records

**Acceptance Criteria:**

* Doctors need to provide their certification details during sign-up, like certification number and expiration date.
* The app then checks these details to ensure they're up-to-date.
* Verified doctors can access the app and patient data, while those whose certifications aren't verified will have limited access until they update their certification.
* If there are any issues with the certification details provided, the app displays clear messages to guide doctors in correcting them. Additionally, each doctor's certification status is clearly displayed in their profile, promoting transparency.
* Periodic reminders are sent to doctors to update their certification when necessary, ensuring compliance with certification requirements over time.

* 1. **Registration and authenticate:**
* **As a patient,** I want to sign up for the application and authenticate as a patient and save my username and password so, every time I get to the app only sign in as patient to the app easily. And views the interface that is designed for patients
* **As a Doctor ,** I want to sign up for the application and authenticate as a doctor and save my username and password so, every time I get to the app only sign in as docotr to the app easily. And views the interface that is designed for doctors

**Acceptance Criteria:**

* Users whether patients or doctors are required to provide essential information such as their name, email, and password during registration.
* Depending on their role, patients have the option to include additional details like date of birth, gender, and medical history, while doctors must input their medical license number and specialty.
* email verification is mandatory to ensure the validity of the provided email address and activate the user's account securely.
* All user data is encrypted to safeguard privacy during transmission and storage.
* The registration process includes error handling mechanisms, such as clear error messages for missing mandatory fields and guidance for password strength.
* The registration experience aims to be user-friendly, with intuitive instructions, options for reviewing and editing information, and a confirmation message upon successful registration.
* Upon registration, the system authenticates each user, distinguishing between patients and doctors based on provided information.
* Authentication for doctors involves validation of their medical license number.
* Access levels and available functionalities within the app are then assigned accordingly.